

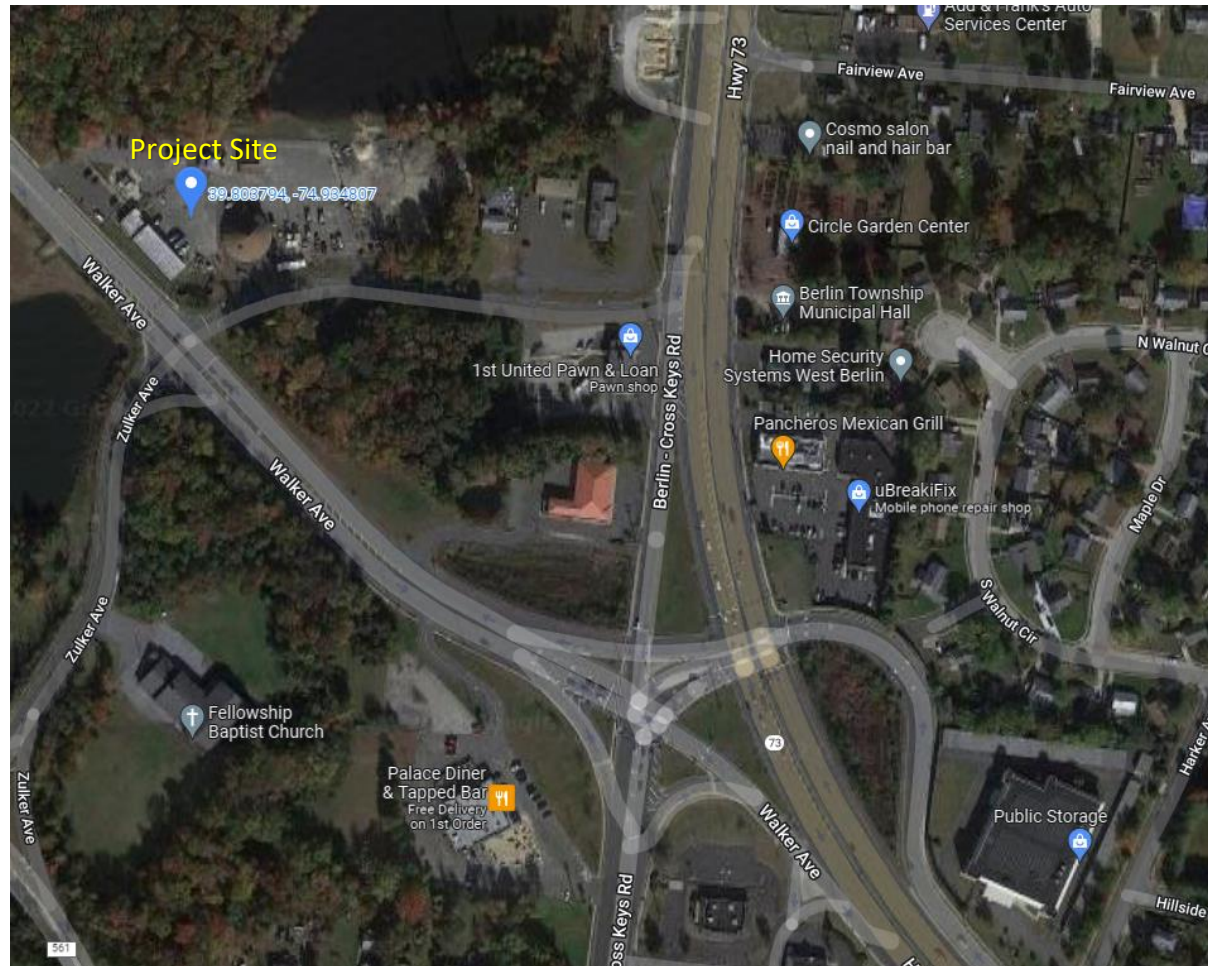
MANDATORY PRE-BID MEETING

PROJECT #	T0617-00
LOCATION	NJDOT West Berlin Maintenance Yard 50 Walker Avenue West Berlin, New Jersey 08091
DATE	November 19, 2024
TIME	10:00 A.M.
CONTACT PERSON	Babatunde Ogunnubi
PHONE #	Office #: 609-633-7061 Cell #: 609-575-4972
MEETING LOCATION	Maintenance Building Entrance NJDOT West Berlin Maintenance Yard 50 Walker Avenue West Berlin, New Jersey 08091 GPS Coordinates (39.803952, -74.934816)

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 Conference. 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 Conference. 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 contractors bid from being accepted.

PROJECT: T0617-00 Material Storage Bin Installation
LOCATION: NJDOT West Berlin Maintenance Yard
50 Walker Avenue
West Berlin, New Jersey 08091
GPS Coordinates (39.803952, -74.934816)



ROAD DIRECTIONS TO NJDOT West Berlin Maintenance Yard

Via HWY NJ-73 S

- Head south on NJ-73 S, Slight right onto Berlin - Cross Keys Rd/Berlin Kresson Rd, Turn right onto Walker Ave to destination

Via HWY NJ-73 N

- Head northwest on NJ-73 N toward E Taunton Ave, Slight right, Keep right to continue on Walker Ave to destination

SPECIFICATIONS

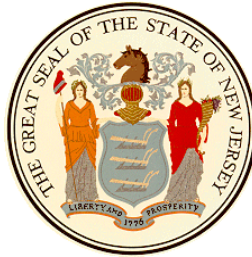
**Material Storage Bin Installation
West Berlin Maintenance Yard
West Berlin, N.J.**

PROJECT NO. T0617-00

STATE OF NEW JERSEY

Honorable Philip D. Murphy, Governor

Honorable Sheila Y Oliver, Lieutenant Governor



DEPARTMENT OF THE TREASURY

Elizabeth Maher Muoio, State Treasurer

DIVISION OF PROPERTY MANAGEMENT AND CONSTRUCTION

Christopher Chianese, Director

DEPARTMENT OF TRANSPORTATION

Francis K. O'Connor, Commissioner

STONEWATER ARCHITECTURE, LLC

P.O. Box 208
Colonia, NJ 07067

January 25, 2024

LIST OF DRAWINGS

T001.00 TITLE SHEET

CIVIL ENGINEERING DRAWINGS

C001.00 EXISTING CONDITIONS PLAN, NOTES & LEGEND
C002.00 SOIL EROSION & SEDIMENT CONTROL PLAN, NOTES & DETAILS
C003.00 SITE DEMOLITION PLAN
C004.00 SITE CONSTRUCTION PLAN
C005.00 SITE ENVIRONMENTAL PLAN
C006.00 GRADING PLAN
C007.00 SITE LIGHTING PLAN
C008.00 CONSTRUCTION DETAILS
C009.00 CONSTRUCTION DETAILS

FHA PLANS

FWW-01 PRE-2015 FHA EXISTING CONDITIONS PLAN
FWW-02 RIPARIAN RESTORATION PLAN

ARCHITECTURAL DRAWINGS

A021.00 EXISTING STORAGE BIN REMOVAL PLAN
A022.00 EXISTING STORAGE BIN REMOVAL ELEVATIONS
A031.00 CHAIN LINK GATE AND GATE DETAILS
A032.00 CHAIN LINK FENCE & DETAILS
A101.00 STORAGE BIN SLAB PLAN
A102.00 STORAGE BIN FIRST FLOOR & ROOF PLANS
A201.00 STORAGE BIN ELEVATIONS
A202.00 STORAGE BIN CROSS SECTIONS
A203.00 STORAGE BIN SECTION

STRUCTURAL DRAWINGS

S001.00 NOTES & SPECIFICATIONS
S002.00 NOTES & SPECIFICATIONS
S003.00 SPECIAL INSPECTION NOTES
S101.00 FOUNDATION PLAN
S102.00 ROOF FRAMING PLAN
S103.00 DETAILS
S104.00 DETAILS
S105.00 DETAILS

ELECTRICAL DRAWINGS

E001.00 ELECTRICAL OVERVIEW SHEET
E002.00 ELECTRICAL SITE PLAN
E101.00 ELECTRICAL PLANS AND DETAILS
E201.00 ONE LINE DIAGRAM

T0617-00
Material Storage Bin Installation
DOT Maintenance Yard, West Berlin, N.J.

DOCUMENT 000107 - SEALS PAGE

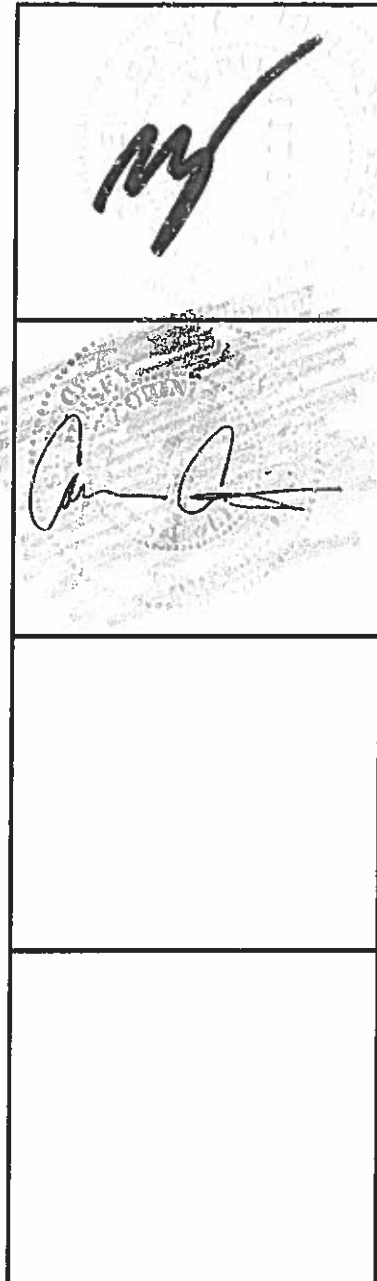
I.1 DESIGN PROFESSIONALS OF RECORD

ARCHITECT Michael A. Moritz AIA
Principal Architect
NJ License # 21A1017266
STONEWATER Architecture, LLC
P.O. Box 208 | Colonia | NJ 07067
908-380-2496
www.stonewaterarchitecture.com

CIVIL ENGINEER Cameron Corini, PE
NJ License #24GE05403500
ROBERTS ENGINEERING GROUP LLC
1670 Whitehorse-Hamilton Square Road
Hamilton, NJ 08690
609-586-1141
www.RobertsEngineeringGroup.com

STRUCTURAL ENGINEER STRUCTURAL WORKSHOP

ELECTRICAL ENGINEER WHITMAN ENGINEERING



DOCUMENT 000107 - SEALS PAGE

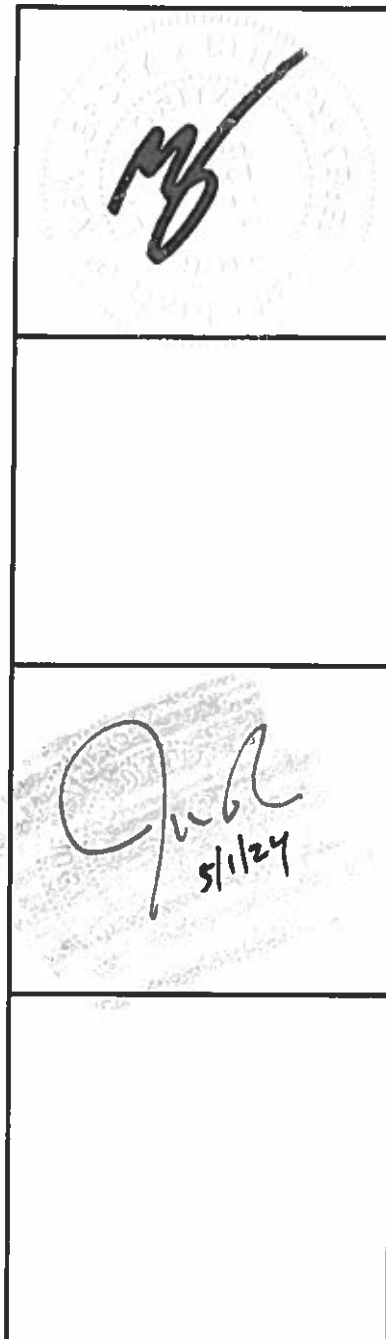
1.1 DESIGN PROFESSIONALS OF RECORD

ARCHITECT Michael A. Moritz AIA
Principal Architect
NJ License # 21AI017266
STONEWATER Architecture, LLC
P.O. Box 208 | Colonia | NJ 07067
908-380-2496
www.stonewaterarchitecture.com

CIVIL ROBERTS ENGINEERING GROUP LLC
ENGINEER

STRUCTURAL STRUCTURAL WORKSHOP
ENGINEER

ELECTRICAL WHITMAN ENGINEERING
ENGINEER



DOCUMENT 000107 - SEALS PAGE

1.1 DESIGN PROFESSIONALS OF RECORD

ARCHITECT	Michael A. Moritz AIA Principal Architect NJ License # 21AI017266 STONEWATER Architecture, LLC P.O. Box 208 Colonia NJ 07067 908-380-2496 www.stonewaterarchitecture.com
CIVIL ENGINEER	ROBERTS ENGINEERING GROUP LLC
STRUCTURAL ENGINEER	STRUCTURAL WORKSHOP
ELECTRICAL ENGINEER	WHITMAN ENGINEERING Jeffrey Thoens, PE, LEED AP BD+C Director of Engineering NJ PE Lic. # 24GE04929100 Whitman 100 Franklin Square Drive, Suite 200 Somerset, NJ 08873 732-390-5858 www.whitmanco.com

 5/1/24

SPECIFICATIONS:
TABLE OF CONTENTS

INSTRUCTIONS TO BIDDERS AND GENERAL CONDITIONS
Final Revision December 2015

TECHNICAL SPECIFICATIONS

DIVISION 01:	SUPPLEMENTARY CONDITIONS
000000	T0617-00 - Spec Cover &TOC
001000	SPECIFICATIONS FORMAT
005000	GENERAL CONDITIONS FINAL REVISED 12 2015
011000	SUMMARY
013100	PROJECT MANAGEMENT AND COORDINATION
013200	CONSTRUCTION PROGRESS DOCUMENTATION
013233	PHOTOGRAPHIC DOCUMENTATION
013300	SUBMITTAL PROCEDURES
014000	QUALITY REQUIREMENTS
015000	TEMPORARY FACILITIES AND CONTROLS
017700	CLOSEOUT PROCEDURES
DIVISION 02:	EXISTING CONDITIONS
024119	SELECTIVE DEMOLITION
028300	TREATMENT OF LEAD IN CONSTRUCTION
028300a	NOTICE OF FINDINGS - NO ACM
028300b	HAZARDOUS MATERIALS REPORT
DIVISION 03:	CONCRETE
033000	CAST-IN-PLACE CONCRETE
DIVISION 04:	MASONRY
NOT USED	
DIVISION 05:	METALS
051200	STRUCTURAL STEEL
053000 –	STEEL DECK
054000	COLD-FORMED METAL FRAMING
DIVISION 06:	WOOD, PLASTICS, & COMPOSITES
NOT USED	
DIVISION 07:	THERMAL AND MOISTURE PROTECTION
074213	METAL WALL AND ROOF PANELS
DIVISION 9:	FINISHES
099113	PAINTING
DIVISION 10:	SPECIALTIES
101453	TRAFFIC SIGNAGE

107516	GROUND-SET FLAGPOLES
DIVISION 26:	ELECTRICAL
260519	LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
260526	GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
260529	HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
260533	RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS
260544	SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING
260553	IDENTIFICATION FOR ELECTRICAL SYSTEMS
262416	PANELBOARDS
262726	WIRING DEVICES
262816	ENCLOSED SWITCHES AND CIRCUIT BREAKERS
263213	PACKAGED ENGINE GENERATOR SYSTEMS
263600	TRANSFER SWITCHES
265613-	LIGHTING POLES AND STANDARDS
DIVISION 27:	COMMUNICATIONS
NOT USED	
DIVISION 28:	ELECTRONICS SAFETY AND SECURITY
NOT USED	
DIVISION 31:	EARTHWORK
311200	SELECTIVE CLEARING
311413	SOIL STRIPPING AND STOCKPILING
312000-	EARTHMOVING, ENVIRONMENTAL
312000a-	ENVIRONMENTAL INVESTIGATION REPORT
312316	EXCAVATION
312514	STABILIZATION MEASURES FOR EROSION AND SEDIMENTATION CONTROL
DIVISION 32:	EXTERIOR IMPROVEMENTS
320116.71	COLD MILLING ASPHALT PAVING
321116.16	AGGREGATE SUBBASE COURSES
321213	PREPARATORY COATS
321216	ASPHALT PAVING
321613	CURBS AND GUTTERS
321623	SIDEWALKS
321713	PARKING BUMPERS
321723	PAVEMENT MARKINGS
329119.13	TOPSOIL PLACEMENT AND GRADING
329219	SEEDING
DIVISION 33:	UTILITIES
334223 -	HEADWALLS AND ENDWALLS FOR STORMWATER PIPING
334241-	GRATINGS AND FRAMES FOR STORMWATER DRAINAGE INLETS
DIVISION 34:	TRANSPORTATION
347113.26	VEHICLE GUIDE RAILS

DIVISION 35: WATERWAY AND MARINE CONSTRUCTION
350150.71 CHANNEL EXCAVATION, CLEANING AND DEEPENING

DIVISION 40: PROCESS INTEGRATION
NOT USED.

DIVISION 41: MATERIAL PROCESSING AND HANDLING EQUIPMENT
NOT USED.

DIVISION 42: PROCESS HEATING, COOLING, AND DRYING EQUIPMENT
NOT USED.

DIVISION 43: PROCESS GAS AND LIQUID HANDLING, PURIFICATION, AND STORAGE EQUIPMENT
NOT USED.

DIVISION 44: POLLUTION CONTROL EQUIPMENT
NOT USED.

DIVISION 45: INDUSTRY – SPECIFIC MANUFACTURING EQUIPMENT
NOT USED.

DIVISION 48: ELECTRICAL POWER GENERATION
NOT USED.

END OF TECHNICAL SPECIFICATION TABLE

GEOTECHNICAL REPORT:
REPORT OF SUBSURFACE EXPLORATION

DOCUMENT 01000 - SPECIFICATIONS FORMAT

PART 1 – GENERAL

1.01 FORMAT

- A. These Specifications generally follow the Construction Specifications Institute format:

Divisions
Sections
Articles
Paragraphs
Subparagraphs

- B. Generally, each Section, except for Division 1 Sections, is divided into three (3) parts:

Part 1 - General
Part 2 - Products
Part 3 - Execution

Note: Certain Sections may contain a "Part 4 - Schedules".

1.02 LANGUAGE

- A. The Specifications language is written using both indicative mood and imperative mood.

Where the imperative mood is used, the language is directed to the Contractor, unless specifically indicated otherwise.

- B. Where a colon (:) is used after a subject, the phrase "shall be" (or variations thereof) is to be inferred.

- C. Instruction Terms

Wherever reference is made in the Contract to the Work or its performance, the terms "directed", "required", "permitted", "ordered", "designated", "prescribed", and words of similar import shall imply the direction, requirement, permission, order, designation or prescription of the Authority.

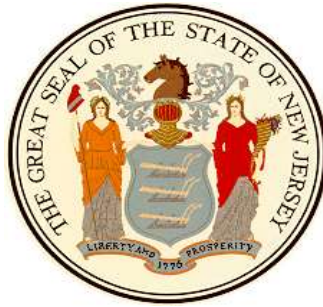
- D. Approval and Acceptance Terms

"Approved", "acceptable" "satisfactory" and words of similar import shall mean and intend approved by, acceptable to, or satisfactory to, the Authority.

- E. Where the word "provide" is used, the meaning shall be that the item or product shall be furnished, delivered, and installed/erected/applied/connected for its intended use and as required for the completed Work.

END OF SECTION

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



REVISED
DECEMBER 2015

INSTRUCTIONS TO BIDDERS
AND
GENERAL CONDITIONS

TABLE OF CONTENTS

INSTRUCTIONS TO BIDDERS

IB 1 Bid Proposals	5
IB 2 Bid Modification.....	7
IB 3 Consideration of Bid	7
IB 4 Awards	8
IB 5 Qualification of Bidders.....	8
IB 6 Deposit and Bid Bond.....	9
IB 7 Performance and Payment Bond.....	10
IB 8 Bulletins and Interpretations	11
IB 9 Assignments.....	11
IB 10 Federal Excise Taxes and State Sales Tax	11
IB 11 Restrictive Specifications.....	12
IB 12 Offer of Gratuities.....	12

GENERAL CONDITIONS

ARTICLE 1 - GENERAL PROVISIONS	15
1.1 Definitions.....	16
1.2 Contract Documents to be provided by DPMC	17
1.3 Intent of the Contract	17
1.4 Workdays	19
1.5 Assignments.....	19
1.6 State Sales Tax.....	19
ARTICLE 2 - OWNER/DPMC	20
2.1 DPMC's Representation	20
2.2 Right to Perform Work	19
2.3 Means and Methods	19
ARTICLE 3 - Architect/Engineer.....	20
3.1 Duties and Responsibilities.....	21
3.2 Progress Meetings	21
3.3 Site Observations	21
3.4 Shop Drawings and Submittals and Invoices.....	21
3.5 Payment Approvals.....	21
ARTICLE 4 - THE CONTRACTOR	22
4.1 Review of the Contract Documents and Field Conditions.....	22
4.2 Insurance	23
4.3 Permits, Laws, and Regulations.....	23
4.4 Responsibility for the Work.....	24
4.5 Indemnification	25
4.6 Supervision	25
4.7 Shop Drawings and Other Submittals.....	26
4.8 As-Built Drawings	29
4.9 Excavations, Cutting and Patching	30
4.10 Testing.....	30

4.11	Equipment and Materials	31
4.12	Temporary Facilities	32
4.13	Storage and Site Maintenance.....	37
4.14	Cut-overs and interruptions.....	39
4.15	Protection/Safety.....	39
4.16	Uncovering and Correction of Work	40
4.17	Layout and Dimensional Control.....	42
4.18	Project Sign.....	42
4.19	Security	42
4.20	DPMC Field Office.....	43
4.21	Photographs.....	43
4.22	Repair of Finished Surfaces, Applied Finishes, Glass.....	43
ARTICLE 5 - SUBCONTRACTORS		44
5.1	Subcontractors and Material Supplier Approvals	44
5.2	Contractor-Subcontractor Relationship	44
ARTICLE 6 - CONSTRUCTION PROGRESS SCHEDULE		46
6.1	General.....	46
6.2	Construction Progress Schedule (Critical Path Method -- CPM Consultant Retained by the State)	46
6.3	Construction Progress Scheduling Provided by the Contractor.....	55
ARTICLE 7 - CONTRACT DURATION/TIME OF COMPLETION		58
7.1	Contract Duration/Notice to Proceed.....	58
7.2	Substantial Completion.....	58
7.3	Final Completion	58
7.4	Partial Occupancy for Use	59
7.5	Delay, Disruption and Interference.....	59
ARTICLE 8 - CLOSE-OUT		62
8.1	Close-out Procedures/Final Payment	62
8.2	Operations, Equipment and Maintenance Manuals	62
8.3	Training.....	62
8.4	Guarantee	63
ARTICLE 9 - PAYMENTS.....		64
9.1	Invoices	64
9.2	Interest.....	64
9.3	Schedule of Values and Final Payment	65
9.4	Certification of Payments to Subcontractor.....	67
9.5	Stored Materials.....	67
9.6	Allowances.....	67
9.7	Retainage.....	67
9.8	Miscellaneous	68
ARTICLE 10 - CHANGES IN THE WORK		70
10.1	Changes in the Work.....	70
10.2	Acceleration	72
ARTICLE 11 - CLAIMS AND DISPUTES		73
11.1	Contractor Claims	72
11.2	Mutual Rights and Responsibilities of All Contractors and the A/E	72

ARTICLE 12 - TERMINATION/SUSPENSION	74
12.1 Suspension of the Work / Stop Work	74
12.2 Termination for Cause	74
12.3 Owner's Right to Complete the Work.....	74
12.4 Termination for Convenience	75
ARTICLE 13 - OTHER REQUIREMENTS	77
13.1 Prevailing Wage.....	77
13.2 Patents	78
13.3 Right to Audit	78
13.4 Insurance	79
13.5 Assignment of Antitrust Claims.....	83
END, GENERAL CONDITIONS	83

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, NJSA 52:35-1, *et seq.*. In the case of a single bid for all of the work, the bidder shall include in the bid the names of its principal subcontractors (in categories as listed in IB1.2 above), which must also be classified in accordance with the said statute.

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

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

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

IB 6 Deposit and Bid Bond

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

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

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

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

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

IB 7 Performance and Payment Bond

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

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

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

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

IB 8 Bulletins and Interpretations

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

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

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

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

IB 9 Assignments

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

IB 10 Federal Excise Taxes and State Sales Tax

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

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

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

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

IB 11 Restrictive Specifications

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

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

IB 12 Offer of Gratuities

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

- a. No vendor shall pay, offer to pay, or agree to pay, either directly or indirectly, any fee, commission, compensation, gift, gratuity, or other thing of value of any kind to any State officer or employee or special State officer or employee, as defined by NJSA 52:34D-13b. and e., in the Department of Treasury or any other agency with which such vendor transacts or offers or proposes to transact business, or to any member of the immediate family, as defined by NJSA 52:13D-13i., of any such officer or employee, or any partnership, firm, or corporation with which they are employed or associated, or in which such officer or employee has an interest within the meaning of NJSA 52:13D-13g.
- b. The solicitation of any fee, commission, compensation, gift, gratuity or other thing of value by any State officer or employee or special State officer or employee from any State vendor shall be reported in writing forthwith by the vendor to the Attorney General and the Executive Commission on Ethical Standards.
- c. No vendor may, directly or indirectly, undertake any private business, commercial or entrepreneurial relationship with, whether or not pursuant to employment, contract or other agreement, express or implied, or sell any interest in such vendor to, any State officer or employee or special State officer or employee having any duties or responsibilities in connection with the purchase, acquisition or sale of any property or services by or to any State agency or any instrumentality thereof, or with any person, firm or entity with which he is employed or associated or in which he has an interest within the meaning of NJSA 52:13D-13g. Any relationships subject to this provision shall be reported in writing forthwith to the Executive Commission on Ethical Standards, which may grant a waiver of this restriction upon application of the State officer 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 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 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

Intentionally Blank Page

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Phased construction.
4. Work by Owner.
5. Work under separate contracts.
6. Future work.
7. Access to site.
8. Coordination with occupants.
9. Work restrictions.
10. Specification and drawing conventions.
11. Miscellaneous provisions.

- B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

- A. Project Identification: T0617-00 Material Storage Bin Installation
- B. Project Location: DOT Maintenance Yard, 50 Walker Ave., West Berlin, N.J.
- C. Owner: State of New Jersey, Department of Transportation.
 - 1. Owner's Representative: Jitendra Patel.
- D. Architect: Architect:
Stonewater Architecture, LLC
P.O. Box 208
Colonia NJ, 07067

Material Storage Bin Installation

DOT Maintenance Yard, West Berlin, N.J.

- E. Architect's Consultants: The Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:
1. Electrical Engineering, Energy, Waste, Management, EH&S Compliance:
 - a. Whitman - 100 Franklin Square Drive, Suite 200 Somerset, NJ 08873
 2. Civil & Site Engineers:
 - a. Roberts Engineering Group, LLC, 1670 Whitehorse-Hamilton Square Rd., Hamilton, New Jersey 08690
 3. Consultant/Environmental
 - a. The Catalyst Group, 100 Overlook Center, 2nd Floor Princeton, New Jersey 08540
 4. Asbestos and Lead:
 - a. USA Environmental Management, Inc., 344 West State Street, Trenton, New Jersey 08618
- F. DPMC Web Site: The DPMC Web site administered by Owner will be used for purposes of obtaining NJ State payment and certification documents, forms and communication transmittals and documents during the construction stage.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:
1. Scope of Work
 - a. Restoration of the historical waterway stream.
 - 1) Excavation and removal of existing culvert pipe.
 - 2) Installation of new headwalls, new culvert pipe & appurtenances.
 - 3) Include dewatering in earthwork specification.
 - 4) Re-establishment of historical streambed.
 - 5) Installing stream bank fills at indicated grades.
 - 6) Landscaping including grading, membranes and plantings indicated on drawings.
 - b. Removal of Existing Materials storage Building
 - 1) Site contamination remediation
 - 2) Include dewatering in earthwork specification.
 - 3) Include Support of Excavation notes and requirements in all earthwork and excavation specifications.
 - c. New Materials Storage Building
 - 1) Include dewatering in earthwork specification.
 - 2) Include Support of Excavation notes and requirements in all earthwork and excavation specifications.
 - 3) Concrete Foundations and Bin Walls
 - 4) Steel Frame and prefinished wall and roof panels
 - 5) New Bin Electrical Lighting and Power

Material Storage Bin Installation

DOT Maintenance Yard, West Berlin, N.J.

- d. Site Work:
 - 1) Removal of existing Pavement & Curbs
 - 2) Reconfigure existing parking areas.
 - 3) Milling and resurfacing existing asphalt areas indicated
 - 4) Removal of Fencing
 - 5) Trenching & Backfilling
 - 6) Power Wiring, Conduit & Junction Boxes
 - 7) New Paving, Curbing, Precast Wheel Stops and Pavement Striping
 - 8) Light Poles and light Fixtures
 - 9) New Landscaping
 - 10) Highway style barriers.
 - 11) New Fencing and Gates
 - 12) All electrical switches and outlets to be mounted above 500-year flood elevation.
 - e. New Flagpoles with permanent Lighting
 - f. Parking expansion & paving outside Gates including 2 Accessible spaces in front.
 - g. Provide Truck Block Heaters at Storage building Bays and new truck parking Spots.
 - h. New emergency generator
 - 1) Diesel Powered with 48-hour fuel storage capacity.
 - 2) Located in the Admin Office Building.
 - 3) Generator to be specified as "Quiet."
 - 4) Building entry improvements
 - i. Certifications and Inspections of Work
 - 1) All Independent, code required and/or certified inspection for any and all code required certifications for any work required or included in this contract shall be performed by an agency approved by the Architect and DPMC and paid for by the contractor and shall be deemed to have been included in the Bid Proposal.
 - 2) No inspection fees shall be paid directly by the Owner. All such fees shall be assumed to have been included in the construction bid price and paid directly to the approved agency by the contractor.
2. Project will be constructed under a single prime contract.

1.5 WORK BY OWNER

A. General:

- 1. The site is an active 24 hour a day 7 day a week DOT Highway Maintenance Yard.
 - a. All construction activities on the site shall be subordinate to DOT requirements
 - b. The DOT will notify the Contractor in cases of weather or traffic emergency response operations.

2. Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate all of the Work of this Contract with work performed by Owner.

- B. Concurrent Work: Owner will continue to perform highway maintenance operations at Project site. Those operations will be conducted simultaneously with work under this Contract.

1.6 WORK UNDER SEPARATE CONTRACTS

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

1.7 FUTURE WORK

1.8 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 Do not disturb portions of Project site beyond areas in which the Work is indicated.
 1. Limits: Confine construction operations to a maximum of 25% of the contract area at any one time to allow concurrent use by owner. Notify the Owner a minimum of 2 weeks before disturbing a new site area.
 2. Limits: Limit site disturbance, including earthwork and clearing of vegetation, to that required or staging areas.
 3. Driveways, Walkways and Entrances: Keep driveways 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.

1.9 COORDINATION WITH OCCUPANTS

- A. Full Owner Occupancy: Owner will occupy existing 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.
- B. Partial Owner Occupancy: Owner will occupy the site during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.
1. Maintain access to existing driveways, parking areas and other site areas and adjacent occupied or used facilities. Do not close or obstruct driveways sidewalks or paved areas or other used facilities without written permission from Owner and authorities having jurisdiction.
 2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.
- C. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
 2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
 3. Before limited Owner occupancy, electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain electrical systems serving occupied portions of Work.
 4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.10 WORK RESTRICTIONS

- A. 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.
- B. On-Site Work Hours: Limit work in the existing building to normal business working hours of DOT Facility, Monday through Friday, unless otherwise indicated.
1. Weekend Hours: With Owner approval 72 hours in advance.

2. Hours for Utility Shutdowns: Utilities shall not be interrupted at any time without facility approval 72 hours in advance of shutdowns. Shutdowns of more than 4 hours will not be permitted.
 3. Temporary utilities for scheduled or unscheduled utility service interruptions of 4 hours or longer caused by or required for contract work shall be provided by the contractor at no cost to the Owner.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
1. Notify Architect, DPMC Project Manager and facility supervisor not less than two days in advance of proposed utility interruptions.
 2. Obtain DPMC Project Manager and DOT Site Supervisor's written permission before proceeding with utility interruptions.
- 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 Architect, DPMC Project Manager and facility supervisor not less than two days in advance of proposed disruptive operations.
 2. Obtain DPMC Project Manager and DOT Site Supervisor's written permission before proceeding with disruptive operations.
- E. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet (8 m) of entrances, operable windows, or outdoor-air intakes.
- F. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.
- G. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.
- H. Employee Screening: Comply with Owner's requirements for Contractor personnel working on Project site.
1. Maintain list of approved screened personnel with Owner's representative.

1.11 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
 - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 - 2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.
 - 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

Intentionally Blank Page

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

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 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. Requests for Information (RFIs).
 - 4. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Requirements:
 - 1. "General Conditions" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 2. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
 - 3. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

- A. RFI: Request from Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.

- B. Key Personnel Names: Within 15 days of kick off meeting, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
 - 1. Post copies of list in project meeting room, in temporary field office. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with the DOT Site Supervisor to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's construction schedule.
 - 2. Preparation of the schedule of values.
 - 3. Installation and removal of temporary facilities and controls.
 - 4. Delivery and processing of submittals.
 - 5. Progress meetings.
 - 6. Project closeout activities.

1.6 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is

required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - c. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work..
2. Electrical Work: Show the following:
 - a. Runs of all buried conduit and junction boxes.
 - b. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
 - c. Location of pull boxes and junction boxes
3. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."

1.7 REQUESTS FOR INFORMATION OR INTERPRETATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
 1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 1. Project number and name.
 2. Date.

3. Name of Contractor.
 4. RFI number, numbered sequentially.
 5. RFI subject.
 6. Specification Section number and title and related paragraphs, as appropriate.
 7. Drawing number and detail references, as appropriate.
 8. Field dimensions and conditions, as appropriate.
 9. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 10. Contractor's signature.
 11. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: DPMC RFI Form.
1. Hard Copy Delivered by hand or
 2. Email Attachments as electronic files in Adobe Acrobat PDF format.
- D. Architect's and Construction Manager's Action: Architect and Construction Manager will review each RFI, determine action required, and return it. Allow seven working days for Architect's response for each RFI. RFIs received after 12:01 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
 3. Architect's action on RFIs that may result in a change to the Contract Time, or the Contract Sum may be eligible for Contractor to submit a Change Proposal according to the "General Conditions."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect and Construction Manager in writing within 10 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log monthly. Include the following:

1. Project name.
 2. Name and address of Contractor.
 3. RFI number including RFIs that were returned without action or withdrawn.
 4. RFI description.
 5. Date the RFI was submitted.
 6. Date Architect's and Construction Project Manager's response was received.
- F. On receipt of Architect's and Construction Manager's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect and Construction Manager within seven days if Contractor disagrees with response.

1.8 PROJECT MEETINGS

- A. Preconstruction Conference: A preconstruction conference will be scheduled before starting construction, at a time convenient to Owner, Construction Manager, and Architect, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting.
 2. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Procedures for processing field decisions and Change Orders.
 - f. Procedures for RFIs.
 - g. Procedures for testing and inspecting.
 - h. Procedures for processing Applications for Payment.
 - i. Distribution of the Contract Documents.
 - j. Submittal procedures.
 - k. Preparation of record documents.
 - l. Use of the premises.
 - m. Work restrictions.
 - n. Working hours.
 - o. Owner's occupancy requirements.
 - p. Responsibility for temporary facilities and controls.
 - q. Procedures for moisture and mold control.
 - r. Procedures for disruptions and shutdowns.
 - s. Construction waste management and recycling.
 - t. Parking availability.
 - u. Office, work, and storage areas.
 - v. Equipment deliveries and priorities.
 - w. First aid.
 - x. Security.

- y. Progress cleaning.
 - z. Provide additional topics for the meeting agenda to Architect 48 hours before the meeting.
 - 4. Minutes: Distribute the meeting minutes to everyone concerned, including all affected subcontractors.
 - 5. Review responsibilities and personnel assignments.
 - 6. Minutes: Architect will record and distribute meeting minutes.
- B. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, DPMC Project Construction Manager, and DOT Site Supervisor of all scheduled meeting dates.
 - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility requirements.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written instructions.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - q. Temporary facilities and controls.
 - r. Space and access limitations.
 - s. Regulations of authorities having jurisdiction.
 - t. Testing and inspecting requirements.
 - u. Installation procedures.
 - v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.
 - y. Protection of construction and personnel.
 - 3. Contractor shall record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.

4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- C. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 30 days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of record documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Submittal of written warranties.
 - d. Requirements for preparing operations and maintenance data.
 - e. Requirements for delivery of material samples, attic stock, and spare parts.
 - f. Requirements for demonstration and training.
 - g. Preparation of Contractor's punch list.
 - h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - i. Submittal procedures.
 - j. Responsibility for removing temporary facilities and controls.
 4. Minutes: Architect will record and distribute meeting minutes.
- D. Progress Meetings: Architect and DPMC Construction Project Manager will conduct progress meetings at biweekly intervals.
1. Coordinate dates of meetings with preparation of payment requests.
 2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction

behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

- 1) Review schedule for next period.
- b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Progress cleaning.
 - 10) Quality and work standards.
 - 11) Status of correction of deficient items.
 - 12) Field observations.
 - 13) Status of RFIs.
 - 14) Status of proposal requests.
 - 15) Pending changes.
 - 16) Status of Change Orders.
 - 17) Pending claims and disputes.
 - 18) Documentation of information for payment requests.
4. Minutes: Architect will record and distribute the meeting minutes to each party present and to parties requiring information.
 - a. Schedule Updating: Architect shall revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

**REQUEST
FOR
INFORMATION**

Project # _____

RFI # _____

Request Date: _____

Requestor: _____

SUBMIT A SEPARATE RFI FOR EACH ITEM NEEDING ACTION

I. REQUEST

REQUESTOR'S SIGNATURE : _____

II. RESPONSIBILITY

THIS SECTION TO BE COMPLETED BY A/E.

ACTION
PERSON (S): _____

ACTION NLT DATE: _____

III. RESPONSE

ACTION PERSON SIGNATURE: _____ DATE _____

NJ STATE PM SIGNATURE: _____ DATE _____

Intentionally Blank Page

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

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 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Contractor's construction schedule.
 - 2. Daily construction reports.
- B. Related Requirements:
 - 1. Section 013300 "Submittal Procedures" for submitting schedules and reports.
 - 2. Section 014000 "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by the Architect.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.

- F. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
 - 1. Working electronic copy of schedule file, where indicated.
 - 2. PDF electronic file.
- B. Construction Schedule Updating Reports: Submit with Applications for Payment.
- C. Daily Construction Reports: Submit at monthly intervals.
- D. Special Reports: Submit at time of unusual event.

1.5 COORDINATION

- A. Coordinate Contractor's construction schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from entities involved.
 - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each task and work area as a separate numbered activity for each main element of the Work. Comply with the following:
 - 1. Activity Duration: Define activities so no activity is longer than 21 days, unless specifically allowed by Architect.
 - 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - a. Steel.

- b. Emergency Generator
 - c. Light Poles and Fixtures
 - 3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
 - 4. Substantial Completion: Indicate completion in advance of date established for Substantial Completion and allow time for Architect's and DPMC Construction Project Manager's administrative procedures necessary for certification of Substantial Completion.
 - 5. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule and show how the sequence of the Work is affected.
- 1. Phasing: Arrange list of activities on schedule by phase.
 - 2. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Substantial Completion.
 - e. Use of premises restrictions.
 - f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.
 - 3. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.
 - k. Curing.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 14 days of date established for the Notice to Proceed.

Base schedule on the startup construction schedule and additional information received since the start of Project.

- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
 - 1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.
- C. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.
- D. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
 - 1. Identification of activities that have changed.
 - 2. Changes in early and late start dates.
 - 3. Changes in early and late finish dates.
 - 4. Changes in activity durations in workdays.
 - 5. Changes in the critical path.
 - 6. Changes in total float or slack time.
 - 7. Changes in the Contract Time.

2.3 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
 - 1. List of subcontractors at Project site.
 - 2. List of separate contractors at Project site.
 - 3. Approximate count of personnel at Project site.
 - 4. Equipment at Project site.
 - 5. Material deliveries.
 - 6. High and low temperatures and general weather conditions, including presence of rain or snow.
 - 7. Accidents.
 - 8. Meetings and significant decisions.
 - 9. Unusual events (see special reports).
 - 10. Stoppages, delays, shortages, and losses.
 - 11. Meter readings and similar recordings.
 - 12. Emergency procedures.
 - 13. Orders and requests of authorities having jurisdiction.
 - 14. Change Orders received and implemented.

2.4 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule two week look ahead schedules ne before each regularly scheduled progress meeting.
 - 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 - 3. As the Work progresses, indicate final completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Architect, DPMC Construction Project Manager, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
 - 1. Post copies in Project meeting rooms and temporary field offices.
 - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200

Intentionally Blank Page

SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

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 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Periodic construction photographs.
 - 3. Final completion construction photographs.
- B. Related Requirements:
 - 1. Section 013300 "Submittal Procedures" for submitting photographic documentation.
 - 2. Section 017700 "Closeout Procedures" for submitting photographic documentation as project record documents at Project closeout.
 - 3. Section 024119 "Selective Demolition" for photographic documentation before selective demolition operations commence.
 - 4. Section 311200 – "Selective Clearing" for photographic documentation before site clearing operations commence.

1.3 INFORMATIONAL SUBMITTALS

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- B. Digital Photographs: Submit image files within three days of taking photographs.
 - 1. Digital Camera: Minimum sensor resolution of 8 megapixels.
 - 2. Format: Minimum 3200 by 2400 pixels, in unaltered original files, with same aspect ratio as the sensor, uncropped, date and time stamped, in folder named by date of photograph, accompanied by key plan file.
 - 3. Identification: Provide the following information with each image description in file metadata tag:
 - a. Name of Project.
 - b. Name and contact information for photographer.
 - c. Name of Architect.

- d. Name of Contractor.
 - e. Date photograph was taken.
 - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - g. Unique sequential identifier keyed to accompanying key plan.
- C. Construction Photographs: Submit two prints of each photographic view within seven days of taking photographs.
 - 1. Format: 8-by-10-inch (203-by-254-mm) images centered on an 8-1/2"x 11" smooth-surface matte, single-weight, commercial-grade photographic paper; punched for standard three-ring binder.
 - 2. Identification: On back of each print, provide an applied label or rubber-stamped impression with the following information:
 - a. Name of Project.
 - b. Name and contact information for photographer.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Date photograph was taken if not date stamped by camera.
 - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - g. Unique sequential identifier keyed to accompanying key plan.

1.4 COORDINATION

- A. Auxiliary Services: Provide auxiliary services needed, including temporary lighting required to produce clear, well-lit photographs without obscuring shadows.

1.5 USAGE RIGHTS

- A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

- A. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of 8 megapixels, and at an image resolution of not less than 3200 by 2400 pixels.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
 - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
 - 1. Date and Time: Include date and time in file name for each image.
 - 2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Architect.
- C. Preconstruction Photographs: Before commencement of excavation, demolition or starting any work construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.
 - 1. Flag excavation areas & construction limits before taking construction photographs.
 - 2. Take 20 photographs to show existing conditions adjacent to property before starting the Work.
 - 3. Take 20 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
 - 4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
- D. Periodic Construction Photographs: Take 20 photographs bi-weekly, with timing each month adjusted to coincide with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.
- E. Architect or DPMC Construction Project Manager-Directed Construction Photographs: From time to time, the Architect or DPMC Construction Project Manager will instruct photographer about number and frequency of photographs and general directions on vantage points. Select actual vantage points and take photographs to show the status of construction and progress since last photographs were taken.
 - a. Commencement of the Work, through completion of subgrade construction.
 - b. Above-grade structural framing.
 - c. Exterior building enclosure.
 - d. Interior Work, through date of Substantial Completion.
- F. Final Completion Construction Photographs: Take 20 color photographs after date of Substantial Completion for submission as project record documents. Architect or DPMC Construction Project Manager will inform photographer of desired vantage points.

T0617-00

January 25, 2024

Material Storage Bin Installation

DOT Maintenance Yard, West Berlin, N.J.

1. Do not include date stamp.

END OF SECTION 013233

SECTION 013300 - SUBMITTAL PROCEDURES

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 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements:
 - 1. Instructions to Bidders and General Conditions for "Payment Procedures" for submitting Applications for Payment, the schedule of values, Schedules and submitting record Drawings, record Specifications, and record Product Data.
 - 2. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
 - 3. Section 017700 "Closeout Procedures" for submitting record Drawings, record Specifications, and record Product Data.
 - 4. Divisions 01 through 49 Sections for specific requirements for submittals in those Sections.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's and DPMC Construction Project Manager's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's and DPMC Construction Project Manager's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and DPMC Construction Project Manager and additional time for handling and reviewing submittals required by those corrections.
1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
 4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for and DPMC Construction Project Manager's final release or approval.
 - g. Scheduled date of fabrication.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. General: Electronic copies of CAD Drawings of the Contract Drawings will not be provided by Architect for Contractor's use in preparing submittals, unless the Contractor completes AIA Document C106 - Digital Data Licensing Agreement.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

- C. Submittals Schedule: Comply with requirements in Division 01 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.
- D. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 - 2. Resubmittal Review: Allow 15 days for review of each resubmittal.
 - 3. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Construction Manager, through Architect, before being returned to Contractor.
- E. Identification: Place a permanent label or title block on each submittal for identification.
 - 1. Indicate name of firm or entity that prepared each submittal on label or title block.
 - 2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 - 3. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Contractor.
 - d. Name and address of subcontractor.
 - e. Name and address of supplier.
 - f. Name of manufacturer.
 - g. Number and title of appropriate Specification Section.
 - h. Drawing number and detail references, as appropriate.
 - i. Submittal number or other unique identifier, including revision identifier
 - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
- F. Additional Copies: Unless additional copies are required for final submittal, and unless Architect or Construction Manager observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
 - 1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect and Construction Manager.
 - 2. Additional copies submitted for maintenance manuals will not be marked with action taken and will be returned.

- G. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a DPMC transmittal form. Architect and Construction Manager will discard submittals received from sources other than Contractor.

1. Transmittal Form: Provide locations on form for the following information:
 - a. Project name.
 - b. Date.
 - c. Destination (To:).
 - d. Source (From:).
 - e. Names of subcontractor, manufacturer, and supplier.
 - f. Category and type of submittal.
 - g. Submittal purpose and description.
 - h. Specification Section number and title.
 - i. Drawing number and detail references, as appropriate.
 - j. Transmittal number numbered consecutively.
 - k. Submittal and transmittal distribution record.
 - l. Remarks. m Signature of transmitter.
2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.

- H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked "No Exceptions or Note Markings Architect's action stamp."

- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

- J. Use for Construction: Use only final submittals with mark indicating "No Exceptions or Note Markings Architect's action stamp."

1.6 CONTRACTOR'S USE OF ARCHITECT'S CAD FILES

- A. A. General: At Contractor's written request, copies of Architect's CAD files will be provided to Contractor for Contractor's use in connection with Project, subject to the following conditions:

1. The Contractor completes AIA Document C106 - Digital Data Licensing Agreement.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
1. Submit electronic submittals via email as PDF electronic files.
 - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 2. Informational Submittals: Submit electronic submittals via email as PDF electronic files.
 3. Certificates and Certifications Submittals: Submit electronic submittals via email as PDF electronic files.
 - a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
 - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before or concurrent with Samples.
 6. Submit Product Data in the following format:

- a. PDF electronic file.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
- 1. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 - 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm), but no larger than 24 by 36" inches.
 - 3. Submit Shop Drawings in the following format:
 - a. PDF electronic file.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
- 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 - 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.
 - e. Specification paragraph number and generic name of each item.
 - 3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
 - 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 2. Manufacturer and product name, and model number if applicable.
 3. Number and name of room or space.
 4. Location within room or space.
 5. Submit product schedule in the following format:
 - a. PDF electronic file.
- F. Coordination Drawing Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."
- G. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."
- H. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."

- I. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."
- J. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- K. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- L. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- M. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- N. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- O. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- P. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- Q. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- R. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.
 - 7. Limitations of use.
- S. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

- T. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- U. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- V. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect/Engineer.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

2.3 ARCHITECT/ ENGINEER OF RECORD'S/ ACTION

- A. Action Submittals: Architect/Engineer will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect/Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- B. Informational Submittals: Architect/Engineer will review each submittal and will not return it or will return it if it does not comply with requirements. Architect/Engineer will forward each submittal to the general contractor for distribution to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect/Engineer.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Submittals not required by the Contract Documents may be returned by the Architect without action.

T0617-00
Material Storage Bin Installation
DOT Maintenance Yard, West Berlin, N.J.

January 25, 2024

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, DPMC Construction Project Manager, or authorities having jurisdiction are not limited by provisions of this Section.
 - 4. Specific test and inspection requirements are not specified in this Section.
 - 5. All costs for special inspections by independent inspection agencies shall be paid for by the contractor.
 - a. Testing Agencies, Independent certified inspections for all code required certifications of any work of this contract shall be performed by an entity or testing agency approved by the Architect and DPMC and paid for by the contractor and shall be deemed to have been included in the Bid Proposal.
- C. Related Requirements:
 - 1. All inspections shall be performed by an independent agency approved by the state of NJ for such inspections and approved by the Architect and DPMC Construction Project Manager.
 - 2. No inspection fees for any portion of the work covered by this contract of any type shall be paid directly by the Owner. All such fees shall be assumed to have been included in the construction bid price and paid directly to the approved agency by the contractor.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- D. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- E. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- H. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- I. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the

minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data: For Contractor's quality-control personnel.
- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
 - 1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.
 - 2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.
- D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.
 - 3. Description of test and inspection.
 - 4. Identification of applicable standards.
 - 5. Identification of test and inspection methods.
 - 6. Number of tests and inspections required.
 - 7. Time schedule or time span for tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.

1.6 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
 - 1. Project quality-control manager may also serve as Project superintendent.
- B. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

- C. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
 - 1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
 - 2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
- D. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- E. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.7 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.
 - 9. Test and inspection results and an interpretation of test results.
 - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - 12. Name and signature of laboratory inspector.
 - 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
 - 1. Name, address, and telephone number of technical representative making report.
 - 2. Statement on condition of substrates and their acceptability for installation of product.
 - 3. Statement that products at Project site comply with requirements.
 - 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.

5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.8 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to [ASTM E 329] <Insert standard>; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- F. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- G. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.9 QUALITY CONTROL

- A. Owner Responsibilities: Quality-control services indicated as Owner's responsibility, shall be performed by the Contractor. Contractor shall submit qualifications of certified inspection or testing agency for Owner approval.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies acceptable to the owner upon request.
 2. Payment for these services will be made from the contractor's general conditions calculated and shall be deemed to have been included in the bid proposal.
 3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will also be charged to Contractor.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 2. Where any services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 3. Where quality-control services are indicated, submit a certified written report, in duplicate, of each quality-control service.
 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- D. Testing Agency Responsibilities: Cooperate with Architect, DPMC Construction Manager, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect, DPMC Construction Manager, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of Contractor.
- E. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify

agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

- F. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

- G. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.

1. Distribution: Distribute schedule to Owner, Architect, DPMC Construction Manager, and testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.10 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Engage a qualified testing agency and/or special inspector approved by the Owner to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in Statement of Special Inspections attached to this Section, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect, DPMC Construction Project Manager, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect and DPMC Construction Project Manager, with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 ACCEPTABLE TESTING AGENCIES

- A. Shall be selected from the consultant list approved by DPMC found at the following location on the NJ.GOV.TREASURY website.

1. https://www.nj.gov/treasury/dpmc/consult_search.shtml

3.2 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect, DPMC Construction Project Manager's reference during normal working hours.

3.3 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Article 4 of the General Conditions.

- B. Protect construction exposed by or for quality-control service activities.

- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

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 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.
 - 2. Section 017700 "Closeout Procedures."
 - 3. Section 311210 "Selective Clearing."
 - 4. Section 312000 "Earthmoving, Environmental"
 - 5. Section 312514 "Stabilization Measures For Erosion And Sedimentation Control"
 - 6. Division 32 for "Asphalt Paving" for construction and maintenance of asphalt pavement for paved areas.

1.3 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.
- B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
 - 1. Electric provided by owner shall be limited to power typical task lighting and hand tools requiring single phase 120 volt alternating current loads of 20 amps maximum.
 - 2. Power for items requiring electrical power exceeding 125V AC, requiring multiple phases and/or exceeding 20 Amps shall be provided by the contractor from portable

generating equipment approved by the Owner at the sole cost of the contractor for operation, monitoring, maintenance and fuel.

1.4 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
- C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- D. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.
 - 1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
 - 2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
- E. Dust-Control Plan: Submit coordination drawing and narrative that indicates the dust-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
 - 1. Waste handling procedures.
 - 2. Other dust-control measures.

1.5 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Temporary Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD

corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide [concrete] galvanized-steel bases for supporting posts.

- B. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches (914 by 1624 mm).

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, DPMC Construction Project Manager, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
 - 1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
 - 2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- (1.2-m-) square tack and marker boards.
 - 3. Heating equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).
 - 4. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction and marked for intended location and application.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
 - 1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
 - 1. Toilets: Use of Owner's existing toilet facilities is prohibited.
- D. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
- E. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 - 1. Install electric power service [overhead] [underground] unless otherwise indicated.
 - 2. Connect temporary service to Owner's existing power source, as directed by Owner.
- F. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
 - 2. Install lighting for Project identification sign.

- G. Telephone Service: All Supervisory Personnel shall be provided with cell phones for official use with telephone numbers provided to DOT, DPMC and Architect for receiving official communications during working hours.
1. At construction trailer and storage units, post a list of important telephone numbers. Including Emergency supervisory personnel.
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Contractor's emergency after-hours telephone number.
 - e. Contractor's On Site Construction Supervisor
 - f. Architect's office.
 - g. Engineers' offices.
 - h. Owner's office.
 - i. Principal subcontractors' field and home offices.
 2. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
 2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations.
1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
- C. Temporary Use of Permanent Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
 2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Section 312000 "Earth Moving."
 3. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course

pavement before installation of final course according to Section 321216 "Asphalt Paving."

- D. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- E. Parking: No contractor parking will be provided on site. The contractor shall use street parking as permitted by state county and municipal ordinances.
- F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
 - 2. Remove snow and ice as required to minimize accumulations.
- G. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Article 4 of the "Instructions To Bidders And General Conditions"
- H. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 - 1. Comply with work restrictions specified in Section 011000 "Summary."
- C. Temporary Erosion and Sedimentation Control: Comply with requirements of EPA Permits and authorities having jurisdiction and requirements specified in Section 311210 "Selective Clearing."
- D. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings.

1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- E. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- F. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- G. Contractor's Area Enclosure Fence: Before construction operations begin, furnish and install area enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

Intentionally Blank Page

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. G.C. shall submit the following forms with each invoice:
 - 1. DPMC-11
 - 2. DPMC-11-2
 - 3. DPMC-11-2A
 - 4. Construction schedule
 - 5. Progress photos of completed work.
 - 6. Certified payroll reports G.C. acknowledged requirements.

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

1.3 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. Instructions to Bidders and General Conditions
 - 2. Section 013233 "Photographic Documentation" for submitting final completion construction photographic documentation.
 - 3. DPMC Close out documents.

1.4 CLOSEOUT SUBMITTALS

- A. Final Completion DPMC Close out Package.
 - 1. DPMC 20 Final Contract Acceptance
 - 2. DPMC 11 Invoice
 - 3. DPMC 11-2 Monthly Estimator for Payment to Contractor
 - 4. DPMC 20r(2) Consent of Surety to Final Payment

Material Storage Bin Installation

DOT Maintenance Yard, West Berlin, N.J.

5. DPMC 11-2a Certification of Prime Contractor Pursuant to N.J.S.A. 52:32-40, 41 and N.J.S.A. 2A:44-148
6. DPMC 20d Copy of Certification of Substantial Completion
7. Cert of Occup. Copy of Certificate of Occupancy or Certificate of Acceptance
8. Landfill: Original receipts and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

B. Certificates of Release: From authorities having jurisdiction.

C. Certificate of Insurance:

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 DPMC Construction Manager Label with manufacturer's name and model number where applicable.

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 DPMC Construction Manager of pending insurance changeover requirements.
2. Participate with Owner in conducting inspection and walkthrough.

3. Terminate and remove temporary facilities from Project site, along with 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 and DPMC Construction Manager 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. Architect will provide a punch list of work to be completed by the contractor prior to final completion.
 2. Reinspection: Request reinspection when the Work identified in previous and punch list inspections as incomplete is completed or corrected.
 3. 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 form DPMC 11 Invoice, according to DPMC procedures.
 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.
- 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 and DPMC Construction Manager 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. Organize list of spaces in sequential order, starting with exterior areas first.
 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Contractor.
 - d. Page number.
 4. Submit list of incomplete items in the following format:
 - a. PDF electronic file. Architect will return annotated file.

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. 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 (215-by-280-mm) 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.
- C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
 - 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. 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.
 - f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - g. Sweep concrete floors broom clean in unoccupied spaces.
 - h. Remove labels that are not permanent.
 - i. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
 - j. Leave Project clean and ready for occupancy.
- B. Construction Waste Disposal: Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls." Insert an article on continuing inspections or consultations by Contractor if required. Possibly insert a schedule of approximate times for inspections.

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.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
 - 2. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

END OF SECTION 017700

SECTION 024119 - SELECTIVE DEMOLITION

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. Demolition and removal of selected portions of building or structure.
 - 2. Demolition and removal of selected site elements.

- B. Related Requirements:

- 1. Section 011000 "Summary" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
 - 2. Section 028300 – Treatment of Lead In Construction
 - 3. Section 312000 "Earthmoving, Environmental" for site clearing and removal of above- and below-grade improvements.

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.

- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

- 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

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, which indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise 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 DOT's site manager'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. Use of elevator and stairs.
 - 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- C. Predemolition Photographs or Video: Submit before Work begins.
- D. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

1.7 CLOSEOUT SUBMITTALS

- A. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.8 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. Owner will occupy the site immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- C. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
 - 1. Before selective demolition, Owner will remove the following items:
 - a. All materials stored in the Pole Barn.
 - b. Stockpiled sand and gravel
- D. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- E. Hazardous Materials: Hazardous materials are present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
 - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
- F. Storage or sale of removed items or materials on-site is not permitted.
- G. 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 Architect.
- D. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.
 - 1. 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 Section 011000 "Summary."
- 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. The Contractor is responsible to locate and mark existing utilities on the property. If the local utilities are not involved, the Contractor shall use his own forces. Otherwise, the Contractor shall contact the local utility companies at the outset of the project for coordination of the work and service upgrades. Utility shutdowns, interruptions to service, deliveries, etc. must be approved by and coordinated with the DPMC and the Client.
 - 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 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. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.

- c. Equipment to Be Removed: Disconnect and cap services and remove equipment.

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.
 - 1. Comply with requirements for access and protection specified in Section 015000 "Temporary Facilities and Controls."
- 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. Cover and protect furniture, furnishings, and equipment that have not been removed.
 - 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."
- 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. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - 2. 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. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.

4. 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 portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly.

- B. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- B. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

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. Comply with requirements specified in Article 4 of the "Instructions To Bidders And General Conditions"
- B. Burning: Do not burn demolished materials.
- C. Disposal: 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.

3.8 SELECTIVE DEMOLITION SCHEDULE

- A. Existing Pole Barn, fencing, pavement and all items indicated or required to be as indicated removed on contract documents.

END OF SECTION 024119

Intentionally Blank Page

DOCUMENT 028300 – TREATMENT OF LEAD IN CONSTRUCTION

PART 1 – GENERAL REQUIREMENTS

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including Instructions to Bidders, General Conditions, and Division 1 Specification Sections, apply to this Section.
- B. Section 024119 - SELECTIVE DEMOLITION
- C. Section 312000- EARTHMOVING, ENVIRONMENTAL
- D. Section 312000a- ENVIRONMENTAL INVESTIGATION REPORT

1.02 CONDITIONS

- 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 Material Storage Bin Installation at NJDOT, Berlin Maintenance Yard, West Berlin, Camden County, N.J. (DPMC Project No. T0617-00) and the demolition of the existing pole barn structure.
- B. Lead-Components:
 - 1. Refer to the attached “Hazardous Materials Report” prepared by USA Environmental Management, Inc., dated November 17, 2021, for details.
- C. The surfaces scheduled to be impacted, as a result of the demolition of the existing pole barn structure associated with the Material Storage Bin Installation at NJDOT, Berlin Maintenance Yard, West Berlin, Camden County, N.J. (DPMC Project No. T0617-00), may be lead comprised or have lead-based paint as defined by the United States Department of Labor, Occupational Safety and Health Administration, (OSHA), is anticipated throughout all painted building components. OSHA does not establish a threshold for lead-containing 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.
- D. 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.
- E. Treatment of Painted Surfaces: 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 renovation/demolition work that generates nuisance dust/particulates. Further, State Facilities are within the jurisdiction of the New Jersey Public Employees

Occupational Safety and Health program, which requires, at a minimum, the use of engineering controls during construction work to minimize dust/particulates.

1. To fulfill the requirements of OSHA, the disturbance, of any lead-containing painted surface, 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, requires the Contractor's engineering controls 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 to provide a site-specific Lead Safety Plan to address:
 - a. Worker protection, including respiratory protection;
 - b. Worksite contamination, clean-up, including personal hygiene, and waste disposal; and
 - c. Exposure monitoring for workers as required by the OSHA, for those persons whose trade will disturb painted surfaces as a result of renovation/demolition activities, paint refinishing, construction and re-construction, etc.

1.03 CONTINGENCY

- A. The intent of this Technical Specification is to provide information and guidance for the disturbance of surface coatings where the work shall generate dust, debris and airborne particulates that may be coated with lead-based paint or lead-containing paint. Should the appropriate Trade performing the work specified that generates these conditions as a result of related renovation/demolition require the use of a Lead Abatement Contractor, licensed by the State of New Jersey, Department of Community Affairs, (DCA), the Lead Abatement Contractor shall not be advertised as such, since the work specified in these Technical Specifications relates to the construction industry and not that of a lead hazard.

1.04 COORDINATION

- A. The Contractor shall coordinate all activities with the Owner's Representative; 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 forty-eight (48) hours of an event. The exception shall be that of emergency situations.

1.05 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.

1.06 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 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.
 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 1926.62.
- B. Definitions Pertaining to the Lead Abatement Industry (The definitions are provided for informational purposes, as applicable to these Technical Specifications; however, the disturbance of any coated surface shall not be completed as a lead abatement project.)
1. Abatement – Abatement of lead-based paint involves removal of lead-based paint or replacement of surfaces containing lead-based paint.
 2. Action Level – As defined in OSHA Construction Standard 29 CFR, Part 1926.62, employee exposure, without regard to use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter ($30 \mu\text{g}/\text{m}^3$) of air averaged over an 8-hour period. As used in this section, " $30 \mu\text{g}/\text{m}^3$ of air" refers to the action level.
 3. Amended Water – Water containing at least one ounce of five percent (5%) trisodium phosphate per gallon of water.
 4. Area Monitoring – Sampling of lead concentrations within and outside the lead control area and inside the physical boundaries which are representative of the airborne lead concentrations which may reach the breathing zone of personnel potentially exposed to lead.
 5. Atomic Absorption Spectroscopy – The analytical method of determining the lead content of a given sample.
 6. Physical Boundary – Area physically roped or partitioned off around a lead control area to limit unauthorized entry of personnel. As used in this section, "outside boundary" shall mean the same as "outside lead control area."
 7. Lead Inspector/Risk Assessor – As used in this section, refers to a person with a current Lead Inspector/Risk Assessor permit issued by the State of New Jersey, Department of Health.
 8. Change Rooms and Shower Facilities – Rooms within the designated physical boundary around the lead control area equipped with separated storage facilities for clean protective work clothing and equipment and for street clothes which prevent cross-contamination.
 9. Decontamination Area – Area for removal of contaminated personal protective equipment (PPE).
 10. Eight-Hour Time Weighted Average (TWA) – Airborne concentration of lead averaged over an 8-hour workday to which an employee is exposed.
 11. High Efficiency Particulate Air (HEPA) Filter Equipment – Vacuuming equipment containing a UL 586 HEPA filter system capable of preventing passage of lead

- contaminated paint dust with an efficiency of 99.97 percent for all particulates greater than 0.3-micron size.
12. Lead – Metallic lead, inorganic lead compounds, and organic lead soaps. Exclude from the definition are other organic lead compounds.
 13. Lead Control Area – An emission control area to prevent the spread of lead dust, paint chips, or debris from lead containing paint removal operations. The lead control area is isolated by physical boundaries to prevent unauthorized entry of personnel.
 14. Permissible Exposure Limit (PEL) – 50 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) of air as an 8-hour time weighted average as determined by OSHA Construction Standard 29 CFR, Part 1926.62.
 15. Personal 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 1926.62. 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 six (6) to nine (9) inches from the center at the nose or mouth of an employee.
 16. Wipe Sampling – Clearance testing procedures which determine the amount of existing lead-based paint surface dust by Atomic Absorption Spectroscopy Analysis are express in micrograms of lead per square foot.

1.07 CODES & STANDARDS

- 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. Incorporation of Publications: The publications listed below form a part of this Technical Specification to the extent referenced, where applicable. The publications referred within the text will be the basic designation only.

1. Code of Federal Regulations (CFR)
 - a. 29 CFR 1910.95 - Occupational Noise Exposure
 - b. 29 CFR 1910.134 - Respiratory Protection
 - c. 29 CFR 1910.1200 - Hazard Communication
 - d. 29 CFR 1910.1025 - Occupational Safety and Health Standards (Lead)
 - e. 29 CFR 1926.55 - Gases, Vapors, Fumes, Dusts, and Mists
 - f. 29 CFR 1926.59 - Hazard Communication
 - g. 29 CFR 1926.62 - Safety and Health Regulations for Construction (Lead)
 - h. 29 CFR 1926.103 - Respiratory Protection
 - i. 29 CFR 1926.453 - Aerial Lifts
 - j. 29 CFR 1926.502 - Fall Protection
 - k. 40 CFR 260 - Hazardous Waste Management Systems (General)
 - l. 40 CFR 261 - Identification and Listing of Hazardous Waste
 - m. 40 CFR 262 - Generators of Hazardous Waste
 - n. 40 CFR 263 - Transporters of Hazardous Waste
 - o. 40 CFR 264 - Owners and Operators of Hazardous Waste Treatment, Storage and Disposal facilities
 - p. 40 CFR 265 - Owners and Operators of Hazardous Waste Treatment, Storage and Disposal facilities
 - q. 40 CFR 171 - Standards for Transportation of Hazardous Materials
 - r. 40 CFR 172 - Hazardous Material Tables and Hazardous Materials Communications Regulations
 - s. 40 CFR 173 - General Requirements for Shipments and Packaging
 - t. 40 CFR 178 - Shipping Container Specifications
2. New Jersey Regulations
 - a. New Jersey Administrative Code (N.J.A.C.) 5:17 – New Jersey Lead Hazard Evaluation and Abatement Code
 - b. N.J.A.C. 8:62 – New Jersey Standards for Lead Certification
 - c. N.J.A.C. 7:26 – New Jersey Waste Disposal Requirements
 - d. N.J.A.C. 12:100-13 – New Jersey Indoor Air Quality Standard

1.08 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.

1.09 POTENTIAL ENVIRONMENTAL HAZARDS

- A. The disturbance or dislocation of paint or other coated surfaces may cause a release of lead dust, fumes, etc., within the building's atmosphere and/or the environment, thereby creating a potential health hazard to workmen, building occupants and the environment. 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(s) may be occupied or unoccupied during all aspects

of renovation/demolition.

1.10 SUBMITTALS

- A. Pre-Project/During the Work Submittals: Upon request by the Owner and/or Owner's Representative, the Contractor shall submit:
 - 1. Written site-specific Health and Safety Plan
 - 2. All Safety Data Sheets (SDS)
- B. Post Project Submittals: Upon completion of work on this project the Contractor shall submit the following information to the Owner, as requested:
 - 1. Daily activity reports and personnel sign-in sheets
 - 2. Minutes of meetings
 - 3. Visitations; authorized and unauthorized
 - 4. Special or unusual events
- C. Waste material disposal manifests shall be submitted for project close-out payment submittal.

1.11 CONTRACTOR'S USE OF THE PREMISE

- A. The Contractor shall abide by all requirements for use of the premises at the facility. However, where not specified, the Contractor shall:
 - 1. 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.
 - 2. 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.
 - 3. 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.
 - 4. 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.
 - 5. 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.
 - 6. Keep public areas such as hallways, stairs, elevator lobbies and toilet rooms free from accumulation of waste, rubbish or construction debris.
 - 7. Smoking or open fires will not be permitted within the building enclosure or on the premises.
 - 8. 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.

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.

PART 2 – DESCRIPTION OF THE WORK

2.01 SUMMARY

- A. The intent of this Technical Specification Section is to provide information and guidance for the disturbance of surface coatings where the work shall generate dust, debris and airborne particulates, that may also be coated with lead paint. Should the appropriate Trade performing the work specified that generates these conditions as a result of related renovation/demolition require the use of a Lead Abatement Contractor, licensed by the DCA, the Lead Abatement Contractor shall not be advertised as such, since the work specified in these Technical Specifications relates to the construction industry and not that of a lead hazard.
- B. Where present, turn-off and disconnect all electrical circuits inside or adjacent to the component to be removed.
- C. Existing forced air Heating, Ventilation and Air Conditioning (HVAC) systems shall be shut down where work occurs, and protected with polyethylene sheeting to minimize the potential for dust, fumes, etc., migrating into these systems from the work area(s). The Contractor shall implement appropriate corrective measures to segregate an active system between work area(s) and adjacent occupied locations, such as "blanking;" these corrective measures shall be at no additional cost to the Owner/Project. Fresh air intakes for these systems shall be protected with two (2) layers of polyethylene sheeting, when work occurs outdoors and in proximity of such.
- D. The Contractor shall post appropriate OSHA warning signs as specified and required by 29 CFR, Part 1926.62. The Contractor shall also post appropriate notices of construction related work, as per N.J.A.C. 12:100-13, indicating potential environmental issues (i.e., dust, gases, fumes, odors, etc.) and the location of SDSs. The Contractor shall provide for clearly marked emergency means of egress for the work areas specified. These notifications shall be placed at eye level and in languages consistent with the building population.
- E. The Contractor shall be liable for all costs associated with the replacement or repair of any utilities, equipment, materials, building components, etc., that may be damaged during the course of Contractor work.

PART 3 – TREATMENT OF PAINTED SURFACES

3.01 LEAD IN CONSTRUCTION REQUIREMENTS

- A. 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
 - 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 per 8 hr. shift. Permissible Exposure Level Limit (PEL) - 50 micrograms per cubic meter of air, Time Weighted Average, 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 & Medical History (to include past lead exposure).
 - b. Habits: (Smoking & Hygiene)
 - c. Problems with: gastrointestinal, hematologic, renal, cardiovascular, reproductive and neurological problems.

- 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
 - 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

3.02 MINIMUM SAFE WORK PRACTICES REQUIREMENTS

- A. 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 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.
1. 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.
 2. 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.
 3. 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.
 4. Treatment Methods for Surfaces Coated with Paint
 - a. Mist surfaces prior to wet scraping in preparation for painting and/or when components are removed for disposal or restoration.
 - i. Lightly mist the component to be removed. Do not apply water to components containing electrical circuits.
 - ii. Using a utility knife or other sharp instrument, carefully score all affected painted seams.
 - iii. Remove any screws or other fasteners.
 - iv. 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.
 - v. 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.
 - vi. HEPA vacuum any dust that may have accumulated behind the component removed.
 - b. Preparation for torch cutting of components.
 - i. 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.
 - ii. The limited paint removal shall expose bare metal, free of all coatings, four (4) inches out from the area to be cut.
 - iii. Limited paint removal shall be accomplished using HEPA vacuum needle guns and/or chemical paint remover.
 - iv. Utilize torches to cut through bare metal for component removal, ensuring that heat from the torch does not impact any adjacent lead-based paint.

- c. Vacuum Water Blasting
 - i. The Contractor shall utilize the equipment in strict conformance with the Manufacturer's specifications.
 - ii. The blast head shall remain in contact with the surface at all times.
 - iii. The Contractor shall implement control measures to capture and/or prevent the migration of water from outside the work area.
 - iv. 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).
- d. Strippable Chemical Solvent
 - i. The chemical stripper shall be troweled, brushed or spray applied. Application thickness of the material shall be determined by the sample test patches.
 - ii. 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 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 washdown water shall be contained as specified in Section 4.0. All water and residue shall be removed by using a wet vacuum system.
 - iii. Apply paste type chemical stripper material to the existing painted surfaces by spray application, and simultaneous application of fibrous laminated cloth, where applicable.
 - iv. Remove all spent chemical stripper, fibrous laminated cloth, and old paint from the substrate manually.
 - v. Provide low pressure fresh water rinse for cleaning of the substrate to remove any visible residual of remover and old paint.
 - vi. 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.
 - vii. 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.
 - viii. 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).
- e. HEPA Vacuum Needle Gun
 - i. Maintain HEPA vacuum attachment in operation during removal operation. Select proper shroud to match the configuration of the surface being treated.

- ii. The shroud shall remain in contact with the surface at all times.
 - iii. HEPA vacuum needle guns shall only be utilized for metal surfaces.
- f. Core Penetrations and Drilling
 - i. 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.
 - ii. 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.
 - iii. Sponges utilized for procedures referenced herein shall only be used once per 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.
- 5. 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.
- 6. Roll polyethylene sheeting drop cloths inward after misting with water prior to disposal.
- 7. 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.
- 8. 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.
- 9. 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.
- 10. All disposable items, including mop heads, rags, personal protection equipment, etc., shall be treated as referenced in these Technical Specifications.

3.03 MINIMUM NEW JERSEY AIR QUALITY REQUIREMENTS

- A. Where general ventilation is inadequate to control air contaminants emitted from point sources within workspaces to below the Permissible Exposure Limit, such as that outlined above for lead by OSHA, other control measures shall be implemented, such as, but not limited to, negative pressure filtration equipment or an equivalent substitution.

- B. Renovation/demolition work 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.
- C. Renovation 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.
- D. Prior to re-occupancy, work areas shall be cleaned and ventilated, as necessary.
- E. 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.

3.04 WORKER SAFETY

- A. The Contractor is responsible for ensuring all appropriate worker protection regulations are followed, inclusive of those of OSHA, Corporate policies and procedures, the project job site requirements, etc. Project job site requirements shall be provided to the Contractor upon Contract Award, or the day the project commences. Provision herein apply to all Trade related work.
- B. Enforcement of the Contractor's on-site staff to comply with Health and Safety Compliance shall be the sole responsibility of the Contractor's supervisory personnel. The Owner's Representative, the Owner and the Owner's consultants/professional services, shall not 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 the Owner and its personnel and/or clients, and/or the Owner's Representative. The exception shall also apply for failure for the Contractor to comply with site rules and regulations. If such a risk occurs, the Owner, Facility and/or Owner's Representative shall Stop Work immediately to rectify the situation.
- C. At a minimum, the Contractor shall ensure the following, which includes provisions within these Technical Specifications.
 - 1. Respiratory Protection Program: Furnish each employee with a half face negative pressure respirator or other appropriate type with a respirator fit test at the time of initial fitting and at least every 12 months thereafter, as required by 29 CFR, Part 1926.62, 29 CFR, Part 1926.103, and 29 CFR, Part 1910.134. Establish and implement a respiratory protection program. Upon completion of the initial employee exposure assessment, adjust respiratory protection as required by 29 CFR, Part 1926.62.
 - 2. Hazard Communication Program: The Contractor shall establish and implement a Hazard Communication Program as required by 29 CFR, Part 1926.59, and 29 CFR, Part 1910.1200.
 - 3. Change Areas and Shower Facilities: Provide clean change areas within the physical boundary around the designated Lead Control Area. Upon completion of initial employee exposure assessment, adjust requirements in accordance with 29 CFR, Part 1926.62.
 - 4. Personnel Protection: Personnel shall wear and use protective clothing and equipment, such as respirators, protection suits, eye protection, hard hats,

- appropriate foot and hand protection, etc. Eating, smoking, or drinking is not permitted in the lead control area. No one will be permitted in the lead control area unless they have been given appropriate training and protective equipment.
5. It is anticipated that the Contractor will be utilizing power tools. The Contractor shall ensure compliance with the requirements of a hearing protection and conservation, as outlined in 29 CFR, Part 1910.95.

- D. Safety and Health Compliance: 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 applicable requirements of the current issue of 29 CFR, Part 1910.1025. Submit matters regarding interpretation of standards to the owners for resolution before starting work. Where specification requirements and referenced documents vary, the most stringent requirement shall apply.

3.05 ADDITIONAL REQUIREMENTS

- A. Construction work shall not generate visible emissions, as required by 40 CFR, Part 61, the National Emissions Standard for Hazardous Air Pollutants (NESHAP).

PART 4 – WASTE HANDLING AND DISPOSAL

4.01 HAZARDOUS WASTE MANAGEMENT PLAN

- A. The Hazardous Waste Management Plan shall comply with applicable requirements of federal, state and local hazardous waste regulations and addresses the following:
1. Identification of hazardous wastes associated with the work as defined in 40 CFR, Part 261.
 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 copies of USEPA, state and local hazardous waste permit applications, permits and USEPA identification numbers.
 4. Names and qualifications (experience and training) of personnel who will be responsible for onsite management of 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. Hazardous wastes shall be collected and containerized daily.
 8. A locked dumpster or covered truck provided by the Contractor shall be used to store hazardous debris prior to removal at the conclusion of the job.

4.02 WASTE REQUIREMENTS

- A. Waste storage on-site, transportation and disposal shall comply with all applicable waste regulations, which include, but are not limited to, the federal USEPA, DOT and the State of New Jersey waste regulations.

- B. Collect a sample of the lead containing waste to determine if it is at or above the toxicity characteristic limit which classifies the waste as hazardous waste, defined as five (5) milligrams per liter (mg/L) lead concentration (USEPA regulation 40 CFR, Part 261.24). TCLP samples shall be analyzed via Test Method 1311 in Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, USEPA publications SW-846.
- C. If the waste classifies as a hazardous waste (i.e., greater than or equal to 5 milligrams per liter of lead concentration), the Contractor shall follow and implement all applicable hazardous waste regulations for the storage, labeling, transportation and disposal of the waste material. This includes, but is not limited to:
 - 1. Labeling of the hazardous waste containers with the words “hazardous waste” and the waste accumulation date; the waste generator name and address.
 - 2. The proper completion of the hazardous waste manifest for the off-site shipment.
 - 3. Storage of the waste materials in USDOT approved containers.
 - 4. Use of a licensed waste transporter and a treatment, storage and disposal facility (TSDF) authorized to accept the waste.

PART 5 – OWNER DIRECTED TESTING AND ANALYSIS

5.01 OWNER TESTING OPTIONS

- A. Testing for lead can be conducted by the Owner at any time during the Contractor’s activities and may contain but not be limited to air, wipe and soil sampling and analysis. Samples obtained will be compared to the most stringent Federal, State and Local standards as applicable.
- B. The Contractor shall be responsible for any and all testing and analysis as indicated in the standards noted in this Section. The Owner may, at its discretion, mirror testing and analysis being conducted by the Contractor.
- C. If lead contamination is discovered related to the Contractor’s activities, the Contractor shall rectify the contaminant issue by cleaning the area until satisfactory lead wipe or soil results are achieved (per HUD and N.J.A.C. 5:17 clearance criteria) at no additional cost to the Owner. The Contractor shall be responsible for the costs associated with the cleaning in addition to the costs associated with the Owner’s Representative.

5.02 SAMPLING COMPLIANCE

- A. Post Renovation Clearance Sampling
 - 1. At the Owner’s discretion, the Owner’s Representative may conduct post clearance sampling in accordance with Method SW-846-7000B. All laboratories which analyze samples shall be USEPA recognized, AIHA-LAP, LLC, Environmental Lead Laboratory Accreditation Program (ELLAP) accredited.
 - 2. Acceptable clearance sampling results shall be less than the HUD and N.J.A.C. 5:17 clearance criteria as follows:
 - a. Wipe Sample results collected inside the work area shall be less than the following micrograms per square foot ($\mu\text{g}/\text{sf}^2$):

- i. Floors 10 $\mu\text{g}/\text{sf}^2$
 - ii. Interior Window Sills 100 $\mu\text{g}/\text{sf}^2$
 - iii. Window Troughs 100 $\mu\text{g}/\text{sf}^2$
- b. Soil Sample taken at the exterior of the work site shall be less than the following micrograms per gram ($\mu\text{g}/\text{g}$):
 - i. Bare Soil 400 $\mu\text{g}/\text{g}$

END OF SECTION 028300



USA Environmental Management, Inc.
Environmental ♦ Engineering ♦ Construction

November 24, 2021

Richard Piacentini, RA
Stonewater Architecture, LLC
P.O. Box 208
Colonia, New Jersey 07067

**RE: Demolition Statement/Certification
Pole Barn Structure
Department of Transportation
Berlin Maintenance Yard
West Berlin, Camden County, N.J.
Block 113, Lot 1**

Dear Mr. Piacentini:

The building referenced above (Pole Barn Structure) was inspected and sampled for the presence of asbestos material(s) which may become friable during demolition. No asbestos-containing building materials were identified during the assessment; which was conducted in accordance with EPA AHERA, 40 CFR, Part 763 protocol.

Please utilize this correspondence as part of the demolition permit submission for meeting the New Jersey Uniform Construction Code requirements of N.J.A.C. 5:23-2.17(e), as well as the United States Environmental Protection Agency (USEPA) National Emission Standards for Hazardous Air Pollutants (NESHAP) 40 CFR, Part 61, Subpart M requirements.

Should you have any questions, please contact the undersigned at your convenience.

Respectfully,
USA ENVIRONMENTAL MANAGEMENT, INC.


William Weisgarber, Jr.
Project Manager

HAZARDOUS MATERIALS REPORT
For
POLE BARN STRUCTURE
DEPARTMENT OF TRANSPORTATION
BERLIN MAINTENANCE YARD
WEST BERLIN, CAMDEN COUNTY, N.J.

DPMC PROJECT NO. T0617-00

Prepared for:

Stonewater Architecture, LLC
P.O. Box 208
Colonia, New Jersey 07067

Prepared by:

USA Environmental Management, Inc.
344 West State Street
Trenton, New Jersey 08618

USAEMI Project No.: 21-020793-01

Report Date: November 17, 2021



USA Environmental Management, Inc.
Environmental Engineering Construction

Table of Contents

1.0	INTRODUCTION	3
2.0	SURVEY FOR ASBESTOS-CONTAINING MATERIALS	3
2.1	Asbestos History	3
2.2	Asbestos Inspection.....	4
2.3	Asbestos Summary	5
2.4	Asbestos Assessment Disclaimer	5
2.5	Asbestos Recommendations.....	6
2.6	Asbestos Certification	6
3.0	SURVEY FOR LEAD-CONTAINING PAINT	7
3.1	Lead Paint History.....	7
3.2	LBP Sampling	8
3.3	XRF Result Ranges	8
3.4	Lead Recommendations	9
3.5	Lead Certification.....	9
4.0	SURVEY FOR POLYCHLORINATED BIPHENYLS (PCBs)	10
4.1	PCB History	10
4.2	PCB Sampling.....	10
4.3	Non-Liquid PCBs Recommendations	10
APPENDIX A	<i>Asbestos Certificates of Analysis Asbestos Chain of Custody Records</i>	
APPENDIX B	<i>XRF Field Survey Data XRF Performance Characteristic Sheet</i>	
APPENDIX C	<i>Laboratory Certifications Inspector Licenses</i>	
APPENDIX D	<i>Asbestos Sample Location Plans</i>	

1.0 INTRODUCTION

USA Environmental Management, Inc., (USAEMI) was contracted by Stonewater Architecture, LLC, to conduct a pre-demolition hazardous materials assessment of the existing Pole Barn Structure located within New Jersey Department of Transportation, Berlin Maintenance Yard, 50 Walker Avenue, West Berlin, Camden County, New Jersey. The purpose of the inspection was to determine the presence or absence of asbestos, lead-containing paint and polychlorinated biphenyls (PCBs) which may be impacted during the demolition of the existing Pole Barn Structure. The work was associated with the State of New Jersey, Department of the Treasury, Division of Property Management & Construction Project No. T0617-00. The assessment was limited to suspect asbestos, lead-containing paint, and PCB materials which may be impacted by the building's demolition.

The hazardous materials assessment was conducted by William Weisgarber, Jr., and Richard Reynolds on October 14, 2021. Both inspectors are certified United States Environmental Protection Agency (EPA), Asbestos Hazard Emergency Response Act (AHERA) Asbestos Building Inspectors. In addition, Mr. Weisgarber and Mr. Reynolds are certified State of New Jersey, Department of Health, Lead Inspectors/Risk Assessors. The inspectors have significant experience in asbestos-containing material (ACM) surveys, lead-containing paint (LCP) assessments and hazardous materials assessments.

Copies of all applicable Certifications and Licensure are attached to this report.

2.0 SURVEY FOR ASBESTOS-CONTAINING MATERIALS

2.1 Asbestos History

During the last few decades, the medical evidence has continued to mount regarding the importance of environmental factors as a source of carcinogenicity. Asbestos is regulated by the Occupational Safety and Health Administration, cited by the National Institute for Occupational Safety and Health, the International Agency for Research on Cancer, the National Toxicology Program, and the Carcinogens Assessment Group of the EPA.

As a result of the pervasive use of this material, asbestos has become a widespread environmental contaminant for large segments of our society and has been conclusively demonstrated to cause fibrosis and malignancies of the lung and other organs. The majority of the evidence comes from industrial exposure to this material, whereas exposures were more intense and for a greater period of time. However, there is also evidence that low exposures to asbestos fibers may also have carcinogenic potential.

Asbestos fibers resist degradation and persist in the environment because of the fibers particular structure. They possess aerodynamic capabilities for prolonged suspension and repeated cycles of re-entrainment. Asbestos fibers find entry into the body by inhalation and through ingestion. The retained fibers are found in tissues throughout the lifetime of the exposed person – long after

cessation of exposure. It has been demonstrated that asbestos fibers can migrate to other organs. Malignancies related to inhalation and ingestion include cancer of the lungs, mesothelioma of the pleura and peritoneum (lining of the lung and abdominal region), and neoplasms of other sites.

The degree and duration of exposure to develop an asbestos related health disorder is unknown at this time. However, a report to the U.S. Consumer Products Safety Commission by the Chronic Hazard Advisory Panel on Asbestos reports:

From a public health standpoint, and in the absence of final clarifications of the uncertainties, it is prudent to behave as if asbestos fibers may be carcinogenic at low level exposure and at small particle sizes.

As a result, the Asbestos Hazard Emergency Response Act (40 CFR Part 763) was enacted. An AHERA inspection requires an accredited inspector to visually inspect and assess the condition of all known or assumed friable asbestos-containing materials; to visually inspect non-friable ACM and touch it to determine friability; and to identify homogeneous areas of friable materials. The National Emission Standard for Hazardous Air Pollutants (NESHAP) requires thorough inspections for ACM in structures before renovation or demolition.

NESHAP ACM CATEGORIES		
Categories	Typical Material Type	Guidance for RACM
Friable ACM	Pipe insulation and pipe-fittings	Able to crush with hand pressure
Category I, Non-friable	Floor covering products, Gaskets, Roofing cements	Non-friable made friable due to sanding, grinding, cutting or abrading
Category II, Non-friable	Cement board products, floor tile, etc., that is significantly damaged.	Non-friable material becoming friable or is expected to become friable from the act of renovation or demolition

Any ACM that is Friable, or Category I and II Non-friable that meets the qualifications to be considered a Regulated Asbestos-Containing Material (RACM), must be removed prior to demolition that would break up, dislodge, or similarly disturb the material or preclude access to the material for subsequent removal. This includes gasket materials.

2.2 Asbestos Inspection

This inspection for ACM was limited in scope to include materials which may be impacted during the demolition of the existing Pole Barn Structure. Wherever possible, the attempt was made to determine the presence of hidden materials. However, no destructive/exploratory sampling was conducted. USAEMI collected the necessary number of bulk samples to properly identify accessible ACM. All samples collected were in accordance with 40 CFR, Part 763, the EPA's, AHERA protocol. Sampling was performed utilizing wet methods. Equipment used during the survey was decontaminated at the completion of extracting each sample, eliminating the potential for any cross contamination of samples. In addition, all samples were given a homogeneous area sampling identification number.

Samples of each homogenous material were delivered to International Asbestos Testing Laboratories (iATL), located at 9000 Commerce Parkway, Suite B, Mount Laurel, New Jersey. iATL is an independent laboratory accredited by the National Voluntary Laboratory Accreditation Program (NVLAP Lab Code: 101165-0). Sample analysis was performed via Polarized Light Microscopy (PLM) in accordance with 40 CFR, Part 763.87(a) and/or Transmission Electron Microscopy (TEM), in accordance with N.J.A.C. 12:120, Appendix. The laboratory's Certificates of Analysis and the corresponding Chain of Custody records are found in Appendix A of this report. Certificates of Analysis include the type and percentage of asbestos, if found in the sampled material, and the method of analysis.

The sample identification system of this report consists of a three-unit sample identification number. The first set of text indicates the sample number, the next set indicates the inspector's initials, and the last six (6) digits indicate the sampling date. These sample numbers match the chain-of-custody and lab reports of analysis.

Sample result summaries are provided in table format. The first column indicates the homogenous area identification number (ID No.); the second column is the material description; and the third column indicates the asbestos content, type of asbestos or if the material was none detected for asbestos. Sampled materials that contain asbestos and/or were assumed to contain asbestos are indicated in ***italic bold***.

2.3 Asbestos Summary

During the course of the assessment, USAEMI noted a total of seven (7) suspect materials from the existing Pole Barn Structure. The suspect materials identified were sampled in sufficient quantity as mandated by 40 CFR, Part 763.87(a). Of the materials analyzed, **none** tested positive for asbestos (greater than one percent (>1%) asbestos by weight). Materials sampled for asbestos content are listed below:

TABLE 1 – SUSPECT ASBESTOS MATERIALS		
ID No.	Material Description	Asbestos Content
01	Black Tar Coating on Concrete Masonry Unit (CMU) Walls	None Detected
02	Textured Stucco Over CMU Walls	None Detected
03	Stucco Over CMU Corrals	None Detected
04	Tar Coating on Floor	None Detected
05	Black Pressed Fiberboard Walls with Tar-Like Coating	None Detected
06	Black Mineral Coat Roof Shingle	None Detected
07	Black Rolled Tar Paper Under ID No. 06	None Detected

2.4 Asbestos Assessment Disclaimer

The Client should be aware that this survey incorporated no destructive sampling to access hidden or obscured asbestos-containing materials (ACM). However, non-observable asbestos-containing

materials may exist in such areas as above solid ceilings/plenum spaces, within concrete masonry wall units, in wall cavities, vapor barriers below concrete slabs and other potential areas which are inaccessible for sample extraction due to the physical coverage of the material. Due diligence was observed in performing sampling by generally recognized industry sampling practices.

2.5 Asbestos Recommendations

The following general recommendations are provided to assist in the demolition, renovation and localized renovation of the existing structures with ACM. Note that any building material that is not identified as homogenous with those addressed in this report must be considered as an ACM unless additional testing indicates otherwise.

The following work practices should be followed whenever activities involving any ACM occur at this Facility:

- Ensure any ACM is managed in accordance with Federal, State and Local regulations.
- Remove any ACM that maybe disturbed during renovations or ensure the materials will not be disturbed.
- Always keep any ACM adequately wet before, during, and after removal operations.
- Conduct activities in a manner which produces no visible emissions to the outside air.
- Handle and dispose of all ACM in accordance with Federal, State and Local regulations.
- Maintain this report as a component of the historical record for the buildings.

2.6 Asbestos Certification

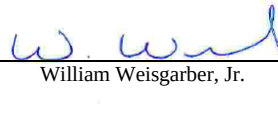
The American Industrial Hygiene Association (AIHA) and National Voluntary Laboratory Accreditation Program (NVLAP) accredited laboratory selected to analyze the bulk samples for asbestos content by PLM and TEM method, equivalent to the "Interim Method for the Determination of Asbestos in Bulk Insulation Samples" (Appendix A to Subpart F in 40 CFR Part 763) was:

INTERNATIONAL ASBESTOS TESTING LABORATORIES
9000 COMMERCE WAY, SUITE B
MOUNT LAUREL, NEW JERSEY 08054

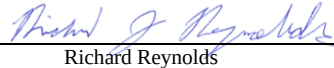
The inspector(s) who physically surveyed for ACM at the facility and have received EPA-approved training as asbestos inspectors:

WILLIAM WEISGARBER, JR. & RICHARD REYNOLDS
USA ENVIRONMENTAL MANAGEMENT, INC.
344 WEST STATE STREET
TRENTON, NEW JERSEY 08618

Signature of Inspector(s):



William Weisgarber, Jr.



Richard Reynolds

The above-signed inspector(s) certify information contained within this asbestos inspection report is true and correct concerning site conditions at the time of survey only.

3.0 SURVEY FOR LEAD-CONTAINING PAINT

3.1 Lead Paint History

Since 1971, the construction industry has been required to protect workers from exposure to lead through engineering and work practice controls. The current U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA) regulations under 29 CFR 1926.62 set the following limits for lead exposure including a lead permissible exposure limit (PEL) of 50 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$), and an action level of $30 \mu\text{g}/\text{m}^3$, as determined using an 8-hour time weighted average. Since lead paint has been determined to be a health threat, an assessment of buildings for the presence of lead paint is recommended in order to prevent occupational exposure to personnel or the general public, and to enact appropriate control measures for lead hazards.

OSHA and EPA regulations must be followed when renovation or demolition work affects any lead-based paint or paints with detectable lead levels referred to as lead-containing paint (LCP). X-Ray Fluorescence (XRF) testing of components was used as the primary testing method for the site.

A preconstruction inspection is not to be confused with a U.S. Department of Housing and Urban Development (HUD) Title X lead inspection. The preconstruction inspection's primary purpose is to identify major building components containing lead or other lead hazards in order to properly address the lead during renovation/demolition that may be impacted by the proposed work for the purpose of OSHA compliance. The inspection was conducted using the EPA's work practice standards for conducting lead-based paint activities (40 CFR 745.27) as a guide.

As per OSHA, disturbance of paint containing lead requires special training and initial exposure monitoring at a minimum. OSHA standard 29 CFR 1926.62 (Lead in Construction Standard) is invoked if any lead is present in paint or other coatings, since there is no minimum concentration level, as opposed to the EPA and HUD definitions of lead-based paint in child occupied facilities and public/private housing. These standards set forth the regulations that apply with regards to construction or renovation of painted materials or structures that contain detectable amounts of lead and not necessarily lead pigment containing items that have been manufactured.

An X-ray tube source XRF instrument was used for this inspection. The unit was operated by a factory trained user in the standard lead paint test mode using the rules and procedures found in the Performance Characteristic Sheet (PCS) for the instrument. The XRF is not substrate dependent according to the PCS, so no substrate corrections were required.

The XRF is calibrated at the beginning of the testing, every four hours thereafter and/or at the end of the testing, whichever came first. Calibrations are noted on the XRF data sheets included in appendices. Quality control included calibrations to the NIST standard for XRF sampling and duplicate testing of the same component.

3.2 LBP Sampling

XRF sampling does not require collection of material and is considered non-destructive. This state-of-the-art method for determining the composition of painted surfaces can quickly determine if a surface contains lead-based/containing paint or not and provides sufficient data concerning the amount of lead contained in paint. Data is provided as recorded by the XRF unit at the time of the survey using pre and post calibration, and by following the performance characteristic sheet of the equipment. Areas are immediately identified as coated with lead-based/containing paint using this method.

Most components tested are believed to contain several layers of paint film and are difficult to interpret. XRF and bulk paint analysis does not differentiate which layer of paint may contain lead. The results only indicate the amount of lead that is present in the sample/test location. Lead is likely to be present at a higher percentage in a particular layer than reported due to averaging the weight of other layers of paint into the calculation. For this reason, OSHA standards apply to any sample with detectable lead. Construction activities that impact these paints may result in exposure to lead, even though they are not technically considered lead-based paints.

Results of the lead testing conducted are presented in the following sections.

3.3 XRF Result Ranges

An inspection was performed on painted and non-painted components to be suspect for the presence of lead found. Readings were then taken from a representative number of surfaces, dependent on the quantity of the particular material present. Although OSHA utilizes the term “any detectable lead,” the amount of “detectable lead” is relevant in order to determine the potential for lead exposure. Information is presented in a lead range format to assist in determining protective measures and special procedures that may be required during renovation/demolition activities.

Using the aforementioned methods, USAEMI determined the following components had detectable levels of lead-containing paint (0.01 mg/cm² or greater).

TABLE 2 – LEAD-CONTAINING COMPONENTS							
Test No.	Room/Location	Wall	Substrate	Component	Lead (mg/cm ²)	EPA/HUD	OSHA
7	Exterior West	A	Concrete	Corrals	1.60	Positive	Positive

TABLE 2 – LEAD-CONTAINING COMPONENTS

Test No.	Room/Location	Wall	Substrate	Component	Lead (mg/cm ²)	EPA/HUD	OSHA
12	Exterior East	C	Metal	Corner Trim (2)	0.03	Negative	Positive
17	Exterior South	D	Concrete	Corrals	1.80	Positive	Positive

Note: Wall "A" Corresponds to the West wall parallel to Walker Avenue - Walls "B", "C", "D" continuing clockwise.

XRF field survey documentation can be found in the attached appendices of this report inclusive of the Performance Characteristic Sheet of the XRF Unit.

3.4 Lead Recommendations

As per OSHA, disturbance of paint containing lead requires special training and initial exposure monitoring at a minimum. OSHA standard 29 CFR 1926.62 (Lead in Construction Standard) is applicable if any lead is present in paint or other coatings, since there is no minimum concentration level. Refer to Appendix B for any components that may initiate the OSHA Lead in Construction Standard.

If the components are impacted, the U.S. Environmental Protection Agency (EPA), Renovation, Repair and Painting (RRP) rules, apply to renovation, repair, painting or any other activity that disturbs lead-based painted surfaces. The Contractor shall be certified by the EPA. The certified Contractor shall be trained in lead-safe work practices through completion of an EPA-accredited course and is responsible for compliance with the EPA rules. In addition, the Contractor shall provide a site specific Lead Safety Plan to address: (1) worker protection as required by the United States Department of Labor, Occupational Safety and Health Administration (OSHA), "Lead in Construction" standard (20 CFR 1926.62) and (2) worksite contamination, clean-up and waste disposal as regulated by the State of New Jersey, Department of Environmental Protection and the State of New Jersey, Department of Health.

Under the Resource Conservation and Recovery Act (RCRA) requirements, all lead-containing waste materials must be tested to determine the level of toxicity of the waste. This is accomplished by submitting a sample of the waste material for testing by the toxicity characteristic leaching procedure (TCLP) for lead to determine if the waste materials must be treated and disposed of as hazardous waste.

3.5 Lead Certification

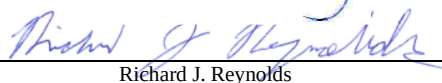
The New Jersey / USEPA-approved and trained lead inspector(s)/risk assessor(s) who surveyed the project site:

WILLIAM WEISGARBER, JR. & RICHARD J. REYNOLDS
USA ENVIRONMENTAL MANAGEMENT, INC.
344 WEST STATE STREET
TRENTON, NEW JERSEY 08618

Signature of Inspector(s):


William Weisgarber, Jr.

Signature of Inspector(s):


Richard J. Reynolds

The above-signed inspector(s) certify information contained within this inspection report is true and correct concerning site conditions at the time of survey only.

4.0 SURVEY FOR POLYCHLORINATED BIPHENYLS (PCBs)

4.1 PCB History

PCBs are synthetic organic chemicals that were produced in the United States from 1929 to 1977. Due to their non-flammability, chemical stability, high boiling point and electrical insulating properties, PCBs were used in hundreds of industrial and commercial applications including electrical, heat transfer, and hydraulic equipment; as plasticizers in paints, plastics and rubber products; in pigments, dyes and carbonless copy paper and many other applications. A major use of PCBs was in fluorescent light fixture ballasts (in the capacitor).

PCBs have been demonstrated to cause a variety of adverse health effects including a number of serious non-cancer tumors in animals. These affect the immune system, reproductive system, nervous system, and endocrine system. Studies in humans provide evidence for carcinogenic and non-carcinogenic effects of PCBs. Concern over PCBs in the environment led Congress in 1976 to enact §6(e) of the Toxic Substance Control Act (TSCA) that included among other things, prohibitions on the manufacture, processing, and distribution in commerce of PCBs.

4.2 PCB Sampling

USAEMI did not identify any suspect non-liquid caulks/sealants for testing/analysis.

4.3 Non-Liquid PCBs Recommendations

As stated, the EPA defines PCBs as those materials which are greater than, or equal to, 50 milligrams per kilogram (mg/Kg), which is equivalent to 50 parts per million (ppm). If any additional suspect PCB caulks/sealants are disclosed, they should be sampled per EPA. Dispose of generated waste materials that contain non-liquid PCBs in compliance with the Toxic Substance Control Act (TSCA). The disposal of PCB remediation waste is regulated under 40 CFR 761.61 of TSCA. Specifications should be developed for the remediation of non-liquid PCB containing materials greater than or equal to 50 mg/Kg.

APPENDIX A

*Asbestos Certificates of Analysis
Asbestos Chain of Custody Records*

Intentionally Blank Page

CERTIFICATE OF ANALYSIS

Client: USA Environmental Mgmt. Inc.
344 West State Street
Trenton NJ 08618

Report Date: 10/20/2021
Report No.: 646013 - PLM Rev #2, 11/4/2021
Project: Hazardous Materials Assessment
Project No.: 21-020793-01

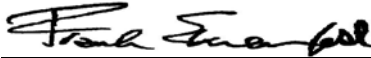
Client: USA351

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 7303911 Client No.: 01 RR 101421	Analyst Observation: Black Tar Client Description: Black Tar Coating on CMU Block Walls	Location: 103 Facility:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100
Lab No.: 7303912 Client No.: 02 RR 101421	Analyst Observation: Black Tar Client Description: Black Tar Coating on CMU Block Walls	Location: 101 Facility:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100
Lab No.: 7303913 Client No.: 03 RR 101421	Analyst Observation: Brown/Grey Stucco Client Description: Stucco Over CMU Walls	Location: Ext - East Facility:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> 3 Fibrous Glass	<u>Percent Non-Fibrous Material:</u> 97
Lab No.: 7303914 Client No.: 04 RR 101421	Analyst Observation: Brown/Grey Stucco Client Description: Stucco Over CMU Walls	Location: Ext - South Facility:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> 1 Fibrous Glass	<u>Percent Non-Fibrous Material:</u> 99
Lab No.: 7303915 Client No.: 05 RR 101421	Analyst Observation: Brown/Grey Stucco Client Description: Stucco Over CMU Walls	Location: Ext - West Facility:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> 1 Fibrous Glass	<u>Percent Non-Fibrous Material:</u> 99
Lab No.: 7303916 Client No.: 06 RR 101421	Analyst Observation: Grey Stucco Client Description: Stucco Over CMU	Location: Ext - West Facility:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100

Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 10/14/2021
Date Analyzed: 10/15/2021
Signature: 
Analyst: David Hayes

Approved By: 
Frank E. Ehrenfeld, III
Laboratory Director

CERTIFICATE OF ANALYSIS

Client: USA Environmental Mgmt. Inc.
344 West State Street
Trenton NJ 08618

Report Date: 10/20/2021
Report No.: 646013 - PLM Rev #2, 11/4/2021
Project: Hazardous Materials Assessment
Project No.: 21-020793-01

Client: USA351

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 7303917	Analyst Observation: Grey Stucco	Location: Ext - South
Client No.: 07 RR 101421	Client Description: Stucco Over CMU	Facility:
<u>Percent Asbestos:</u>	<u>Percent Non-Asbestos Fibrous Material:</u>	<u>Percent Non-Fibrous Material:</u>
<i>None Detected</i>	None Detected	100

Lab No.: 7303918	Analyst Observation: Grey Stucco	Location: Ext - South
Client No.: 08 RR 101421	Client Description: Stucco Over CMU	Facility:
<u>Percent Asbestos:</u>	<u>Percent Non-Asbestos Fibrous Material:</u>	<u>Percent Non-Fibrous Material:</u>
<i>None Detected</i>	None Detected	100

Lab No.: 7303919	Analyst Observation: Black Coating	Location: 103 (Floor)
Client No.: 09 RR 101421	Client Description: Tar Coating at Floor	Facility:
<u>Percent Asbestos:</u>	<u>Percent Non-Asbestos Fibrous Material:</u>	<u>Percent Non-Fibrous Material:</u>
<i>None Detected</i>	2 Cellulose 1 Fibrous Glass	97

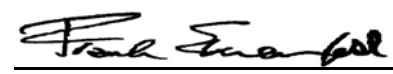
Lab No.: 7303920	Analyst Observation: Black Coating	Location: 103 (Floor)
Client No.: 10 RR 101421	Client Description: Tar Coating at Floor	Facility:
<u>Percent Asbestos:</u>	<u>Percent Non-Asbestos Fibrous Material:</u>	<u>Percent Non-Fibrous Material:</u>
<i>None Detected</i>	2 Cellulose 1 Fibrous Glass	97

Lab No.: 7303921	Analyst Observation: Tan Fiberboard	Location: 103
Client No.: 11 RR 101421	Client Description: Black Pressed Fiberboard Walls With Tar Like Coating	Facility:
<u>Percent Asbestos:</u>	<u>Percent Non-Asbestos Fibrous Material:</u>	<u>Percent Non-Fibrous Material:</u>
<i>None Detected</i>	90 Cellulose	10

Lab No.: 7303921(L2)	Analyst Observation: Black Coating	Location: 103
Client No.: 11 RR 101421	Client Description: Black Pressed Fiberboard Walls With Tar Like Coating	Facility:
<u>Percent Asbestos:</u>	<u>Percent Non-Asbestos Fibrous Material:</u>	<u>Percent Non-Fibrous Material:</u>
<i>None Detected</i>	None Detected	100

Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 10/14/2021
Date Analyzed: 10/15/2021
Signature: 
Analyst: David Hayes

Approved By: 
Frank E. Ehrenfeld, III
Laboratory Director

CERTIFICATE OF ANALYSIS

Client: USA Environmental Mgmt. Inc.
344 West State Street
Trenton NJ 08618

Report Date: 10/20/2021
Report No.: 646013 - PLM Rev #2, 11/4/2021
Project: Hazardous Materials Assessment
Project No.: 21-020793-01

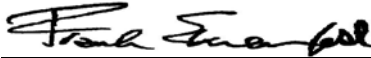
Client: USA351

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 7303922 Client No.: 12 RR 101421	Analyst Observation: Tan Fiberboard Client Description: Black Pressed Fiberboard Walls With Tar Like Coating	Location: 103 Facility:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> 90 Cellulose	<u>Percent Non-Fibrous Material:</u> 10
Lab No.: 7303922(L2) Client No.: 12 RR 101421	Analyst Observation: Black Coating Client Description: Black Pressed Fiberboard Walls With Tar Like Coating	Location: 103 Facility:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100
Lab No.: 7303923 Client No.: 13 RR 101421	Analyst Observation: Brown Shingle Client Description: Brown Mineral Coat Roof Shingle	Location: R1 Facility:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> 15 Fibrous Glass Trace Cellulose	<u>Percent Non-Fibrous Material:</u> 85
Lab No.: 7303924 Client No.: 14 RR 101421	Analyst Observation: Brown Shingle Client Description: Brown Mineral Coat Roof Shingle	Location: R1 Facility:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> 15 Fibrous Glass 1 Cellulose	<u>Percent Non-Fibrous Material:</u> 84
Lab No.: 7303925 Client No.: 15 RR 101421	Analyst Observation: Black Tar Paper Client Description: Black Rolled Tar Paper Under ID NO. 06	Location: R1 Facility:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> 75 Cellulose	<u>Percent Non-Fibrous Material:</u> 25
Lab No.: 7303926 Client No.: 16 RR 101421	Analyst Observation: Black Tar Paper Client Description: Black Rolled Tar Paper Under ID NO. 06	Location: R1 Facility:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> 75 Cellulose	<u>Percent Non-Fibrous Material:</u> 25

Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 10/14/2021
Date Analyzed: 10/15/2021
Signature: 
Analyst: David Hayes

Approved By: 
Frank E. Ehrenfeld, III
Laboratory Director

CERTIFICATE OF ANALYSIS

Client: USA Environmental Mgmt. Inc.
344 West State Street
Trenton NJ 08618

Client: USA351

Report Date: 10/20/2021
Report No.: 646013 - PLM
Project: Hazardous Materials Assessment
Project No.: 21-020793-01

Appendix to Analytical Report

Customer Contact: Bill Weisgarber

Method: 40 CFR Appendix E to Subpart E of Part 763, interim method for the Determination of Asbestos in Bulk Insulation Samples, USEPA 600, R93-116 and NYSDOH ELAP 198.1 as needed.

This appendix seeks to promote greater understanding of any observations, exceptions, special instructions, or circumstances that the laboratory needs to communicate to the client concerning the above samples. The information below is used to help promote your ability to make the most informed decisions for you and your customers. Please note the following points of contact for any questions you may have.

iATL Customer Service: customerservice@iatl.com

iATL Office Manager: wchampion@iatl.com

iATL Account Representative: Shirley Clark

Sample Login Notes: See Batch Sheet Attached

Sample Matrix: Bulk Building Materials

Exceptions Noted: See Following Pages

General Terms, Warrants, Limits, Qualifiers:

General information about iATL capabilities and client/laboratory relationships and responsibilities are spelled out in iATL policies that are listed at www.iATL.com and in our Quality Assurance Manual per ISO 17025 standard requirements. The information therein is a representation of iATL definitions and policies for turnaround times, sample submittal, collection media, blank definitions, quantification issues and limit of detection, analytical methods and procedures, sub-contracting policies, results reporting options, fees, terms, and discounts, confidentiality, sample archival and disposal, and data interpretation.

iATL warrants the test results to be of a precision normal for the type and methodology employed for each sample submitted. iATL disclaims any other warrants, expressed or implied, including warranty of fitness for a particular purpose and warranty of merchantability. iATL accepts no legal responsibility for the purpose for which the client uses test results. Any analytical work performed must be governed by our Standard Terms and Conditions. Prices, methods and detection limits may be changed without notification. Please contact your Customer Service Representative for the most current information.

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA LAP LLC, or any agency of local, state or province governments nor of any agency of the U.S. government.

This report shall not be reproduced except in full, without written approval of the laboratory.

Information Pertinent to this Report:

Analysis by US EPA 600 93-116: Determination of Asbestos in Bulk Building Materials by Polarized Light Microscopy (PLM).

Certifications:

- NIST-NVLAP No. 101165-0
- NYSDOH-ELAP No. 11021
- AIHA-LAP, LLC No. 100188

Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. PC Trace represents a <0.25% amount. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analytical Methodology Alternatives: Your initial request for analysis may not have accounted for recent advances in regulatory requirements or advances in technology that are routinely used in similar situations for other qualified projects. You may have the option to explore additional analysis for further information. Below are a few options, listed as the matrix followed by the appropriate methodology. Also included are links to more information on our website.

Bulk Building Materials that are Non-Friable Organically Bound (NOB) by Gravimetric Reduction techniques employing PLM and TEM: ELAP 198.6 (PLM-NOB), ELAP 198.4 (TEM-NOB) See additional information at the end of this appendix.

CERTIFICATE OF ANALYSIS

Client: USA Environmental Mgmt. Inc.
344 West State Street
Trenton NJ 08618

Client: USA351

Report Date: 10/20/2021
Report No.: 646013 - PLM
Project: Hazardous Materials Assessment
Project No.: 21-020793-01

Loose Fill Vermiculite Insulation, Attic Insulation, Zonolite (copyright), etc.: US EPA 600 R-4/004 (multi-tiered analytical process)
Sprayed On Insulation/Fireproofing with Vermiculite (SOF-V): ELAP 198.8 (PLM-SOF-V)

Soil, sludge, sediment, aggregate, and like materials analyzed for asbestos or other elongated mineral particles (ex. erionite, etc.): ASTM D7521, CARB 435, and other options available

Asbestos in Surface Dust according to one of ASTM's Methods (very dependent on sampling collection technique – by TEM): ASTM D 5755, D5756, or D6480

Various other asbestos matrices (air, water, etc.) and analytical methods are available.

Disclaimers / Qualifiers:

There may be some samples in this project that have a "NOTE:" associated with a sample result. We use added disclaimers or qualifiers to inform the client about something that requires further explanation. Here is a list with highlighted disclaimers that may be pertinent to this project. For a full explanation of these and other disclaimers, please inquire at **customerservice@iatl.com**.

- 1) Note: No mastic provided for analysis.
- 2) Note: Insufficient mastic provided for analysis.
- 3) Note: Insufficient material provided for analysis.
- 4) Note: Insufficient sample provided for QC reanalysis.
- 5) Note: Different material than indicated on Sample Log / Description.
- 6) Note: Sample not submitted.
- 7) Note: Attached to asbestos containing material.
- 8) Note: Received wet.
- 9) Note: Possible surface contamination.
- 10) Note: Not building material. 1% threshold may not apply.
- 11) Note: Recommend TEM-NOB analysis as per EPA recommendations.
- 12) Note: Asbestos detected but not quantifiable.
- 13) Note: Multiple identical samples submitted, only one analyzed.
- 14) Note: Analyzed by EPA 600/R-93/116. Point Counting detection limit at 0.080%.
- 15) Note: Analyzed by EPA 600/R-93/116. Point Counting detection limit at 0.125%.
- 16) Note: This sample contains >10% vermiculite mineral. See Appendix for Recommendations for Vermiculite Analysis.

Recommendations for Vermiculite Analysis:

Several analytical protocols exist for the analysis of asbestos in vermiculite. These analytical approaches vary depending upon the nature of the vermiculite mineral being tested (e.g. un-processed gänge, homogeneous exfoliated books of mica, or mixed mineral composites). Please contact your client representative for pricing and turnaround time options available.

iATL recommends initial testing using the EPA 600/R-93/116 method. This method is specifically designed for the analysis of asbestos in bulk building materials. It provides an acceptable starting point for primary screening of vermiculite for possible asbestos.

Results from this testing may be inconclusive. EPA suggests proceeding to a multi-tiered analysis involving wet separation techniques in conjunction with PLM and TEM gravimetric analysis (EPA 600/R-04/004).

For New York State customers, NYSDOH requires disclaimers and qualifiers for various vermiculite containing samples that direct analysis via ELAP198.6 and ELAP198.8 for samples that contain >10% vermiculite mineral where ELAP198.6 may be used to evaluate the asbestos content of the material. However, any test result using ELAP198.6 will be reported with the following disclaimer: "ELAP198.6 method does not remove vermiculite and may underestimate the level of asbestos present in a sample containing >10% vermiculite."

Further information on this method and other vermiculite and asbestos issues can be found at the following: Agency for Toxic Substances and Disease Registry (ATSDR) www.atsdr.cdc.gov, United States Geological Survey (USGS) www.minerals.usgs.gov/minerals/, US EPA www.epa.gov/asbestos. The USEPA also has an informative brochure "Current Best Practices for Vermiculite Attic Insulation" EPA 747F03001 May 2003, that may assist the health and remediation professional. NYS customers please follow current NYSDOH ELAP requirements per policy on subject of surfacing and vermiculite, May 6, 2016, Testing Requirements for Surfacing Material Containing Vermiculite (https://www.wadsworth.org/sites/default/files/WebDoc/1198_8_02_2.pdf)

The following is a summary of the analytical process outlines in the EPA 600/R-04/004 Method:

- 1) **Analytical Step/Method:** Initial Screening by PLM, EPA 600R-93/116
Requirements/Comments: Minimum of 0.1 g of sample. ~0.25% for most samples.

CERTIFICATE OF ANALYSIS

Client: USA Environmental Mgmt. Inc.
344 West State Street
Trenton NJ 08618

Report Date: 10/20/2021
Report No.: 646013 - PLM
Project: Hazardous Materials Assessment
Project No.: 21-020793-01

Client: USA351

2)**Analytical Step/Method:** Wet Separation by PLM Gravimetric Technique, EPA R-04/004

Requirements/Comments: Minimum 50g** of dry sample. Analysis of "Sinks" only.

3)**Analytical Step/Method:** Wet Separation by PLM Gravimetric Technique, EPA R-04/004

Requirements/Comments: Minimum 50g** of dry sample. Analysis of "Floats" only.

4)**Analytical Step/Method:** Wet Separation by TEM Gravimetric Technique, EPA R-04/004

Requirements/Comments: Minimum 50g** of dry sample. Analysis of "Sinks" only.

5)**Analytical Step/Method:** Wet Separation by TEM Gravimetric Technique, EPA R-04/004

Requirements/Comments: Minimum 50g** of dry sample. Analysis of "Suspension" only.

*With advance notice and confirmation by the laboratory.

**Approximately 1 Liter of sample in double-bagged container (~9x6 inch bag of sample).

New York State Department of Health requires that samples originating from NYS that they categorize as Non-friable Organically Bound materials can only be confirmed as None Detected for asbestos by method 198.4. See the table below for a list of those materials. (ENVIRONMENTAL LABORATORY APPROVAL PROGRAM CERTIFICATION MANUAL - ITEM No. 198.1, Revision Date 5/6/16)

*Asphalt Shingles, Caulking, Ceiling Tiles with Cellulose, Duct Wrap, Glazing, Mastic, Paint Chips, Resilient Floor Tiles, Rubberized Asbestos Gaskets, Siding Shingles, Vinyl Asbestos Tile, NOB materials (other than SM-V) with <10% vermiculite, Any material (Friable or NOB other than SM-V) with >10% vermiculite.

Statistically derived uncertainty with any measure should be taken into consideration when reviewing and interpreting all reported data and results. A more comprehensive listing of accuracy, precision, and uncertainty as it impacts this method is available upon request.

CERTIFICATE OF ANALYSIS

Client: USA Environmental Mgmt. Inc.
344 West State Street
Trenton NJ 08618

Report Date: 10/20/2021
Report No.: 646013 - TEM NOB Rev #2, 11/4/2021
Project: Hazardous Materials Assessment
Project No.: 21-020793-01

Client: USA351

TEM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 7303912
Client No.: 02 RR 101421
Description: Black Tar
% Asbestos Detected:
None Detected

Facility:
Location: 101

% Non-Asbestos Fibrous Material:
3.9 SiAl, Other Fiber

Organic Fraction: 73.7 %
Gravimetrically Reduced Subsample: 26.3%

% Non-Fibrous Material:
22.4 Other

Please refer to the Preface of this report for further information regarding your analysis.

Date Received: 10/14/2021
Date Analyzed: 10/20/2021
Signature: 
Analyst: Mark Stewart

Approved By: 
Frank E. Ehrenfeld, III
Laboratory Director

CERTIFICATE OF ANALYSIS

Client: USA Environmental Mgmt. Inc.
344 West State Street
Trenton NJ 08618

Report Date: 10/20/2021
Report No.: 646013 - TEM NOB Rev #2, 11/4/2021
Project: Hazardous Materials Assessment
Project No.: 21-020793-01

Client: USA351

TEM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 7303920
Client No.: 10 RR 101421
Description: Black Coating
% Asbestos Detected:
None Detected

Facility:
Location: 103 (Floor)

% Non-Asbestos Fibrous Material:
1.5 SiAl, Other Fiber

Organic Fraction: 26.0 %
Gravimetrically Reduced Subsample: 74.0%

% Non-Fibrous Material:
72.5 Other

Please refer to the Preface of this report for further information regarding your analysis.

Date Received: 10/14/2021
Date Analyzed: 10/20/2021
Signature: 
Analyst: Mark Stewart

Approved By: 
Frank E. Ehrenfeld, III
Laboratory Director

CERTIFICATE OF ANALYSIS

Client: USA Environmental Mgmt. Inc.
344 West State Street
Trenton NJ 08618

Report Date: 10/20/2021
Report No.: 646013 - TEM NOB Rev #2, 11/4/2021
Project: Hazardous Materials Assessment
Project No.: 21-020793-01

Client: USA351

TEM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 7303922(L2)
Client No.: 12 RR 101421
Description: Black Coating
% Asbestos Detected:
None Detected

Facility:
Location: 103

% Non-Asbestos Fibrous Material:
None Detected

Organic Fraction: 97.7 %
Gravimetrically Reduced Subsample: 2.3%

% Non-Fibrous Material:
2.3 Other

Please refer to the Preface of this report for further information regarding your analysis.

Date Received: 10/14/2021
Date Analyzed: 10/20/2021
Signature: 
Analyst: Mark Stewart

Approved By: 
Frank E. Ehrenfeld, III
Laboratory Director

CERTIFICATE OF ANALYSIS

Client: USA Environmental Mgmt. Inc.
344 West State Street
Trenton NJ 08618

Client: USA351

Report Date: 10/20/2021
Report No.: 646013 - TEM NOB Rev #2, 11/4/2021
Project: Hazardous Materials Assessment
Project No.: 21-020793-01

TEM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 7303924
Client No.: 14 RR 101421
Description: Brown Shingle
% Asbestos Detected:
None Detected

Facility:
Location: R1

% Non-Asbestos Fibrous Material:
Trace SiAl, Other Fiber

Organic Fraction: 65.9 %
Gravimetrically Reduced Subsample: 34.1%

% Non-Fibrous Material:
34.1 Other

Please refer to the Preface of this report for further information regarding your analysis.

Date Received: 10/14/2021
Date Analyzed: 10/20/2021
Signature: 
Analyst: Mark Stewart

Approved By: 
Frank E. Ehrenfeld, III
Laboratory Director

CERTIFICATE OF ANALYSIS

Client: USA Environmental Mgmt. Inc.
344 West State Street
Trenton NJ 08618

Client: USA351

Report Date: 10/20/2021
Report No.: 646013 - TEM NOB Rev #2, 11/4/2021
Project: Hazardous Materials Assessment
Project No.: 21-020793-01

TEM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 7303926
Client No.: 16 RR 101421
Description: Black Tar Paper
% Asbestos Detected:
None Detected

Facility:
Location: R1
% Non-Asbestos Fibrous Material:
None Detected

Organic Fraction: 98.2 %
Gravimetrically Reduced Subsample: 1.8%
% Non-Fibrous Material:
1.8 Other

Please refer to the Preface of this report for further information regarding your analysis.

Date Received: 10/14/2021
Date Analyzed: 10/20/2021
Signature: 
Analyst: Mark Stewart

Approved By: 
Frank E. Ehrenfeld, III
Laboratory Director

CERTIFICATE OF ANALYSIS

Client: USA Environmental Mgmt. Inc.
344 West State Street
Trenton NJ 08618

Client: USA351

Report Date: 10/20/2021
Report No.: 646013 - TEM NOB
Project: Hazardous Materials Assessment
Project No.: 21-020793-01

Appendix to Analytical Report:

Customer Contact: Bill Weisgarber
Analysis: ELAP Section 198.4

This appendix seeks to promote greater understanding of any observations, exceptions, special instructions, or circumstances that the laboratory needs to communicate to the client concerning the above samples. The information below is used to help promote your ability to make the most informed decisions for you and your customers. Please note the following points of contact for any questions you may have.

iATL Customer Service: customerservice@iatl.com
iATL Office Manager: wchampion@iatl.com
iATL Account Representative: Shirley Clark
Sample Login Notes: See Batch Sheet Attached
Sample Matrix: Bulk material, Non-Friable Organically Bound material such as VSF, FT, M, RM, Tar, CB, Shingle, Tar Paper, Caulk, Glazing
Exceptions Noted: See Following Pages

General Terms, Warrants, Limits, Qualifiers:

General information about iATL capabilities and client/laboratory relationships and responsibilities are spelled out in iATL policies that are listed at www.iATL.com and in our Quality Assurance Manual per ISO 17025 standard requirements. The information therein is a representation of iATL definitions and policies for turnaround times, sample submittal, collection media, blank definitions, quantification issues and limit of detection, analytical methods and procedures, sub-contracting policies, results reporting options, fees, terms, and discounts, confidentiality, sample archival and disposal, and data interpretation.

iATL warrants the test results to be of a precision normal for the type and methodology employed for each sample submitted. iATL disclaims any other warrants, expressed or implied, including warranty of fitness for a particular purpose and warranty of merchantability. iATL accepts no legal responsibility for the purpose for which the client uses test results. Any analytical work performed must be governed by our Standard Terms and Conditions. Prices, methods and detection limits may be changed without notification. Please contact your Customer Service Representative for the most current information.

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA LAP LLC, or any agency of local, state or province governments nor of any agency of the U.S. government.

This report shall not be reproduced except in full, without written approval of the laboratory.

Information Pertinent to this Report:

Analysis by ELAP Section 198.4

Certifications:

- NIST-NVLAP No. 101165-0
- NYSDOH-ELAP No. 11021
- AIHA-LAP, LLC No. 100188

All results are based on the samples as received at the lab. iATL assumes that appropriate sampling methods have been used and that the data upon which these results are based have been accurately supplied by the client.

The "Gravimetrically Reduced Subsample" is the portion of the submitted sample remaining following the ashing and acid treatment processes. TEM analysis occurs on this portion of the sample.

Final results are calculated to represent the sample as submitted. Results are verifiable for only those operations and analyses performed in the laboratory.

CERTIFICATE OF ANALYSIS

Client: USA Environmental Mgmt. Inc.
344 West State Street
Trenton NJ 08618

Report Date: 10/20/2021
Report No.: 646013 - TEM NOB
Project: Hazardous Materials Assessment
Project No.: 21-020793-01

Client: USA351

Disclaimers / Qualifiers:

There may be some samples in this project that have a "NOTE:" associated with a sample result. We use added disclaimers or qualifiers to inform the client about something that requires further explanation. Here is a complete list with highlighted disclaimers pertinent to this project. For a full explanation of these and other disclaimers, please inquire at customerservice@iatl.com.

- (1)Note: Sample not analyzed.
- (2)Note: Sample not analyzed at request of client.
- (3)Note: Sample analysis terminated. Clearance criteria exceeded (average >70.0 s/mm²). Set fails by AHERA 40 CFR 763.
- (4)Note: Heavy loading (>0.1 s/cc) of non-asbestos particulate that might prohibit the required morphological, diffraction and elemental identification of asbestos. The absence of asbestos on the sample can not be concluded. Analysis for informational purposes only.
- (5)Note: Heavy loading (>10% per grid opening) non-fibrous particulate. Sample analysis terminated. Clearance criteria exceeded (>10%). Sample voided by AHERA 40 CFR 763.
- (5A)Note: Heavy loading (>25% per grid opening) non-fibrous particulate. Sample analysis terminated. Clearance criteria exceeded (>25%). Sample voided by NIOSH 7402.
- (6)Note: Sample turbidity >1.0 NTU. Therefore MDL >> 0.1 MFL. Does not meet National Primary Drinking Water Standards.
- (7)Note: Sample integrity compromised. Received sample cassette with top open (40 CFR 763 c-e).
- (8)Note: Received sample cassettes with portion of filter missing. "PCM re-prep"
- (9)Note: Void - overloaded, unable to prep.
- (10)Note: Void - filter damaged.
- (11)Note: No volume supplied.
- (12)Note: Heavy loading (>0.1 s/cc) of non-asbestos / non-fibrous particulate.
- (13)Note: Method analytical sensitivity of <0.003 s/cc not attained due to volume of air sampled. NIOSH requires a minimum of 400L.
- (13A)Note: Volume does not meet AHERA requirements.(<1188 L)
- (14)Note: Geometric Mean = 0.xxxx Structures/cc
- (15)Note: Samples received on 0.8 micron PCM filters. Samples must be submitted on 0.45 micron filter cassettes per AHERA guidelines
- (18)Note: *Results are for informational purposes only. Samples received on 0.8um PCM cassettes. Per AHERA 40 CFR 763 guidelines samples must be obtained on a 0.45um cassette.
- (TEM NOB 1) Note: The above result represents only the analysis of NOB-residue submitted from the client.
- (TEM NOB 2) Note: Insufficient material (<100mg) to verify results.



USA Environmental Management, Inc.

344 West State Street
Trenton, New Jersey 08618

CLIENT: Stonewater Architecture, LLC
PROJECT: Hazardous Materials Assessment
SITE: NJDOT West Berlin Maintenance
BUILDING: Pole Barn Structure (Bldg. No. 1495)

DATE: October 14, 2021
TECHNICIAN: Richard Reynolds
PROJECT #: 21-020793-01
DPMC #: T0617-00

TYPE OF ANALYSIS
☒ PLM, EPA/600/R-93/116
☒ Stop @ 1st Positive ID No.

BULK SAMPLE DATA AND CHAIN OF CUSTODY FORM

SAMPLE ID	MATERIAL / (ID No.)	SAMPLE LOCATION	ADDITIONAL ANALYSIS
7303911 01 PR 10421	Black Tar Coating on CMU Block walls (01)	103	☐ TEM EPA NOB (if ND or <1% by PLM)
7303912	↓ (01)	101	☒ TEM EPA NOB (if ND or <1% by PLM)
7303913 03	Stucco Over CMU walls Entrance (02)	Ext. East	☐ TEM EPA NOB (if ND or <1% by PLM)
7303914 04	↓ (02)	Ext. South	☐ TEM EPA NOB (if ND or <1% by PLM)
7303915 05	↓ (02)	Ext. West	☐ TEM EPA NOB (if ND or <1% by PLM)
7303916 06	Stucco Over CMU Corrids ↓ (03)	Ext. West	☐ TEM EPA NOB (if ND or <1% by PLM)
7303917 07	↓ (03)	Ext. South	☐ TEM EPA NOB (if ND or <1% by PLM)
7303918 08	↓ (03)	Ext. South	☐ TEM EPA NOB (if ND or <1% by PLM)
7303919 09	Tar Coating @ Floor ↓ (04)	103 (Floor)	☐ TEM EPA NOB (if ND or <1% by PLM)
7303920 10	↓ (04)	103 (Floor)	☒ TEM EPA NOB (if ND or <1% by PLM)
7303921 11	Black Pressed Fiberglass Walls w/ Tar-like Coating (05)	103	☐ TEM EPA NOB (if ND or <1% by PLM)
7303922 12	↓ (05)	103	☒ TEM EPA NOB (if ND or <1% by PLM)

TURN-AROUND-TIME	
☐ 6 Hours	☐ 3 Days
☐ 1 Day	☒ TEM, 2 Days
☒ 2 Days	☐ TEM, 3 Days

RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME
I. <i>Richard Reynolds</i>	10/14		RECEIVED		
II.			II.		
III.			III. <i>Oct 14 2021</i>		

COMMENTS: CMUs - Concrete Masonry Units

Richard Reynolds IATL - By
10/15/21



USA Environmental Management, Inc.

344 West State Street
Trenton, New Jersey 08618

CLIENT: Stonewater Architecture, LLC
PROJECT: Hazardous Materials Assessment
SITE: NJDOT West Berlin Maintenance
BUILDING: Pole Barn Structure (Bldg. No. 1495)

DATE: October 14, 2021
TECHNICIAN: Richard Reynolds
PROJECT #: 21-020793-01
DPMC #: T0617-00

TYPE OF ANALYSIS

☒ PLM, EPA/600/R-93/116
☒ Stop @ 1st Positive ID No.

BULK SAMPLE DATA AND CHAIN OF CUSTODY FORM

SAMPLE ID	MATERIAL / (ID No.)	SAMPLE LOCATION	ADDITIONAL ANALYSIS
7303923 13 ER 16/14/21	Brown Mineral Coat Roof Shingles (06)	R1	☐ TEM EPA NOB (if ND or <1% by PLM)
7303924 14	↓ (06)	R1	☒ TEM EPA NOB (if ND or <1% by PLM)
7303925 15	Black Polled Tar Paper Under ID No. 06 (07)	R1	☐ TEM EPA NOB (if ND or <1% by PLM)
7303926 16	↓ (07)	R1	☒ TEM EPA NOB (if ND or <1% by PLM)
	()		☐ TEM EPA NOB (if ND or <1% by PLM)
	()		☐ TEM EPA NOB (if ND or <1% by PLM)
	()		☐ TEM EPA NOB (if ND or <1% by PLM)
	()		☐ TEM EPA NOB (if ND or <1% by PLM)
	()		☐ TEM EPA NOB (if ND or <1% by PLM)
	()		☐ TEM EPA NOB (if ND or <1% by PLM)
	()		☐ TEM EPA NOB (if ND or <1% by PLM)
	()		☐ TEM EPA NOB (if ND or <1% by PLM)
	()		☐ TEM EPA NOB (if ND or <1% by PLM)

TURN-AROUND-TIME	
☐ 6 Hours	☐ 3 Days
☐ 1 Day	☒ TEM, 2 Days
☒ 2 Days	☐ TEM, 3 Days

RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME
I. <i>Richard Reynolds</i>	10/14		I.		
II.			II.		
III.			III.		

COMMENTS: _____

APPENDIX B

XRF Field Survey Data
XRF Performance Characteristic Sheet



Client: Stonewater Architecture

Inspection Date: 10/14/2021

Project #: 21-020793-01

Inspector: R. Reynolds

Site: West Berlin Maintenance Yard - Pole Barn (Bldg. 1495)

Inspector ID #: 029956

Name: T0617-00 - Material Storage Bin Installation

XRF Serial #: 2122

Test No.	Room/Location	Wall	Substrate	Component	Lead (mg/cm ²)	EPA/HUD	OSHA
1	Calibration A	-	-	-	0.90	-	-
2	Calibration B	-	-	-	1.00	-	-
3	Calibration C	-	-	-	1.00	-	-
4	Exterior West	A	Wood	Wall	0.00	Negative	Negative
5	Exterior West	A	Concrete	Foundation	0.00	Negative	Negative
6	Exterior West	A	Wood	Column (1)	0.00	Negative	Negative
7	Exterior West	A	Concrete	Corrals	1.60	Positive	Positive
8	Exterior North	B	Wood	Column (2)	0.00	Negative	Negative
9	Exterior North	B	Metal	Corner Trim	0.00	Negative	Negative
10	Exterior North	B	Wood	Fascia Board	0.00	Negative	Negative
11	Exterior East	C	Wood	Wall	0.00	Negative	Negative
12	Exterior East	C	Metal	Corner Trim (2)	0.03	Negative	Positive
13	Exterior East	C	Concrete	Foundation	0.00	Negative	Negative
14	Exterior South	D	Wood	Wall	0.00	Negative	Negative
15	Exterior South	D	Concrete	Foundation	0.00	Negative	Negative
16	Exterior South	D	Wood	Fascia Board	0.00	Negative	Negative
17	Exterior South	D	Concrete	Corrals	1.80	Positive	Positive
18	101	A	Wood	Wall	0.00	Negative	Negative
19	101	B	Wood	Wall	0.00	Negative	Negative
20	101	D	Wood	Wall	0.00	Negative	Negative
21	102	A	Wood	Wall	0.00	Negative	Negative
22	102	B	Wood	Wall	0.00	Negative	Negative
23	102	D	Wood	Wall	0.00	Negative	Negative



Client: Stonewater Architecture

Inspection Date: 10/14/2021

Project #: 21-020793-01

Inspector: R. Reynolds

Site: West Berlin Maintenance Yard - Pole Barn (Bldg. 1495)

Inspector ID #: 029956

Name: T0617-00 - Material Storage Bin Installation

XRF Serial #: 2122

Test No.	Room/Location	Wall	Substrate	Component	Lead (mg/cm ²)	EPA/HUD	OSHA
24	Calibration A	-	-	-	1.10	-	-
25	Calibration B	-	-	-	1.00	-	-
26	Calibration C	-	-	-	1.00	-	-

Performance Characteristic Sheet

EFFECTIVE DATE: September 24, 2004

EDITION NO.: 1

MANUFACTURER AND MODEL:

Make: Niton LLC

Tested Model: XLp 300

Source: ^{109}Cd

Note: This PCS is also applicable to the equivalent model variations indicated below, for the Lead-in-Paint K+L variable reading time mode, in the XLi and XLp series:

XLi 300A, XLi 301A, XLi 302A and XLi 303A.

XLp 300A, XLp 301A, XLp 302A and XLp 303A.

XLi 700A, XLi 701A, XLi 702A and XLi 703A.

XLp 700A, XLp 701A, XLp 702A, and XLp 703A.

Note: The XLi and XLp versions refer to the shape of the handle part of the instrument. The differences in the model numbers reflect other modes available, in addition to Lead-in-Paint modes. The manufacturer states that specifications for these instruments are identical for the source, detector, and detector electronics relative to the Lead-in-Paint mode.

FIELD OPERATION GUIDANCE

OPERATING PARAMETERS:

Lead-in-Paint K+L variable reading time mode.

XRF CALIBRATION CHECK LIMITS:

0.8 to 1.2 mg/cm² (inclusive)

The calibration of the XRF instrument should be checked using the paint film nearest 1.0 mg/cm² in the NIST Standard Reference Material (SRM) used (e.g., for NIST SRM 2579, use the 1.02 mg/cm² film).

If readings are outside the acceptable calibration check range, follow the manufacturer's instructions to bring the instruments into control before XRF testing proceeds.

SUBSTRATE CORRECTION:

For XRF results using Lead-in-Paint K+L variable reading time mode, substrate correction is not needed for:

Brick, Concrete, Drywall, Metal, Plaster, and Wood

INCONCLUSIVE RANGE OR THRESHOLD:

K+L MODE READING DESCRIPTION	SUBSTRATE	THRESHOLD (mg/cm ²)
Results not corrected for substrate bias on any substrate	Brick	1.0
	Concrete	1.0
	Drywall	1.0
	Metal	1.0
	Plaster	1.0
	Wood	1.0

BACKGROUND INFORMATION

EVALUATION DATA SOURCE AND DATE:

This sheet is supplemental information to be used in conjunction with Chapter 7 of the HUD *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing* ("HUD Guidelines"). Performance parameters shown on this sheet are calculated from the EPA/HUD evaluation using archived building components. Testing was conducted in August 2004 on 133 testing combinations. The instruments that were used to perform the testing had new sources; one instrument's was installed in November 2003 with 40 mCi initial strength, and the other's was installed June 2004 with 40 mCi initial strength.

OPERATING PARAMETERS:

Performance parameters shown in this sheet are applicable only when properly operating the instrument using the manufacturer's instructions and procedures described in Chapter 7 of the HUD Guidelines.

SUBSTRATE CORRECTION VALUE COMPUTATION:

Substrate correction is not needed for brick, concrete, drywall, metal, plaster or wood when using Lead-in-Paint K+L variable reading time mode, the normal operating mode for these instruments. If substrate correction is desired, refer to Chapter 7 of the HUD Guidelines for guidance on correcting XRF results for substrate bias.

EVALUATING THE QUALITY OF XRF TESTING:

Randomly select ten testing combinations for retesting from each house or from two randomly selected units in multifamily housing. Use the K+L variable time mode readings.

Conduct XRF retesting at the ten testing combinations selected for retesting.

Determine if the XRF testing in the units or house passed or failed the test by applying the steps below.

Compute the Retest Tolerance Limit by the following steps:

Determine XRF results for the original and retest XRF readings. Do not correct the original or retest results for substrate bias. In single-family housing a result is defined as the average of three readings. In multifamily housing, a result is a single reading. Therefore, there will be ten original and ten retest XRF results for each house or for the two selected units.

Calculate the average of the original XRF result and retest XRF result for each testing combination.

Square the average for each testing combination.

Add the ten squared averages together. Call this quantity C.

Multiply the number C by 0.0072. Call this quantity D.

Add the number 0.032 to D. Call this quantity E.

Take the square root of E. Call this quantity F.

Multiply F by 1.645. The result is the Retest Tolerance Limit.

Compute the average of all ten original XRF results.

Compute the average of all ten re-test XRF results.

Find the absolute difference of the two averages.

If the difference is less than the Retest Tolerance Limit, the inspection has passed the retest. If the difference of the overall averages equals or exceeds the Retest Tolerance Limit, this procedure should be repeated with ten new testing combinations. If the difference of the overall averages is equal to or greater than the Retest Tolerance Limit a second time, then the inspection should be considered deficient.

Use of this procedure is estimated to produce a spurious result approximately 1% of the time. That is, results of this procedure will call for further examination when no examination is warranted in approximately 1 out of 100 dwelling units tested.

TESTING TIMES:

For the Lead-in-Paint K+L variable reading time mode, the instrument continues to read until it is moved away from the testing surface, terminated by the user, or the instrument software indicates the reading is complete. The following table provides testing time information for this testing mode. The times have been adjusted for source decay, normalized to the initial source strengths as noted above. Source strength and type of substrate will affect actual testing times. At the time of testing, the instruments had source strengths of 26.6 and 36.6 mCi.

Testing Times Using K+L Reading Mode (Seconds)						
	All Data			Median for laboratory-measured lead levels (mg/cm ²)		
Substrate	25 th Percentile	Median	75 th Percentile	Pb < 0.25	0.25 ≤ Pb < 1.0	1.0 ≤ Pb
Wood Drywall	4	11	19	11	15	11
Metal	4	12	18	9	12	14
Brick Concrete Plaster	8	16	22	15	18	16

CLASSIFICATION RESULTS:

XRF results are classified as positive if they are greater than or equal to the threshold, and negative if they are less than the threshold.

DOCUMENTATION:

A document titled *Methodology for XRF Performance Characteristic Sheets* provides an explanation of the statistical methodology used to construct the data in the sheets, and provides empirical results from using the recommended inconclusive ranges or thresholds for specific XRF instruments. For a copy of this document call the National Lead Information Center Clearinghouse at 1-800-424-LEAD.

This XRF Performance Characteristic Sheet was developed by the Midwest Research Institute (MRI) and QuanTech, Inc., under a contract between MRI and the XRF manufacturer. HUD has determined that the information provided here is acceptable when used as guidance in conjunction with Chapter 7, Lead-Based Paint Inspection, of HUD's *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*.

Intentionally Blank Page

APPENDIX C

*Laboratory Certifications
Inspector Licenses*

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

International Asbestos Testing Laboratories

9000 Commerce Parkway

Suite B

Mt. Laurel, NJ 08054

Mr. Frank E. Ehrenfeld III

Phone: 856-231-9449 Fax: 856-231-9818

Email: frankehrenfeld@iatl.com

<http://www.iatl.com>

ASBESTOS FIBER ANALYSIS

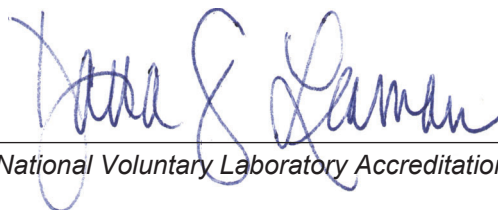
NVLAP LAB CODE 101165-0

Bulk Asbestos Analysis

<u>Code</u>	<u>Description</u>
18/A01	EPA -- 40 CFR 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

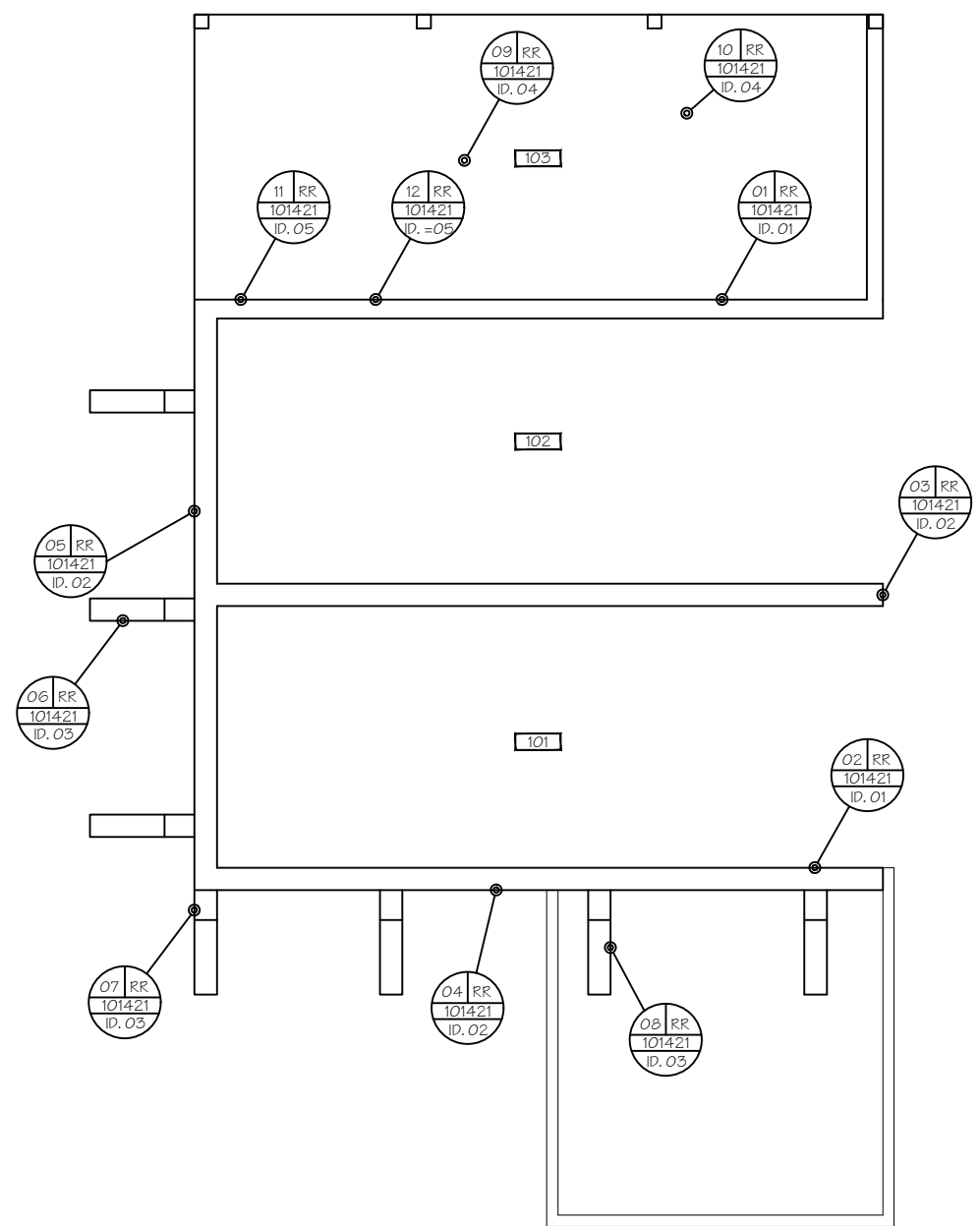
<u>Code</u>	<u>Description</u>
18/A02	U.S. EPA's "Interim Transmission Electron Microscopy Analytical Methods-Mandatory and Nonmandatory-and Mandatory Section to Determine Completion of Response Actions" as found in 40 CFR, Part 763, Subpart E, Appendix A.



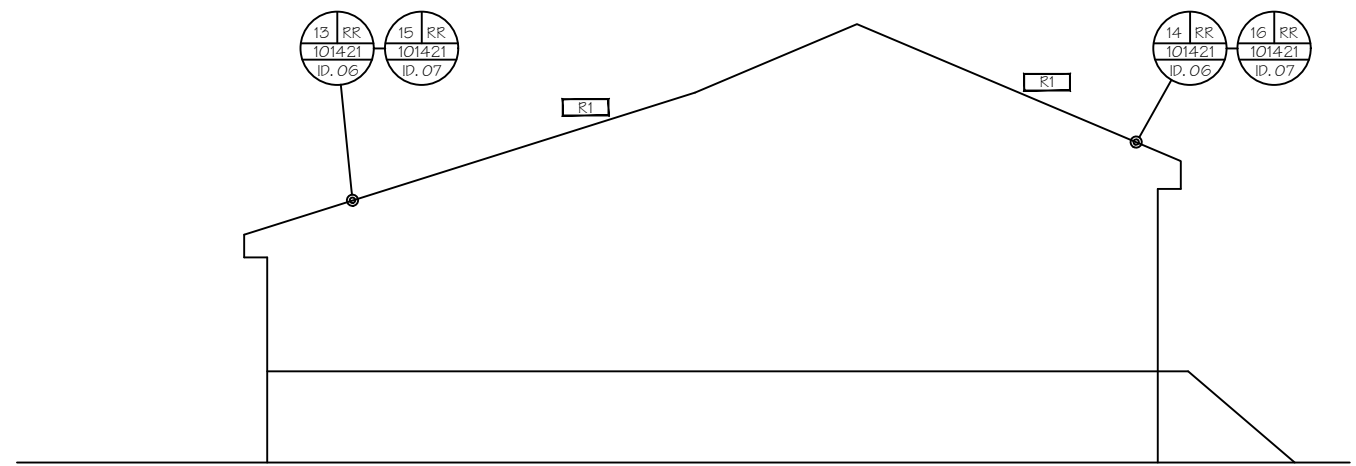
For the National Voluntary Laboratory Accreditation Program

APPENDIX D

Asbestos Sample Location Plans



1 FIRST FLOOR SAMPLING PLAN
HA.1 SCALE: 3/16" = 1'-0"



2 ROOF SAMPLING PLAN
HA.1 SCALE: 3/16" = 1'-0"

- BULK SAMPLE LOCATION LEGEND -

SAMPLE NOT ANALYZED, STOPPED AT FIRST POSITIVE

DATE SAMPLED

MATERIAL ID No.

SAMPLE No.

INSPECTOR'S INITIALS

POSITIVE SAMPLE RESULT > 1% DETECTED

Rev:	Date:	By:

USAEMI Project #:
21-020793-01

DPMC Project #:
TO617-00

Scale:
AS NOTED

Checked by:
RR

Date:
11-17-2021

Drawn by:
WWJ

William Weisgarber, Jr., Building Inspector
Certificate No. NAETI 59926

Richard Reynolds, Building Inspector
Certificate No. NAETI 59814

USA Environmental Management, Inc.
344 West State Street
Trenton, NJ 08618
609.656.8101

Environmental, Engineering & Construction

Stonewater Architecture, LLC
P.O. Box 208
Colonial, New Jersey 07067

NJDOT Berlin Maintenance Yard
Pole Barn Structure
West Berlin, Camden County, N.J.

Drawing Title:
Pole Barn
Structure
Asbestos
Sampling Plan

Drawing No.
HA.1

Sheet: 1 of 1

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Foundations
 - 2. Substructure.
 - 3. Suspended slabs-on-grade.
 - 4. Superstructure.
 - 5. Concrete toppings.
 - 6. Site concrete
- B. Related Sections include the following:
 - 1. Division 03 Section 033000 "Cast-In-Place Concrete"
 - 2. Division 05 Section 051200 "Structural Steel"
 - 3. Division 05 Section 053000 "Steel Deck";
 - 4. Division 31

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 REFERENCES

- A. Follow the guidelines contained in the latest editions of the following codes, specifications and standards except where more stringent requirements are shown or specified in the Contract Documents.
 - 1. Local Building Code with local amendments
 - 2. American Concrete Institute 318/318R: Building Code Requirements for Structural Concrete and Commentary.

1.5 SUBMITTALS

- A. General:

1. Review of submittals is of a general nature only, and the responsibility for conformance with intent of drawings shall remain with the Contractor. Review does not imply or state that the fabricator has correctly interpreted the construction documents.
 2. All submissions shall be in accordance with the submission schedule developed and agreed between the Architect and Contractor at the commencement of the project. Submission shall include dates of order and delivery of materials to the shop and the site.
 3. Shop drawing schedule shall allow adequate time for reviews. Reinforcing steel shall not be fabricated or placed before the shop drawings have been reviewed by the Architect and returned.
 4. Where shop drawings are resubmitted, the Contractor shall cloud and identify all changes made due to additions, deletions, and corrections to the shop drawing. Shop drawings resubmitted without each change being clouded and identified will be returned for resubmission.
- B. Product Data: For each type of product indicated, including ICC-ES for mechanical couplers.
- C. Design Mixtures: Each concrete mix design to be used on the project shall be reviewed and approved by the Testing Agency and Architect prior to concrete being delivered to site. Submit proposed mix designs for each class of concrete on the Mix Design submittal form included at the end of this specification. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
1. For each concrete mixture, the following information shall be included: where the mix is to be used, all materials and admixtures including their source and proportions in the mix; Water content, water-to-cement ratio, slump, and aggregate grading; whether the mixture is appropriate for pumping; and total chloride content.
 2. Provide shrinkage test results for mixes with shrinkage criteria showing that mix meets performance criteria. The mix design number must match with the mix design number shown on the test data.
 3. Indicate compressive strength and method used to determine strength. The compressive strength of the concrete shall be proportioned per ACI. Include all calculations and tests required by ACI 318 Section 5.3 and 5.4. Laboratory test data must be submitted along calculations that show with each mix design meets the strength requirement. Mix design number must match the mix design number shown on the test data. Include all test results or past history back up data specific as part of the submittal. Test results within the past two years shall be used to indicate performance in accordance with past history.
 4. Indicate amounts of mixing water to be withheld for later addition at Project site.
 5. Each mix shall be stamped and signed by a Professional Engineer licensed in the State of the project.
- D. Steel Reinforcement Shop Drawings: Placing drawings in accordance with SP 66 that detail fabrication, bending, and placement. Direct copies of the contract documents are not acceptable as a submission from the Contractor.

1. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splice and lap locations and lengths, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement. Include any welding to be done.
 2. Shop drawings shall make it clear where each bar is located. Beams, grade beams and walls shall be shown in elevation. On elevations show locations of all sleeves and penetrations.
 3. Check architectural, structural, mechanical, and electrical and other contract documents for anchor bolt schedules and locations, anchors, inserts, conduits, sleeves, and any other items which are required to be cast in concrete, and make necessary provisions as required so that reinforcing steel will not interfere with the placement of such embedded items.
 4. Show all areas of congestion. Identify where reinforcing steel will interfere with the placement of embedded items such as anchor bolts, anchors, inserts, conduits, sleeves and any other items which are required to be cast in concrete.
- E. Submit schedule of concrete placement operations before commencing Work.
- F. Show on one or more plans and/or elevations, locations of construction, contraction and expansion of joints, slab edges, curbs, equipment pads, depressions, sleeves and openings.
- G. Formwork: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.
1. Design Criteria:
 - a. Design of concrete formwork, shoring, reshoring and bracing shall be the sole responsibility of the Contractor and shall conform to Code requirements and shall be in accordance with the recommendations of ACI 347. Forms shall provide the required shape and dimensions specified on the Documents.
 - b. Provide forms complete and of such strength and adequately braced so as to prevent any spreading, shifting or settling when concrete is placed to ensure finished concrete surfaces of the required tolerances.
 - c. Forms shall be tight to prevent leakage or washing out of cement mortar from concrete.
 - d. Bolts, rods, and other devices when used for internal ties and spreaders shall be of such construction that when the forms are removed, no metal shall be within 1 inch of the exterior concrete surfaces or within 1/2 inch of interior concrete surfaces.
 2. Shop Drawing Requirements:
 - a. Shop Drawings shall show location and layout of construction joints, reveals, slab edges, form joints, sleeves, openings, location of embedded items and blockouts, and all related details.
 - b. Shop Drawings will show dimensioned location to the face of formwork for walls, beams, columns, slab edges, slab depressions, etc.

- c. Formwork details affecting Architectural finish quality shall be reviewed by the Architect.
 - d. Indicate where formwork release agent will be used, as applicable.
- H. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and installing and removing reshoring. Show how forces will be transferred to the reshores. Show that procedures will not cause damage to the structure nor result in additional permanent deflections.
- I. Samples: For waterstops, vapor retarder, formwork, as requested by Architect.
- J. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
 - 1. Normal weight aggregate (per ASTM C33). Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity. Include evaluation of reactivity and the following:
 - a. Abrasion Resistance: ASTM C131; Los Angeles Machine.
 - b. Cleanness Value: Test Method NO. C 227; coarse aggregate only.
 - c. Fineness: ASTM C117.
 - d. Organic Impurities: ASTM C40.
 - e. Potential Reactivity: ASTM C289.
 - f. Sand Equivalent: Test Method No. C 217.
 - g. Sieve Analysis: ASTM C136.
 - h. Soundness: ASTM C88.
- K. Product Test Reports and Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials, per ASTM C150, ASTM C595, ASTM C618, ASTM C989, and/or ASTM C1240, as applicable.
 - 2. Admixtures. Where more than one admixture is used, include certification that admixtures are compatible. Per ASTM C494 for each type used; include chloride ion content.
 - 3. Form materials and form-release agents; form ties.
 - 4. Steel reinforcement and accessories.
 - 5. Welding Electrodes
 - 6. Waterstops.
 - 7. Curing compounds.
 - 8. Floor and slab treatments.

9. Non-shrink grout, per ASTM C1107 Grade B.
 10. Bonding agents.
 11. Adhesives.
 12. Vapor retarders.
 13. Semirigid joint filler.
 14. Joint-filler strips.
 15. Post-installed concrete anchors.
 16. Repair materials.
- L. Submit a complete description of the system proposed for meeting the specified floor slab flatwork tolerances. Submit survey data from a minimum of two previous slab installations to demonstrate capability to satisfy specified tolerances.
- M. Field quality-control test and inspection reports.
- N. Submit an affidavit identifying cementitious material used, including manufacturer's lot number, date of shipment by manufacturer, date of receipt by the concrete supplier, place of storage and date of use.
- O. Transit-Mix Delivery Slips
1. Keep record at the Site showing time and place of each pour of concrete, together with transit mix delivery slip certifying contents of the pour per ASTM C94. Include the time water was added to dry mix.
 2. Make the record available for inspection at the Site and to the Architect for his review upon request.
 3. Upon completion of this portion of the Work, deliver the record and the delivery slips to the Architect.
- P. Minutes of pre-installation conference.

1.6 QUALITY ASSURANCE

- A. Standards: Comply with the following unless modified by requirements in the Contract Documents:
1. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
 2. ACI 301, "Specification for Structural Concrete," Sections 1 through 5 and Section 7, "Lightweight Concrete."
 3. ACI 318, "Building Code Requirements for Reinforced Concrete."
 4. ACI SP-66, "Detailing Manual"

5. American Welding Society (AWS) D1.4, "Structural Welding Code – Reinforcing Steel"
 6. Local Building Code.
- B. Installer Qualifications: A qualified installer who employs on Project personnel qualified as DPMC Prequalified, ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- C. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- D. Testing Agency: Shall be a DPMC prequalified firm arranged and paid for by the contractor, unless otherwise specified; re-testing paid for by the Contractor.
- E. Contractor's Quality Control Plan: Quality Control includes the functions performed by the Contractor to ensure that the material and workmanship of concrete construction meets the project specifications and applicable standards. The Contractor shall submit a Quality Control Plan that addresses all inspection issues, including testing and inspection per ACI. The verification testing and inspection carried out by the Testing Agency does not relieve the contractor of the responsibility for conducting their own quality control/inspection program to ensure the requirements of the Contract Documents have been met. The Contractor's Quality Control Plan will be reviewed by the Testing Agency.
- F. Quality Control Inspector Qualifications: Along with Quality Control Plan, Contractor shall submit written qualifications for all inspectors to be assigned Quality Control functions for concrete work.
- G. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
- H. Mechanical Bar Couplers shall have a current ICC-ES Evaluation Report that indicates compliance with requirements of these specifications.
- I. Unidentifiable Reinforcing Steel: Tested by testing agency; paid for by Contractor:
1. Test reinforcing delivered to site which cannot be properly identified by heat number and mill mark for compliance with ASTM A615 as follows:
 - a. No. 8 Bar and Smaller: One tensile test and one bend test of each size per 7-1/2 tons, or portion thereof.
 - b. No. 9 Bar and Larger: One tensile test of each size per 10 tons, or portion thereof.
- J. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code-- Reinforcing Steel."

1. Welders whose work fails to pass inspection shall be requalified before performing further welding.
 2. Firm specializing in furnishing and installing reinforcement shall be DPMC prequalified.
 3. All welding shall be performed by operators who are qualified for the types of welds used. Each operator shall have been qualified within the preceding one year as prescribed by AWS.
 4. Require welders to retake the qualification test if, as determined by the Architect, there is a reasonable doubt as to the proficiency of the welder. If the welder does not requalify, they shall not perform any welding on the project.
- K. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to test concrete mixtures. When mixes, are proportioned by trial batch method, engage a Laboratory conforming to ASTM E329 and under direction of a Professional Engineer licensed in the State of the project.
- L. Prefabrication and Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
1. Review proposed concrete design mixtures and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Owner's Representative(s)
 - b. Architect/Engineer
 - c. Construction Manager/General Contractor
 - d. Concrete Subcontractor
 - e. Independent Testing Laboratory Paid for By Contractor
 - f. Ready Mix Concrete Supplier
 - g. Admixture Manufacturer Representative
 - h. Formwork Manufacturer/Supplier
 - i. Any other subcontractor and/or material supplier including plumbing, waterproofing and electrical supplier or manufacturer required
 2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete placement, concrete finishes and finishing, cold- and hot-weather concreting procedures, schedule, curing procedures, construction, contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, concrete protection, temporary shoring and bracing, moisture sensitivity of floor

coverings, minimizing shrinkage cracking, mix design, cement paste content, aggregate gradation, protecting base course prior to slab on grade placement, list of critical items for inspection, water control, communication, and key concrete tolerances.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement:

1. Deliver, store, and handle steel reinforcement to prevent bending and damage.
2. Deliver reinforcing to Site properly bundled and tagged. Use tags that indicate bar size, lengths and marks corresponding to markings shown on shop drawings. Segregate so as to maintain identification after bundles are broken.
3. Store reinforcement in a manner that will prevent excessive rusting or fouling with/ grease, oil, dirt, and other bond weakening materials.
4. Do not use damaged, reworked, or deteriorated material.

B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

C. Formwork: Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use.

D. Concrete Materials:

1. Protect cement from moisture and rotate stock to ensure fresh materials.
2. Protect aggregates as necessary to maintain saturated condition when batched.
3. Storage methods should comply with ACI 301 4.1.4.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Products: Subject to compliance with requirements, provide one of the products specified.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.

2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. For exposed surfaces not otherwise specified use Special exterior Type Douglas Fir, Grade AB plywood, conforming to NBS PS-1, minimum 3/4 in. thick and constructed so that finished concrete will be straight, smooth, dense, free from honeycombs, bulges, or depressions. Keep joints between plywood sections to a minimum and make tight and strongly backed so that adjoining edges remain flush and true.
- D. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
- E. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation. For areas exposed to view, use new forms or specially selected forms.
- F. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.
- G. Foam Filler or High Density Styrofoam Fill: Expanded polystyrene foam, ASTM C578, Type IX, 1.9 pounds per cubic foot density.
- H. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- I. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- J. Form Gaskets (for sealing form panel joints) Gaskets shall be closed cell, completely skinned, foam rubber or neoprene, with pressure sensitive paperbacked adhesive on surfaces to be bonded to forms. Gaskets shall be of sufficient thickness, widths and compressibility for specific use.
- K. Form Sealer (Wood Forms): All form sealers shall be of a type which will not harmfully affect the appearance and/or utility of the concrete surface or the application of sealers, paint, vinyl fabric or any other finishes. In addition, form sealer shall prevent the development of bond or adhesion to concrete.
- L. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
 2. Form release agents shall have a VOC content of 250 grams/liter or less.

- M. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal. Wire ties or embedded PVC pipe shall not be permitted.
1. Furnish units that will leave no corrodible metal closer than 1-1/2 inch to the plane of exposed concrete surface.
 2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface and permit neat and solid patching at every hole.
 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.
- N. Expansion Joint Filler:
1. Fiber Type: Preformed asphalt impregnated fiber, ASTM D1751, 1/2 inch thick unless otherwise noted.
 2. Cork Type: Preformed cork expansion joint, ASTM D1752. Type II, 1/2 inch thick unless otherwise noted.
- O. Expansion Joint Sealant: ASTM C920, Type M, Class 2 5; two part polyurethane traffic grade sealant, gray color.
1. Horizontal Joints: Pourable, Grade P, Use T.
 2. Vertical Joints: Nonsag, Grade NS, Use NT.
- P. Foundation Formwork – Leave in Place: Ribbed mesh fabricated from galvanized sheet steel; stay-form, or equal.

2.3 FORM-FACING MATERIALS

- A. Reinforcing Bars:
1. ASTM A615, Grade 60, deformed, unless noted otherwise.
 2. ASTM A706, deformed, where bars are welded, where #6 or larger bars are mechanically coupled, or where designated on drawings.
- B. Steel Bar Mats: ASTM A184/A 184M, fabricated from ASTM A615, Grade 60, deformed bars, assembled with clips.
- C. Tie Wire: American Wire 16 gauge or heavier black annealed wire.
- D. Spiral Reinforcement: Use Plain-Steel Wire if specified as wire or ASTM A615 Grade 60 if specified by bar size.
- E. Plain-Steel Wire: ASTM A82, as drawn.
- F. Deformed-Steel Wire: ASTM A496.

G. Plain-Steel Welded Wire Reinforcement: ASTM A185, plain, fabricated from as-drawn steel wire into flat sheets.

H. Deformed-Steel Welded Wire Reinforcement: ASTM A497, flat sheet.

2.4 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A615, Grade 60, plain-steel bars, cut bars true to length with ends square and free of burrs. Shop paint with iron oxide zinc chromate primer.

B. Zinc Repair Material: ASTM A780, zinc-based solder, paint containing zinc dust, or sprayed zinc.

C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view or where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports, unless noted otherwise.
2. Where supports are placed against ground or atop vapor barrier use precast concrete blocks not less than 3 inches square with two 16 gauge embedded wires.
3. At Architectural Concrete and surfaces exposed to weather; CRSI Class 1 plastic protected.

D. Mechanical Bar Couplers: Provide coupler capable of achieving Type 1- splice, unless otherwise noted on Drawings. Couplers shall be provided in areas where continuity of components is required for the overall structural integrity of the framing system. For instance, couplers are needed for the connection of grade beams to foundation walls and other similar components to satisfy the structural integrity of the connections, especially at cold joints without dowels.

1. Type 1: ICC-ES approved; capable of developing 125% of specified minimum yield strength of bar in tension or compression.
2. Type 2: ICC-ES approved; capable of developing the lesser of 95% of the ultimate tensile strength or 160% of the specified minimum yield strength of the bar in tension or compression.

E. Welding Electrodes: As required in AWS D1.4. As a minimum, use E70XX electrodes.

F. Deformed Bar Anchors: Nelson, flux filled deformed bar anchors, type D2L, as manufactured by Nelson Stud Welding Division of TRW or approved equal.

2.5 REINFORCEMENT FABRICATION

A. Fabricate reinforcing in accordance with ACI 301, 315 or CRSI "Manual of Standard Practice."

B. Bending:

1. Do not bend or kink reinforcing except as shown on the Drawings.

2. Minimum bend diameters and hook extensions as shown on the drawings or per ACI.
 3. In case of fabrication errors do not rebend or straighten reinforcement in a manner that will injure or weaken the material.
 4. Reinforcing bars are to be bent cold, do not preheat, unless approved by Architect.
 5. Do not rebend reinforcement that has previously been bent within 6 inches of new bend except as allowed in section 3.3.2.8 of ACI 301.
- C. Spirals: Provide a minimum of 1-1/2 finishing turns top and bottom.
- D. Unacceptable Materials: Reinforcement with any of the following defects shall not be permitted in the Work and will be replaced without cost:
1. Bar lengths, depths and bends exceeding specified fabrication tolerances.
 2. Bend or kinks not shown on the Drawings or final shop drawings.
 3. Bars with reduced cross-section due to rusting or other cause.
 4. Bars with dirt, mud, grease or form release agent.

2.6 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
1. Portland Cement: ASTM C150, Type II, where concrete is in contact with soil. Cement may be Type I elsewhere, unless noted otherwise.
 2. Supplement Portland Cement with the following Supplementary Cementitious Materials (SCM):
 - a. Fly Ash: ASTM C618, Class C or F, mix design shall reflect properties desired.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C989, Grade 100 or 120.
 - c. The SCM producer shall practice an effective quality control program to guard against contamination of the SCM.
 3. Blended Hydraulic Cement: ASTM C595 or C1157, Type IS portland blast-furnace slag, IP portland-pozzolan, I (PM) pozzolan-modified Portland, or I (SM), slag-modified portland cement. If selected, Contractor shall demonstrate reasoning for the use of blended cement and have sufficient prior experience with it.
 4. Cementitious material used shall have at least 2 years of use with proposed aggregates without detrimental reaction.
 5. Alkali content shall not exceed 0.6% when tested in accordance with ASTM C114.
 6. The temperature of cement delivered to the plant shall not exceed 150 degrees F.

- B. Silica Fume: ASTM C1240, amorphous silica.
- C. Normal-Weight Aggregates: ASTM C33, Class 3S for foundation elements, coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
 - 1. Coarse Aggregate:
 - a. Maximum Size: 3/4 inch nominal.
 - b. Minimum Specific Gravity: 2.65.
 - c. Aggregate shall contain no thin or elongated pieces. Any piece having a major dimension more than 2 times the average thickness shall be considered thin or elongated.
 - d. If shrinkage controlled concrete, Coarse Aggregate shall be crushed limestone, granite, or accepted equal.
 - e. Aggregates shall consist mainly of calcium or magnesium carbonate, e.g., limestone or dolomite, and containing 40 percent or less quartz, chert or flint.
 - f. The maximum size used in a particular location shall be consistent with the form and dimensions of the section being placed, with the location and spacing of the reinforcing steel and with the method of vibration. The aggregate sizes shall be such as will produce dense, uniform concrete, free of rock pockets, honeycombs, or other irregularities.
 - g. Combined aggregate gradation for slabs and other designated concrete shall be 8% to 18% for large top size aggregates (1-1/2-inch) or 8% - 22% for smaller top size aggregates (1-inch or 3/4-inch) retained on each sieve below the top size and above the No. 100.
 - 2. Fine Aggregate: Uniformly graded, clean sand, free from excessive fines, organic materials or other deleterious materials. Free of materials with deleterious reactivity to alkali in cement.
- D. Water: ASTM C94 clean, free from deleterious matter and potable.
- E. Recycled (Reclaimed) Aggregates:
 - 1. May be used only in below grade work or concrete to be covered in its final condition.
 - 2. Maximum 10% of total aggregates by weight.
 - 3. Use one source for each required type throughout the project.
 - 4. Testing per Greenbook Standard Specifications for Public Works Construction Latest Adopted Edition.

2.7 ADMIXTURES

- A. General: Only if accepted by the Owner's Representative in accordance with ACI 318/318R 3.6 if they comply with requirements of ASTM C494. Where more than one is used, admixtures shall be compatible. Use of admixtures shall be consistent throughout Work.
 - 1. Where specified herein do not use other admixtures without the written acceptance of the Architect.
 - 2. Prohibited Admixtures: Admixtures containing more than 0.05 percent chloride ions, fluorides, sulphites, thiocyanates, and/or nitrates are not permitted. Do not use admixtures that will negatively impact the visual finish of concrete exposed to view.
- B. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other admixtures.
 - 1. Products:
 - a. Grace Construction Materials; Darex AEA or Daravair
 - b. Master Builders, Inc.; MB-VR or Micro Air
 - c. Euclid Chemical Company (The); Air Mix or Air 40
 - d. Or approved equal.
- C. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing (Plasticizing) Admixture: ASTM C494, Type A. Products:
 - a. Grace Construction Products, W. R. Grace & Co.; "WRDA with Hycol"
 - b. Master Builders, Inc.; "Pozzolith 220N"
 - c. Euclid Chemical Company (The); "WR-91 or Eucon MR"
 - d. Or approved equal.
 - 2. Retarding Admixture: ASTM C494, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C494, Type D. Products:
 - a. Sika Corporation; "Sikament 30,"
 - b. Euclid Chemical Company (The); "Eucon Retarder-75"
 - c. MasterSet DELVO by BASF Corporation
 - d. MaterPozzolith 700 by Mater Builders Solutions
 - d. Or Approved equal.
 - 4. High-Range, Water-Reducing (Superplasticizers) Admixture: Products:

- a. Sika Corporation; "Sikament 300"
 - b. BASF Construction Products; "Rheobuild 1000"
 - c. Euclid Chemical Company (The); "Eucon 37, 1037 or Plastol"
 - d. Or Approved equal
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C494, Type G.
6. Plasticizing and Retarding Admixture: ASTM C1017, Type II.
7. Non-Chloride, Non-Corrosive Accelerating Admixture: ASTM C494, Type C or E. Manufacturer must have long-term non-corrosive test data from an independent testing laboratory (of at least a year's duration) using an acceptable accelerated corrosion test method. Products:
 - a. Euclid Chemical Company (The); "Accelguard 80, 90, or NCA"
 - b. MasterSet FP 20 by Mater Builders Solutions
 - c. Sika Mix NCA by Sika Corp.
 - d. Or approved equal
- D. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, 30% calcium nitrite solids inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C494, Type C.
 1. Products:
 - a. Boral Material Technologies, Inc.; Boral BCN.
 - b. Euclid Chemical Company (The); Eucon CIA.
 - c. Grace Construction Products, W. R. Grace & Co.; DCI.
 - d. Master Builders, Inc.; Rheocrete CNI.
 - e. Sika Corporation; Sika CNI.
 - f. Or approved equal

2.8 GRANULAR FILL

- A. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.
- B. Fine-Graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D 448, Size 10, with 100 percent passing a 3/8-inch sieve, 10 to 30 percent passing a No. 100 sieve, and at least 5 percent passing No. 200 sieve; complying with deleterious substance limits of ASTM C 33 for fine aggregates.

2.9 FLOOR AND SLAB TREATMENTS

- A. Liquid Sealer and Densifier: High performance, deeply penetrating concrete densifier; odorless, colorless, non-yellowing silicate based solution designed to harden, dustproof and protect concrete floors housing equipment or subjected to heavy vehicular traffic and movable units in order to protect the concrete surfaces from surface damage. The compound must contain a minimum solids content of 20% of which 50% is silicate. The compound shall contain no VOCs. Products:

1. Euco Diamond Hard by Euclid Chemical Company
2. Seal Hard by L & M Construction Company
3. LIQUI-HARD by W.R. Meadows
4. Or approved equal

2.10 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C171, polyethylene film, fiber reinforced asphaltic vapor barrier building paper, or white burlap-polyethylene sheet.
1. Provide in a thickness of 42 mils; standard weight of 53 lbs./1000 ft²; tensile strength (machine direction) of 36 lbs./in.; and puncture resistance of 70 lbs.
- D. Water: Potable.
- E. Curing compounds shall have a VOC limit of 200 g/l. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, dissipating or strippable. Sodium silicate compounds are prohibited.
1. Products:
 - a. Kurez DR VOX or Horncure WB 30 by Euclid Chemical Company
 - b. SIL-CRETE by W.R. Meadows
 - c. Sakrete Cure N Seal by Gainer Company
 - d. Or approved equal
- G. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C1315, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.
1. Products:
 - a. Super Aqua-Cure VOX by Euclid Chemical Company
 - b. DECRA-SEAL 100 by W.R. Meadows

- c. VOCOM-25 by W.R. Meadows
- d. Or approved equal

2.11 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber or ASTM D1752, cork or self-expanding cork or ASTM D1752, gray sponge rubber.
- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D2240.
 - 1. Products:
 - a. Euco 700 or QWIKjoint 200 by Euclid Chemical Company
 - b. Sikadur 51 SL by Sika Chemical Corp.
 - c. Rezi-Weld Flex by W.R. Meadows
 - d. Or approved equal
- C. Bonding Agent: ASTM C1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
 - 1. Products:
 - a. Flex-Con, SBR Latex or AKKRO 7T by Euclid Chemical Company
 - b. Daraweld C by WR Grace
 - c. Intralok by W.R. Meadows
 - d. Or approved equal
- D. Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
 - 1. Types I and II, non-load bearing, IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
 - 2. Products:
 - a. Euco #452 Series or Duralcrete Series by Euclid Chemical
 - b. Sikadur Hi-Mod Series by Sika Corp
 - c. Sikadur 32 by Sika Corp
 - d. Dural 452 by Euclid Chemicals
 - e. Or approved equal
- E. Post-Installed Concrete Anchors:

1. Expansion Anchors: Kwik Bolt by Hilti Inc, Trubolt Wedge by ITW Ramset/Red Head, Power-Stud by Powers-Rawl, or as indicated on the drawings or approved equal.
2. Epoxy Dowels / Epoxy Anchors: HIT HY 150 by Hilti, Inc., CIA-Gel 7000 by Covert Operations, SET by Simpson Strong Tie, Power-Fast by Powers-Rawl, or as indicated on the drawings or approved equal.
3. Grouted Dowels / Grouted Anchors: High strength non-shrink grout to anchor reinforcing steel or threaded rods in concrete shall be Masterflow 928 grout as manufactured by Master Builders, Sika Grout 212 as manufactured by Sika Corporation, 588-10K and 1428 HP by W.R. Meadows, or approved equal.

2.12 MORTARS AND GROUTS

- A. Patching Mortar for exposed concrete shall be made of the same material and of approximately the same proportions as used for concrete, except that coarse aggregate shall be omitted and mortar shall consist of not more than 1 part Portland cement to 2-1/2 parts damp loose sand by volume.
 1. Combine white and gray Portland cement as necessary to match color specified by Architect. Use no more mixing water than necessary for handling and placing.
 2. Mix patching mortar in advance and allow to stand with frequent mixing with trowel without adding water until it has reached the stiffest consistency that will permit placing.
- B. High Flow Grout:
 1. Where high fluidity and/or increased placing time is required, use high flow grout.
 2. ASTM C1107, "Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink)".
 3. When placed at a fluid consistency there shall be at least 95% bearing under an 18 inches x 36 inches base plate.
 4. "Hi-Flow Grout" manufactured by The Euclid Chemical Company or "Masterflow 928" manufactured by BASF Construction Products, SikaGrout 328, or approved equal.
- C. Epoxy grout for anchor reinforcing steel or threaded rods in concrete shall be Masterflow MP as manufactured by BASF Construction Products, or Sikadur 32 Hi-Mod as manufactured by Sika Corporation, or Epoxy 452 or E3G by Euclid Chemical Company, or approved equal.
- D. Cementitious grout for anchor reinforcing steel or threaded rods in concrete shall be Masterflow 928 grout as manufactured by BASF Construction Products or Sika Grout 212 as manufactured by Sika Corporation, Hi-Flow grout by Euclid Chemical Company, or approved equal.
- E. Drypack Mortar for Form Holes at Non-Architectural Grade Surfaces: Composed of 1 part Portland cement and 2 parts of fine aggregate and water. Match color of adjacent surfaces.

2.13 REPAIR MATERIALS

- A. High Strength Flowing Repair Mortar: For forming and pouring structural members, or large horizontal repairs, provide the flowable one-part, high strength microsilica modified repair mortar with 3/8" aggregate. The product shall achieve 9000 psi @ 28-days at a 9-inch slump.
1. Products:
 - a. Eucocrete or Eucocrete Supreme by Euclid Chemical Company
 - b. Sika Quick 1000 by Sika
 - c. Meadow-Crete FNP by R.W. Meadows
 - d. Or approved equal
- B. Concrete Patching Mortar:
1. Horizontal repairs, ASTM C1059, Type II. Products:
 - a. Euclid Chemical Co.; Euco Thin Top Supreme, Concrete Top Supreme or Tamms Patch II
 - b. Sika Chemical Corp.; Sikatop 121 or 122
 - c. Meadow-Patch by R.W. Meadows
 - d. Or approved equal
 2. Vertical or Overhead repairs, ASTM C1059, Type II. Available Products:
 - a. Euclid Chemical Co.; Verticoat, Verticoat Supreme or Speed Crete Red Line
 - b. Sika Chemical Corp.; Sikatop 123
 - c. Master Builders; Emaco R300, 310 or R350
 - d. Or approved equal
- C. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
1. Cement Binder: ASTM C150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C219.
 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
 4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C109.
 5. Bond Strength: Not less than 1000 psi at 28 days when tested according to ASTM C1042.
 6. Products:
 - a. Euclid Chemical Co.; Super Flo-Top
 - b. Master Builders; Under Layment 110
 - d. EUCO Super FLO-TOP 512 and FLO-TOP 90 by THE Euclid Chemical Company

- c. Or approved equal
- D. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C109.
 - 5. Products:
 - a. Euclid Chemical Co.; Thin Top Supreme or Tamms Patch II
 - b. Master Builders; Topping 112
 - c. Sika Quick 1000 by Sika
 - d. Or approved equal
 - 6. Product shall exhibit the following properties: Chaplin Abrasion Test – 0.0079-inches maximum at 28 days.

2.14 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301. Add appropriate type of admixtures as required to enhance concrete durability especially in area exposed to the elements.
 - 1. Procurement of concrete mix design is responsibility of Contractor.
 - 2. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Supplementary Cementitious Materials (SCM): Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not more than 25 percent, or as noted otherwise within this specification, without exceeding the following limits:
 - 1. The exact percentage shall be based on a successful test placement onsite.
- C. Limit water-soluble, chloride-ion content as determined for exposure class per ACI 318 Table 4.3.1.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability. Mix designs shall reflect admixtures to be used for different conditions.

2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use high range water-reducing admixture in pumped concrete, fiber concrete, self-consolidating concrete, concrete for heavy-use industrial slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

2.15 CONCRETE MIXTURES

A. Definition of Mix Properties:

1. Concrete strength (f'_c) is the minimum compressive strength at 28 days, tested in accordance with ASTM C39.
2. Aggregate size is the largest of the coarse aggregate.
3. Slump shall be measured at the point of delivery in accordance with ASTM C143. Slump tolerance shall meet the requirements of ACI 117. Slump can be increased with use of a superplasticizer to improve workability of mix. After addition of superplasticizer, slump shall not exceed 8" at point of delivery unless self-consolidating concrete is used.
4. Air content is by volume and may be plus or minus 1.5 percent at point of delivery.
5. Water/cementitious ratio is specified by weight.
6. Drying shrinkage limit is percentage change in length after 21 days of drying when tested as per ASTM C157 with 4 inches x 4 inches x 11 inches specimen moist cured 7 days prior to drying. The maximum shrinkage is 0.04% @ 28 days unless otherwise indicated.

B. Foundations walls, grade beams, and Piers: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength (f'_c) at 28 days: Use the larger of 4000 psi or the minimum strength required for exposure class per ACI 318 Table 4.3.1.
2. Exposure class: see structural drawings
3. Maximum Water-Cementitious Materials Ratio: use the lower of 0.40 or the ratio determined for exposure class per ACI 318 Table 4.3.1.
4. SCM Replacement ratio: refer to earlier sections of this specification
5. Aggregate: normal weight aggregate, maximum size 3/4 inch
6. Air Content: as determined for exposure class per ACI 318 Table 4.3.1
 - a. Not to exceed 3% for trowel finished or polished concrete floors
 - b. For exterior slab on grades (exposed to the elements) and in open areas such as the trash room, increase the air content as required to resist the freeze-thaw effects.
7. Shrinkage Limit: 0.040% @ 28 days.

C. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength (f'_c) at 28 days: Use the larger of 4000 psi or the minimum strength required for exposure class per ACI 318 Table 4.3.1.
2. Exposure class: per ACI Recommended Durability Requirements per ACI
3. Maximum Water-Cementitious Materials Ratio: use the lower of 0.45 or the ratio determined for exposure class per ACI 318 Table 4.3.1.
4. SCM Replacement ratio: refer to earlier sections of this specification
5. Aggregate: normal weight aggregate, maximum size 1 inch
6. Air Content: as determined for exposure class per ACI 318 Table 4.3.1, but not to exceed 3% for trowel finished or polished concrete floors
7. Shrinkage Limit: 0.040% @ 28 days.

2.16 FABRICATING REINFORCEMENT

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

2.17 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116, and furnish batch ticket information.
1. The batching plant shall be equipped with an electric metering device capable of determining moisture content of sand.
 2. Begin the mixing operation within thirty minutes after the cement has been intermingled with the aggregates.
 3. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- B. Lightweight Concrete: Mix lightweight concrete in accordance with the directions of the approved lightweight aggregate manufacturer.

2.18 WATERSTOPS

- A. Use continuous waterstops at all cold joints and connections between all the foundation elements and components.
- B. Flexible Rubber Waterstops for New-to-New Construction: CE CRD-C 513, with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.
1. Manufacturers: Subject to compliance, provide products by one of the following:
 - a. Greenstreak
 - b. Williams Products, Inc.
 - c. Waterstop System, by Sika

- c. Or approved equal
- C. Self-Expanding Butyl Strip Waterstops for New to Existing Construction: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, $\frac{3}{4}$ by 1 inch.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Carlisle Coatings & Waterproofing, Inc., MiraSTOP.
 - b. CETCO; Volclay Waterstop-RX.
 - c. Concrete Sealants Inc.; Conceal CS-231.
 - d. Greenstreak; Swellstop.
 - e. Henry Company, Sealants Division' Hydro-Flex.
 - f. JP Specialties, Inc.; Earth Shield Type 20.
 - g. Or approved equal

PART 3 EXECUTION

3.1 PRE-CONSTRUCTION MEETING

- A. At least three weeks prior to commencement of concrete work, meet at the Project site to review methods and sequence of concrete construction, standard of workmanship, material selection, testing and quality control requirements, detailed requirements of the design mixes, placement procedures, off-site batching requirements, coordination of the work with other trades and other pertinent topics related to the Work. The meeting shall include the following:
 - 1. Owner's Representative(s)
 - 2. Architect/Engineer
 - 3. Construction Manager/General Contractor
 - 4. Concrete Subcontractor
 - 5. Independent Testing Laboratory
 - 6. Ready Mix Concrete Supplier
 - 7. Admixture Manufacturer Representative
 - 8. Formwork Manufacturer/Supplier
 - 9. Any other subcontractor and/or material supplier including plumbing, waterproofing and electrical supplier or manufacturer required
- B. The minutes shall include a statement by the concrete contractor indicating that the proposed mix design and placing techniques shall produce the concrete quality required by these specifications.

3.2 PREPARATION

- A. Prior to Work specified in this Section, carefully inspect the installed Work of other trades and verify that such Work is complete to the point where this installation may properly commence.

- B. Verify that forms may be constructed in accordance with all applicable codes and regulations, the referenced standards, and the design documents.
 - 1. Ensure Excavations are sufficient to permit placement, inspection, and removal of forms.
 - 2. Verify reinforcing steel has been inspected prior to concealing with formwork.
 - 3. Verify geotechnical engineer has approved all foundation excavations.
- C. The Contractor shall verify all dimensions prior to starting construction.
- D. Coordination:
 - 1. Obtain necessary information for coordination of formwork with items to be embedded in concrete.
 - 2. Coordinate size and location of openings in concrete. Obtain Architects approval for openings not shown on Structural Drawings.
- E. Discrepancies:
 - 1. Notify the Architect of any discrepancies or inconsistencies.
 - 2. Do not proceed with installation in areas of discrepancy until such discrepancies have been fully resolved.

3.3 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads and such that formwork can withstand excessive deflection when filled with wet concrete.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, camber and position indicated, within tolerance limits of ACI 117. Make proper provision for all openings, offsets, recesses, anchorage, blocking, and other features of the Work as shown or required. Provide openings as required for vibrators and concrete placing.
- C. For exposed concrete with architectural requirements (textured and stained concrete), submit the type of form that would satisfy such requirements. The same type of forms shall be used for the mockups required for this area.
- D. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch for smooth-formed finished surfaces.
 - 2. Class B, 1/4 inch for rough-formed finished surfaces.
- E. Construct forms tight enough to prevent loss of concrete mortar. Tape all joints at forms for sandblasted finished concrete, including joints between plywood and trim strips.
- F. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
 2. Do not use rust-stained steel form-facing material.
- G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- I. Chamfer exterior corners and edges of permanently exposed concrete.
- J. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- K. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- L. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- M. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement. Do not allow excess form coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed.

3.4 EARTH FORMS

- A. Earth Forms: Unless otherwise indicated or required by the Construction documents, concrete for foundations that will remain in permanent contact with the soil may be placed directly against vertical excavated surfaces provided the material will stand without caving and suitable provisions are taken to prevent raveling of top edges or sloughing of loose material from walls of excavation. Sides of excavation shall be made with a neat cut and the width made as detailed on Drawings.
1. Where sides are unstable or excavations are not accurately cut tolerances of ACI 301, construct formwork to the extent required, at no additional cost to Owner.
 2. Hand trim sides and bottom of earth forms; remove loose dirt prior to placing concrete.
 3. Form footings to minimum extent shown on Drawings.

3.5 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded. Ensure that embedded items are placed and held, during placing of concrete, to tolerances consistent with other items that will be attached to them.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 3. Install dovetail anchor slots in concrete structures as indicated.
 4. Install concrete accessories in accordance with manufacturer's recommendations: straight, level, and plumb.
- B. Provide pipe sleeves when pipes pass through concrete. Fill voids in sleeves, inserts and anchor slots with readily removable material to prevent entry of concrete into voids.
- C. No conduit shall be cast in concrete unless specifically indicated on the Structural Drawings.
- D. Coring of concrete after placement is not permitted without prior approval by the Engineer of Record.

3.6 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 48 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained. Duration to be confirmed following creation of mix designs which affect strength gain.
1. Leave formwork for structural elements that supports weight of concrete in place until concrete has achieved its specified design compressive strength, f'_c .
 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
 3. When forms are removed in less than 7 days, curing shall be continued as follows:
 - a. Loosen form ties and run water down inside of form to keep concrete wet.
 - b. Immediately following form removal, thoroughly wet surface.
 - c. Continue curing as specified elsewhere in this specification.
- B. Remove forms carefully to avoid damaging corners and edges of exposed concrete. Prying against the face of concrete shall not be allowed.
- C. For concrete with special architectural requirements, provide specific information about the form removal process, including the type of form releasing agent compatible with the textured finishing and color of the stained concrete.
- D. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

- E. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.
- F. Re-use of forms shall in no way delay or change the schedule for placement of concrete from the schedule obtained if all of the forms were new.
- G. All forms below ground surface, along with all shores and braces, shall be removed before backfilling.

3.7 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Wherever embedded items interfere with placing of reinforcement notify the Architect and obtain approval before placing any concrete. Do not bend or field cut bars around openings or sleeves.
 - 2. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete. Where there is a potential of rust staining adjacent finish surfaces, take necessary steps to prevent staining.
- C. Accurately position, support, and secure reinforcement against displacement, particularly under the weight of workmen and the placement of concrete. Use bar supports in sufficient number, size and location to prevent vertical displacement of the reinforcement and gouging of the formwork. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 - 1. Do not exceed the tolerances specified in ACI 117.
 - 2. Reinforcement shall be held in place by means of supports adequate to prevent displacement and to maintain reinforcement at proper distance from form face. The use of wood supports and spacers inside the forms is not permitted.
 - 3. Dowels shall be tied securely in place before concrete is deposited. In the event there are no bars in position to which dowel may be tied, No 3 bars (minimum) shall be added to provide proper support and anchorage.
 - 4. Do not place reinforcement in floor slabs or beams until concrete has been placed in columns and walls, except where bars extend down into columns or walls.
 - 5. Use templates for placement of column dowels.
 - 6. Where Drawings do not show the spacing of the reinforcing, the minimum clear spacing shall conform to ACI 318 Section 7.6.
 - 7. Reinforcing partially embedded in concrete shall not be field bent except as shown on the Drawings or accepted by the Engineer.
 - 8. Wherever conduits, piping, inserts, sleeves, etc., interfere with placing of reinforcing steel, obtain acceptance of method of procedure before any concrete is placed. Bending of bars around openings or sleeves not permitted.

- D. Splicing: Make splices only at those locations shown on the Drawings or as accepted by the Engineer. Splice locations not shown on the Drawings shall be approved in shop drawings before fabrication. Stagger splices in adjacent bars wherever possible.
- E. Reinforcing shall be rigidly and securely tied with steel tie wire. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- F. If allowed, field bending or straightening shall be in accordance with section 3.3.2.8 of ACI 301.
- G. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing plus 2 inches or 6 inches, whichever is greater. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.
- H. Install deformed bar anchors in accordance with the manufacturer's recommendations.
- I. Install mechanical splices and reinforcing couplers in accordance with manufacturers' recommendations.

3.8 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Existing Concrete to New Concrete Joints
 - 1. Chip keys and roughen existing concrete surfaces where new concrete abuts. Roughened surface to a minimum 1/4" amplitude or as accepted by the Engineer. Roughen surface by bush hammering, chipping or sandblasting to remove surface mortar and expose clean aggregate.
 - 2. Drill and install dowels using epoxy grout in accordance with manufacturer's printed recommendations.
 - 3. Prime surface with 10-mil layer of epoxy adhesive using a stiff brush. Place concrete while the epoxy adhesive is still tacky. Re-prime if necessary.
- C. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by the Architect and Engineer. All joint locations shall be submitted by the contractor for approval by the architect/engineer per the same guidelines as for the shop drawing submittal.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 2. In walls, do not space construction joints more than 60 feet apart in horizontal direction, maximum 20 feet apart in vertical direction unless otherwise shown. In framed slabs and beams, and on metal deck slabs, do not space construction joints more than 90 feet apart. In non-reinforced slabs on grade, do not space construction joints more than 60 feet in width.
 - 3. Form keyed joints at all joints. Embed keys at least 1-1/2 inches into concrete. Geometry of keys shall be subject to review by the Engineer. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.

4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 5. Space vertical joints in walls beside piers integral with walls, near corners, and in concealed locations where possible.
 6. Roughen surface at all construction joints where key is not used and under baseplates. Roughened surface to a minimum 1/4" amplitude or as accepted by the Engineer. Roughen concrete surface while concrete is still green where possible. Do not leave laitance, loosened particles of aggregate or damaged concrete at surface. Forms and reinforcing shall be cleaned of drippings. Dampen contact surfaces of construction joints, leaving them free of standing water, before placing fresh concrete.
 7. Use an epoxy-bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- D. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 2. Sawed Joints: The Soft-Cut saw shall be used to a depth of T/4 inches immediately after final finishing. Conventional saw, shall be used as soon as possible after final finishing without raveling to a depth of T/4 inches.
- E. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
 2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealants," are indicated.
 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- F. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate one-half of dowel length to prevent concrete bonding to one side of joint.

3.9 WATERSTOPS

- A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during

progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions. Comply with ACI 301.

- B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable. Comply with ACI 301.

3.10 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed. Ensure that all foreign material has been removed from surfaces, including reinforcement and embedded items, against which concrete will be placed.

B. The addition of water to the mix after leaving the plant is not permitted unless approved by Architect. The addition of water at the site is contingent upon full time inspection of the process by the independent DPMC prequalified testing laboratory and the acceptance of the Inspector. Comply with ACI 301, section 4.3.2.1.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

D. Method: Convey concrete as rapidly and directly as practicable to preserve quality and to prevent segregation.

1. Do not deposit concrete that has initially set. Retempering of concrete, which has partially set, is not permitted.
2. Maximum time for discharge of concrete shall be per ASTM C94.

E. Sequence: Pour all walls and columns full height to designated construction joints. Pour all beams, and horizontal structures to designated construction joints. Construction joints to be made in walls only where indicated on the Drawings.

F. Placement: Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete. Deposit concrete to avoid segregation.

1. When placing is once started, carry it on as a continuous operation until placement of the panel or section is complete. Construction joints to be made only where indicated on the Drawings or on approved shop drawings. Prevent the formation of cold joints at other locations.
2. Deposit concrete in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. Deposit concrete in a manner to avoid inclined construction joints.
3. Particular care shall be used when starting a concrete pour to maintain the continuity of appearance. Use all means necessary to avoid blemishes, imperfections, or changes in the finish.
4. Maintain reinforcement in position on chairs during concrete placement.

G. Consolidation: Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.

1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301. Use and type of vibrator shall conform to ACI 309, Guide for Consolidation of Concrete.
2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
3. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. Place vibrating element directly in concrete and not attached to either inside or outside of forms or to reinforcing steel.
4. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate. Do not over-vibrate concrete.

H. Initial Finishing:

1. Screed slab surfaces with a straightedge and strike off to correct elevations.
2. Where floor drains or floor slopes are indicated, slope slabs uniformly to provide even fall for drainage.
3. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

J. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When concrete is expected to be placed at air temperatures of less than 40 deg F, contractor shall review with Architect all special procedures that will be used including mix design modifications and methods of protection. This review shall occur prior to the expected extreme temperatures.
2. Provide sufficient protection material and equipment on the Project site in advance of the time when the mean daily temperatures are expected to drop below 40 degrees F.
3. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301. In addition, take precautions including, but not limited to:
 - a. Use non-chloride, non-corrosive accelerating admixture in accordance with previously accepted submittals.
 - b. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - c. Do not use calcium chloride, salt, or other materials containing antifreeze agents unless otherwise specified and approved in mixture designs.
 - d. Use only the specified non-chloride accelerator.

K. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. When concrete is expected to be placed at air temperatures of greater than 80 deg F, contractor shall review with Architect all special procedures that will be used including mix design modifications and methods of protection. This review shall occur prior to the expected extreme temperatures.
2. Provide sufficient protection material and equipment on the Project site in advance of the time when the mean daily temperatures are expected to rise above 80 degrees F.
3. When air temperature exceeds 80 deg F, take special precautions to prevent slump loss, rapid setting, and plastic shrinkage; including but not limited to:
 - a. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - b. Use set retarding admixture in accordance with previously accepted submittals.
 - c. Convey, deposit, finish and commence curing of concrete as rapidly as practicable.
4. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.
5. Use the water reducing, retarding admixture to "normalize" initial set.

3.11 FINISHING FORMED SURFACES

- A. Exposed Concrete: per the guidelines set forth in Division 3 Section for architectural concrete finishing.
- B. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections exceeding 1/4 inch.
- C. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.
- D. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
- E. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
- F. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.12 FINISHING FLOORS AND SLABS

- A. Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in 1 direction.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 - 1. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
 - a. Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15. These values apply to all floors and slabs unless noted otherwise.
 - b. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17. These values apply to slabs-on-grade.
 - 2. Slabs supporting modular office partitions, adhered flooring systems, or compact storage shelving must also comply with the manufacturer's tolerance requirements.
 - 3. Slabs scheduled to receive wood flooring must also comply with tolerances required for installation of wood flooring. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-foot long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 1/4 inch.
 - 4. Fill or grind completed floors as necessary to achieve specified finish tolerances. Fill shall be with a self-leveling cementitious product capable of being tapered to a feathered edge.
 - a. Repair any floor section measuring below either the minimum local F-number or the minimum local L-number.
- E. Trowel and Fine-Broom Finish: While concrete is still plastic, slightly scarify surface with a fine broom.
 - 1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.
- F. Broom Finish: Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
- G. Schedule of Concrete Finish Types, unless otherwise indicated on Drawings, or specified by the Architect:
 - 1. Formed Surfaces Not Exposed To View: Rough Formed.
 - 2. Formed Surfaces Exposed To View At Building Interior: Smooth Formed.

3. Formed Surfaces Exposed To View At Building Exterior: Smooth Formed.
4. Formed Surfaces to Receive:
 - a. Paint: Grout Cleaned.
 - b. Waterproofing, Dampproofing: Smooth Formed.
 - c. Veneer Plaster: Smooth Formed.
5. Exposed Interior Slabs: Trowel.
6. Exposed Stair Fills and Ramps: Nonslip Aggregate.
7. Slabs to Receive:
 - a. Concrete Toppings: Float.
 - b. Mortar Setting Beds: Scratch.
 - c. Membrane Waterproofing: Float.
 - d. Fluid Applied Waterproofing: Trowel.
 - e. Resilient Flooring: Trowel.
 - f. Carpet: Trowel.
 - g. Tile (thin-set): Fine Broom.
 - h. Loading Dock: Non-Oxidizing Metallic Hardener, Trowel Finish
8. Exposed to View Curbs: Provide monolithic finish by stripping forms while concrete is green and steel-troweling surfaces to a dense, hard, finish with corners intersections and terminations slightly rounded.

3.13 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.14 CONCRETE PROTECTING AND CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305 for hot-weather protection during curing.

- B. Where supplementary cementitious materials are used, extra precautions shall be taken to prevent premature drying.
- C. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- D. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- E. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- F. Architectural and polished concrete and all concrete in ACI 318 Table 4.2.1 exposure category C1, C2, F1, F2, and F3 shall utilize a minimum seven-day wet cure.
- G. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven (7) days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven (7) days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. After curing period has elapsed, remove strippable curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

4. Curing and Sealing Compound: Apply uniformly to exposed floors and slabs which receive subsequent finishes or penetrating sealers in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
5. Interior slabs to receive resilient flooring: Cure only with moisture retaining cover or strippable curing compound. Do not cure with curing/sealing compound.
6. Interior slabs to receive thin set of tile: Cure only with moisture retaining cover. Do not cure with curing compound.
7. Exterior Flatwork: Apply 1 coat of curing/ sealing compound as soon as possible after finishing.

3.15 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
 2. Do not apply to concrete that is less than ten days' old. 7 days of moist curing followed by 2 days of drying.
 3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry.

3.16 JOINT FILLING

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

3.17 CONCRETE SURFACE REPAIRS

- A. Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval. Repair and replacement work will be done at Contractor's expense.
- B. Defective Concrete is defined as concrete which is under strength, out of line, level or plumb, or shows objectionable cracks, honeycombing, rock pockets voids, spalling, exposed reinforcement, that has any sawdust, wood, or debris embedded in it, or is otherwise defective, and in the Architect's and Engineer's judgment these defects impair the proper strength or appearance of the work.

- C. Any concrete work not in accordance with the Specification and Drawings will be deemed to be defective.
- D. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- E. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by the Architect and Engineer.
- F. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 - 2. After concrete has cured at least 14 days, correct high areas by grinding.
 - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with polymer patching mortar. Finish repaired areas to blend into adjacent concrete.
 - 4. Correct other low areas scheduled to receive floor coverings with a polymer repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 - 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 - 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete

surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- G. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and or polymer patching mortar.
- H. Repair materials and installation not specified above may be used, subject to Architect's and Engineer's approval.

3.18 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Contractor will engage and pay for a DPMC prequalified special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Inspections:
 1. Steel reinforcement placement.
 2. Steel reinforcement welding.
 3. Headed bolts and studs.
 4. Post-installed concrete anchors, per ICC-ES recommendations.
 5. Verification of use of required design mixture.
 6. Concrete placement, including conveying and depositing.
 7. Curing procedures and maintenance of curing temperature.
 8. Verification of concrete strength before removal of shores and forms from beams and slabs.
- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 1. Testing Frequency: Obtain at least one composite sample for each 50 cu. yd. or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 2. Slump: ASTM C143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C231, pressure method, for normal-weight concrete; ASTM C173, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Water Content: In accordance with AASHTO T318, "Measurement of Water Content Using the Microwave Oven".
5. Concrete Temperature: ASTM C1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
6. Unit Weight: ASTM C567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
7. Compression Test Specimens: ASTM C31.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
8. Compressive-Strength Tests: ASTM C39; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below the specified compressive strength by more than 500 psi.
11. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28 -day tests.
12. Non-Compliant Test Reports: All test reports indicating non-compliance should be e-mailed immediately to all parties on the test report distribution list. Such shall use text and font color to clearly identify them as non-compliances.
13. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by the Architect or the Engineer but will not be used as sole basis for approval or rejection of concrete.
14. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect and Engineer.

15. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42 or by other methods as directed by the Architect or the Engineer.
 - a. If test results indicate that compressive strength requirements have not been met, the Contractor shall justify that the load carrying capacity of the structure has not been reduced. Carry out tests of cores drilled from the area in question as directed by the Architect in accordance with ASTM C43 and ACI 318 Section 5.6.5.
 - b. If the compressive tests of the core specimens fail to show the compressive strength specified, the concrete shall be deemed defective and shall be replaced or adequately strengthened in a manner acceptable to the Architect. Perform load tests as outlined in ASTM C39, as directed by the Architect, on the questionable portion of the Work.
16. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
17. Correct deficiencies in the Work that test reports and inspections indicate does not comply with the Contract Documents.

D. Reinforcing Steel

1. Notify the testing agency and the Architect at least 48 hours before concrete is to be poured or reinforcing is covered up.
2. Before any concrete is poured on any particular portion of the building, the reinforcing steel and form dimensions will be inspected by the Testing Agency. Any errors or discrepancies shall be corrected before concrete is placed.
3. As a minimum, all testing and inspection as per the requirements of Uniform Construction Code. Reinforcing steel to be assumed to have been designed for calculated stresses in excess of 70 percent of the basic allowable values.
4. In addition to other required inspections, the following are subject to Special Inspection as per IBC Chapter 1704.4:
 - a. Placement of Reinforcing Steel
 - b. Welding of Reinforcing Steel
5. A special inspector from the Testing Agency shall be present during all field bending of reinforcement.
6. Installation of deformed bar anchors to be tested in accordance with Section 7.1 of AWS D1.1.
7. Welding of Reinforcement: There shall be continuous inspection during all welding of reinforcement. All butt welds to be inspected using radiographic testing. At the Owners option recognized non-destructive tests such as resistance, Magnetic Particle Examination, and Liquid Penetrant Inspection may be used to inspect the welds.
8. Comply with ICC-ES approvals with respect to special inspection required during installation.
9. Testing and inspection of mechanical splices and reinforcing couplers to conform to manufacturer's recommendations and ICC-ES approval.

- E. Survey and Adjustment: Continuously observe formwork operations, record such observations on a daily basis, and submit reports of the results. Instrument check forms before and during concrete placement to assure no movement has taken place. Make appropriate corrections to reposition displaced forms.
1. Measure floor and slab flatness and levelness according to ASTM E1155 within 24 hours of finishing.
 2. Certify, by written report submitted on a weekly basis, for each level and story that the elevations, finish lines and building lines of the hardened concrete are within tolerances, as substantiated by transit survey; also that all embeds and inserts have been installed within tolerance.

END OF SESSION

Intentionally Blank Page

SECTION 05 12 00 - STRUCTURAL STEEL

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. The structural steel as shown on the Contract Drawings and specified herein, including, but not limited to, the following:
 - a. Girders and beams.
 - b. Columns and diagonal bracing.
 - c. Miscellaneous steel shown on the structural drawings.
 - d. Purlins.
 - e. Loose Lintels.
 - f. Grouting of base plates, leveling and bearing plates.
 - g. Bolts, washers and other steel accessories.
 - h. Architecturally Exposed Structural Steel
 - i. Items or areas specified on the Contract Drawings and Documents.

B. Related Sections

- 1. Division 01 Section "General Requirements" for independent testing agency procedures and administrative requirements.
- 2. Division 03 section "Cast-in-Place concrete"; Section 033000.
- 3. Division 05 Section "Steel Decking"; Section 053000
- 4. Division 09 "Painting and Finishing"; Section 099113.

1.3 REFERENCES

- A. Follow the guidelines contained in the latest editions of the following codes, specifications and standards except where more stringent requirements are shown or specified in the Contract Documents.
- B. The New York City Building Code, 2014, with local amendments.
- C. American Institute of Steel Construction (AISC).

1. AISC 360 "Specification for Structural Steel Buildings".
 2. AISC 303 "Code of Standard Practice for Steel Buildings and Bridges". When reference (directly or indirectly) is made to this document, reference is made only to technical issues and excludes all issues related to schedule, Owner's responsibilities, approvals and commercial terms.
- D. Research Council on Structural Connections (RCSC).
1. RCSC "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts".
- E. American Society for Testing and Materials (ASTM)
1. ASTM A6 "Specification for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use".
 2. ASTM A27 "Specification for Steel Castings, Carbon, for General Application".
 3. ASTM A36 "Specification for Carbon Structural Steel".
 4. ASTM A53 "Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless".
 5. ASTM A148 "Specification for Steel Castings, High Strength, for Structural Purposes".
 6. ASTM A307 "Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength".
 7. ASTM A325 "Specification for Structural Bolts, Steel, heat Treated, 120/105 ksi Minimum Tensile Strength".
 8. ASTM A449 "Specification for Quenched and Tempered Steel Bolts and Studs".
 9. ASTM A490 "Specification for Heat-Treated, Steel Structural Bolts, 150 ksi Minimum Tensile Strength".
 10. ASTM A500 "Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes".
 11. ASTM A501 "Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing".
 12. ASTM A514 "Specification for High-Yield Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding".
 13. ASTM A563 "Specification for Carbon and Alloy Steel Nuts".
 14. ASTM A572 "Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel".
 15. ASTM A588 "Specification for High-Strength Low-Alloy Structural Steel with 50 ksi Minimum Yield Point to 4 inch Thick".
 16. ASTM A618 "Specification for Hot-Formed and Seamless High-Strength Low-Alloy Structural Tubing".
 17. ASTM A992 "Standard Specification for Steel for Structural Shapes for Use in Building framing".

18. ASTM B695 "Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
 19. ASTM F436 "Specification for Hardened Steel Washers".
 20. ASTM F959 "Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners".
 21. ASTM F1544 "Standard Specification for Anchor Bolts, Steel, 36, 55 and 106-ksi Yield Strength".
 22. ASTM F1852 "Standard Specification for 'Twist Off' Type Tension Control Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/ 105 ksi Minimum Tensile Strength".
- F. American Welding Society (AWS).
1. AWS D1.1 "Structural Welding Code – Steel".
- G. American Association of State Highway and Transportation Officials (AASHTO).
1. AASHTO "Standard Specifications for Highway Bridges".
- H. Structural Steel Painting Council (SSPC).
1. SSPC "Steel Structures Painting Manual, Volume 2, Systems and Specifications".
- I. Pipe fabrication institute (PFI)
1. PFI "Pipe bending methods, tolerances, process and material requirements (PFI Standard ES-24)"

1.4 DEFINITION

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC's "Code of Standard Practice for Steel Buildings and Bridges," that support design loads.
- B. Architecturally Exposed Structural Steel (AESS): Structural steel designated as architecturally exposed structural steel in the Contract Documents.
- C. Heavy Sections: Rolled and built-up sections as follows and subjected to special notch toughness, fabrication, welding and inspection requirements as defined in this specification:
1. Shapes included in ASTM A6 with flanges thicker than 2 inches.
 2. Welded built-up members with plates thicker than 2 inches.
 3. Column base plates thicker than 2 inches.

1.5 SUBMITTALS

- A. General:

1. Review of submittals if of a general nature only, and responsibility for conformance with the intent of the Contract Documents shall remain with the Contractor. Review does not imply nor state that fabricator has correctly interpreted the Contract Drawings.
 2. All submissions shall be in accordance with the submission schedule developed and agreed between the Architect and Contractor at the commencement of the project. Submission shall include dates of order and delivery of materials to the shop and the site.
 3. Shop drawing schedule shall allow adequate time for reviews. Submittal shall include all related pieces in an assembled or area. The Contractor shall allow adequate time in shop drawing preparation stage for the dimensioning process and coordination with the Architectural Drawings and those of other disciplines.
 4. Submit a schedule for steel shop and erection drawings. Assume a maximum of one hundred drawings will be reviewed in any 10 working day period.
 5. Where shop drawings are resubmitted, the Contractor shall cloud and identify all changes made due to additions, deletions, and corrections to the shop drawing. Shop drawings resubmitted without each change being clouded and identified will be returned for resubmission.
- B. Product Data: For each type of product indicated.
- C. Shop Drawings: Show fabrication of structural-steel components, including anchor rod setting plans, details of layout and connections, fabrication of all members, and element and erection plans. Direct copies of the Contract Documents are not acceptable as a submission from the Contractor.
1. Submit shop drawings to Architect for review and obtain Architect's acceptance prior to start of fabrication.
 2. Include layout, member size, and weights, materials used, and beam marks as well as orientation and relation of members to appropriate grid lines and setting elevations for column bases. Reference shop drawings to specific location and detail number on the Structural Drawings.
 3. Include details of cuts, connections, splices, camber, holes, openings, doubler plates, stiffeners and other pertinent data, including bolt hole sizes, connection materials, and welded joint designations.
 4. Include embedment drawings.
 5. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
 6. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pre-tensioned and slip-critical high-strength bolted connections.
 7. Indicate surface preparation and finishes.

8. Submit plans of all levels locating the edge of slab at perimeter and at interior openings.

D. Connections Design:

1. The Contractor is responsible for the design of connections when they are not fully defined on the Contract Documents.
2. The Engineer responsible for the design of connections shall be licensed in the State of the project. At the commencement of the project submit a letter signed and sealed by the Engineer that will supervise the steel connection design attesting to this responsibility.
3. At the end of the steel shop drawing submission phase submit a letter, signed and sealed by the Engineer supervising the steel connection design, attesting to the completion of the work.
4. Submit calculations of all connections. Calculations and details shall be clearly keyed to the appropriate members on the construction documents. Calculations shall bear the seal of the Engineer supervising design of the steel connections.
5. Contractor shall not proceed with steel erection until these requirements are fulfilled.
6. The Contractor shall not submit any piece drawing for review until all connections used on that drawing have been reviewed by the Engineer. Drawings submitted with connections that have not previously been submitted for review will be rejected as incomplete.

E. Erection Procedures:

1. Submit procedures, methods, sequences of erection, temporary shoring and guying, and equipment proposed for erecting structural steel. Erection procedures are submitted for record only and therefore will not be returned to the Contractor.

F. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1, "Structural Welding Code - Steel" for non-prequalified welded joints. All submitted Procedures shall be reviewed by the Testing Agency prior to use on the project. The Procedures will be submitted to the Engineer for record only.

G. Weld Shrinkage and Distortion Procedures: Submit weld shrinkage and distortion procedures for all welded connections where distortion due to weld shrinkage may cause damage to the steel material. The welding sequence and procedures are to minimize the effect of weld shrinkage, residual stresses, and to maintain erection tolerances. These procedures shall be reviewed by Testing Agency, and then used by Testing Agency to verify conformance. As a minimum, procedures shall be submitted for the following connections:

1. Welding of continuity plates and doubler plates into the WF columns.
2. Field welding and bolting of north truss and columns connection ((include beam flange welds, rib welds, connection plate bolting and weld).
3. Welding ASTM A913 columns to base plates.

- H. Fastener Installation Procedures: Submit written procedures for the pre-installation testing, installation snugging, pre-tensioning, and post-installation inspection of fasteners. The procedures shall meet all requirements of the Research Council on Structural Connections (RCSC) "Specification for Structural Joints Using ASTM A325 or A490 Bolts" and the Contract Documents.
- I. Qualification Data.
- J. Welding certificates.
- K. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- L. Mill test reports for structural steel, including chemical and physical properties, regardless of thickness or use. Reports shall comply with ASTM A6.
 - 1. Submit a mill report for each heat of steel used, and certified fastener reports for all fasteners, including nuts, washers and direct tension indicators prior to the start of fabrication. For unsatisfactory mill test report, retest steel.
 - 2. Include Charpy test results for heavy sections and for materials where Charpy values are specified.
 - 3. Mill test reports shall include ladle analysis and tensile elongation and bend tests.
 - 4. Mill reports shall traceable to individual pieces of steel used.
- M. Product Test Reports and Certifications: Submit manufacturer's test reports and certifications. Test Reports and Certifications are submitted for record only and therefore will not be returned to the Contractor. A copy of the test reports and certifications shall be sent to the owners Quality Assurance Agency. The Contractor Certificate of Compliance letter shall accompany the Manufacturer's Certifications.
 - 1. Bolts, nuts, and washers including mechanical properties and chemical analysis. Certifications for high strength bolts shall conform to certification requirements contained in ASTM A325, A490, F1852, F959, F2280.
 - 2. Direct-tension indicators.
 - 3. Tension-control, high-strength bolt-nut-washer assemblies.
 - 4. Shear stud connectors. Shear studs, as supplied, shall meet the requirements of AWS D1.1, Sections 7.2 and 7.3.
 - 5. Shop primers.
 - 6. Nonshrink grout.
 - 7. Welding electrodes, fluxes and shielded gas products. Certifications shall satisfy the applicable AWS A5 and project requirements.

8. Spray-on fireproofing. Submit certificate issued by paint manufacturer ensuring compatibility between the primer and the spray-on fireproofing.
- N. Source quality-control reports.
- O. Submit fabricators identification mark system to Testing Agency prior to fabrication.
- P. As-Built Drawings: At the end of the work included in this Section submit a complete set of reproducible drawings incorporating all changes, additions and deletions to the Construction Drawings due to revisions, change orders, field conditions, or any other reason.

1.6 QUALITY ASSURANCE

- A. Testing Agency: Shop and field testing and inspection of steelwork specified in this document or requested by the Owner will be performed by an independent agency engaged by the Owner.
- B. Comply with applicable provisions of the current edition of the following specifications and documents, except where more stringent requirements are shown or specified:
 1. AISC 303 "Code of Standard Practice for Structural Steel Buildings and Bridges".
 2. AISC 360, "Specification for Structural Steel Buildings".
 3. AISC "Steel Construction Manual".
 4. RCSC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts." with supplements.
 5. American Welding Society (AWS) D1.1.
- C. All work shall be performed by qualified operators experienced in their field of work and as otherwise required by these specifications.
- D. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD and prequalified by the DPMC.
- E. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector and prequalified by the DPMC.
- F. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1 for each process, position and joint configuration. Each operator shall have been qualified as prescribed by AWS. Qualification performed more than six months prior to the start of the welding by the welder is acceptable, provided written documentation is submitted showing that the welder has continued to use the applicable welding process on an ongoing basis since the test was conducted, with no lapse in service exceeding six months.
- G. Contractor's Quality Control Plan. Quality Control includes the functions performed by the Contractor to ensure that the material and workmanship of structural steel construction meets the project specifications and applicable standards. The Contractor shall submit a Quality Control Plan that addresses all inspection issues, including fabrication/erection testing and inspection per AWS D1.1 and AISC 341 Appendix Q. The verification testing and inspection carried out by the Testing

Agency does not relieve the contractor of the responsibility for conducting their own quality control/inspection program to ensure the requirements of the Contract Documents have been met. The Contractor's Quality Control Plan will be reviewed by the Testing Agency.

- H. Quality Control Inspector Qualifications. Along with Quality Control Plan, Contractor shall submit written qualifications for all inspectors to be assigned Quality Control functions for structural steel work, including general inspection, bolting inspection, welding inspection, and non-destructive testing. Qualifications for welding inspectors shall show evidence of ability to monitor all WPS variables, check weld sizes, and visually detect weld defects.
- I. Unidentifiable Materials: Materials delivered with certificates are classified as identifiable; those without certificates are classified as unidentifiable.
- J. Testing of Unidentifiable Material: By Contractor's testing agency; paid for by Contractor.
 - 1. Testing of Unidentifiable Material: By Contractor's testing agency; paid for by Contractor.
 - a. General: Test material not identifiable by heat number and mill test or other acceptable manufacturer's identification per ASTM A370 as follows.
 - b. Shear Studs: Each lot of 100 studs; tensile tests on 3 finished studs per AWS.
 - c. Structural Shapes and Plates: From coupons taken from material; one tensile test and one bend test per 5 tons of each shape.
 - d. High Strength Bolts: Each lot of 100 bolts; tensile tests on 2 bolts in full size and one tensile test on a 1/2" diameter machined specimen.
 - e. Other Materials: Test as directed.
- K. Prefabrication and Preinstallation Conference: Prior to performing fabrication or erection work, there shall be a pre-fabrication and pre-erection meeting to review welding procedures, bolting procedures, and inspection requirements for all welding and bolting operations. The meeting shall include the following individuals: Owner's Representative, Testing Agency, Special Inspector, Steel Fabricator and Erector personnel supervising the shop, field and Quality Control work.
- L. Surveys
 - 1. Contractor shall conduct field surveys and field verification as required to incorporate existing conditions from previous works, such as foundations and existing buildings, to the work before shop drawings are produced.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Do not handle structural steelwork until paint has thoroughly dried. Care shall be exercised to avoid abrasions and other damage.
- B. Store materials to permit easy access for inspection and identification. Support steel members off ground. Protect steel members and packaged materials from corrosion and deterioration or from

damage by construction operations. Materials showing evidence of damage will be rejected and shall be immediately removed from the site.

- C. Do not store materials on the structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed, to the acceptance of the Architect, and at no additional cost to the Owner.
- D. All structural bolts, nuts, washers and load indicators shall be delivered to the site, where they will be installed, in unopened containers. Protect all structural fasteners from weathering and corrosion prior to installation and tightening.
- E. Requirements for storage and handling of electrodes shall be per AWS D1.1. Additional requirements include:
 - 1. Long term storage of weld consumables shall be indoors, where moisture or dew does not collect, and in undamaged manufacturer's shipping bags, boxes, and containers.
 - 2. Open Flux Cored Arc Welding (FCAW) electrodes shall be completely covered during hours of non-use (i.e., weekends, nights of nonuse, days of nonuse, etc.). Where rain or dew could be expected to collect (i.e., open floors of erection site, open shop bays, etc.), electrodes shall also be covered.

1.8 COORDINATION

- A. Surveys: Contractor shall conduct field surveys and field verification as required to incorporate existing conditions from previous works, such as foundations and existing buildings, to the work before shop drawings are produced.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, templates, instructions, and directions for installation.
- C. Notify the Owner's Representative in sufficient time prior to shop or field fabrication or erection to permit testing and inspection without delaying work.
- D. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.

PART 2 PRODUCTS

2.1 STRUCTURAL STEEL MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled steel may be used pending Engineer's approval.
- B. Structural Steel Shapes, Bars, and Plates:
 - 1. W-Shapes: ASTM A992.

2. Channels: ASTM A572, Grade 50
3. Angles-Shapes: ASTM A36
4. Plate and Bar: ASTM A572, Grade 50
5. Cold-Formed Hollow Structural Sections: ASTM A500 structural tubing.
6. Steel Pipe: ASTM A53, Type E or S, Grade B.
7. Heavy Sections: Heavy sections as defined in this specification shall have toughness properties meeting a Charpy V-Notch (CVN) value of 20 ft-lb at 70 degrees F. Testing shall be conducted in accordance with the current AISC specifications.

C. Welding Electrodes:

1. Conform to AWS D1.1. Base selection of electrodes on the actual properties of the metal connected.
2. Electrodes shall have a specified minimum tensile strength of at least 70 ksi.
3. Use low hydrogen electrodes.

D. Metallic Filler: Provide Plastic Steel Putty where required or noted on the drawings.

2.2 BOLTS, CONNECTORS AND ANCHORS

A. Unfinished Bolts and Nuts (Machine Bolts) and Threaded Rods:

1. Bolts and Nuts: ASTM A307, Grade A
2. Washers: ASTM F436

B. Specified High Strength Bolts Nuts, Washers and Direct Tension Indicators:

1. ASTM A325 Type 1
2. ASTM A490 Type 1 bolts where noted on drawings.
3. ASTM F1852 Twist-Off Type Torque Control Bolts manufactured by Infasco or Vermont Fasteners (or proved equal) are a suitable alternative to ASTM A325 bolts, although use of such bolts shall not negate the requirement that Direct Tension Indicators be used for inspection.
4. ASTM A563 Type DH Heavy Hex Nuts shall be used.
5. ASTM A436 Through-Hardened Flat Washers shall be used.
6. ASTM F959 Direct Tension Indicators manufactured by Beth-Fast or J & M Turner (or proved equal) shall be used on all A325 and A 490 bolts on slip critical connections regardless of whether or not Twist-Off bolts are used.

C. Anchor Rods: ASTM F1554 Grade 36.

D. Where fasteners are indicated as galvanized, provide units that are zinc coated in accordance with ASTM B695, Class 50. Galvanized fastener assemblies shall be Rotational Capacity Tested prior to

use, and reports of such tests submitted prior to installation. Galvanized A563 nuts shall be lubricated in accordance with Supplementary requirement S2.

- E. Shear Studs or Headed Studs: ASTM A108, Grades 1015 or 1020, headed-stud type, cold-finished carbon steel; AWS D1.1, Type B and conform to requirements of AWS D1.1 Section 7. Length noted is the installed length.
- F. Expansion Bolts: Kwik-Bolt II as manufactured by Hilti Inc., or as indicated on the drawings or equal.

2.3 PRIMER

- A. Shop Paint: SSPC, Paint 20, Type I, Inorganic or Type II, Organic. Paint shall comply with the requirements of SSPC-PS 12.01.
- B. Field applied primer shall comply with the VOC requirements called out in the “Green Seal Standard for Anti-Corrosive Paints” (GC-03). Primer paints shall be compatible with finishes and spray-on fireproofing specified elsewhere.

2.4 GROUT

- A. Drypack for Base Plates: Master Builders’ “Embeco 636 Grout”; Euclid Chemical Company’s “Euco Dry Pack Grout”, Master Builders’ “Masterflow Dry Pack” or equal. Mix to a plastic consistency.
- B. Non-Shrink Grout for Base Plates: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2400 psi in 48 hours and 6000 psi in 28 days; “Euco NS Grout” manufactured by The Euclid Chemical Company or “Five-Star Grout” manufactured by US Grout Corporation, or equal.

2.5 CONNECTION DESIGN

- A. Contractor shall design all steel connections not fully defined in the Contract Documents.
- B. Type of Connections
 - 1. All connections shall be one of the following:
 - a. High-strength bolts assemblies.
 - b. Unfinished bolts assemblies.
 - c. Welds.
 - 2. When the type of connection is shown on the Drawings use that type of connection unless otherwise approved in writing by the Engineer of Record.
 - 3. Use a connection other than unfinished bolts where required by code and in the following locations:
 - a. All beam and column connections and splices unless otherwise noted on Drawings.
 - b. All connections indicated as such.
 - c. Connections that are a part of the lateral force resisting system.

- d. Connections for supports of running machinery or of other live loads which produce impact.
- e. Connections carrying equipment and stack loads.
- f. Beams supporting columns or posts.
- g. Connections for cantilevers.
- h. Full and partial moment connections.

C. Design Criteria.

- 1. Design connections for the loads and according to the requirements in the Contract Documents and the applicable building regulations.
- 2. Bolts shall be at least 3/4 inches in diameter.

2.6 FABRICATION

A. General

- 1. Fabrication to be performed in accordance with Chapter M of AISC “Specification for Structural Steel Buildings”, the AISC “Code of Standard Practice for Buildings and Bridges” sections 3.2, 5, 6, 8 and the Drawings and Specifications.
 - a. Assume all thermally cut edges are subject to substantial stresses.
 - b. Paragraph M4.6 (Field Painting) shall be considered deleted from Chapter M.
 - c. The last sentence of paragraph M5.1 shall be deleted from Chapter M.
- 2. Fabrication tolerances shall comply with AISC Code of Standard Practice for Steel Buildings and Bridges.
- 3. Provide holes, slots and openings together with necessary reinforcing as shown on the Drawings required for securing work of other trades to the work specified here. Use suitable templates for proper locations of these openings. Where openings are shown on the Drawings no change shall be permitted without prior approval.
- 4. Provide drain holes in closed hollow sections to prevent water build-up.
- 5. All hollow members exposed to weather shall be hot-dipped galvanized and oriented in such a fashion to promote drainage and prevent water from accumulating inside the hollow sections.
- 6. Provide 3/8 inch thick cap plate for all hollow sections, unless otherwise noted on drawings.
- 7. Steel requiring adjustment shall be provided with slotted holes as shown on the Drawings.
- 8. Where thickness of material exceeds 7/8 inch or the diameter of hole, drill or ream holes after punching even where punching is allowed by referenced standards. Flame cut holes for fasteners are not acceptable.
- 9. Fabricate beams and girders with natural camber upward, unless otherwise shown or indicated on the Drawings. Camber stated in the Drawings is the required camber after erection.
- 10. Splice members only where indicated on Structural Drawings or where accepted by the Architect and engineer.

11. Grind burrs, sharp arrises and ragged edges that would prevent solid seating of the connected parts.
12. Manual oxygen cutting shall be done only with mechanically guided torches. An unguided torch may be used provided the cut is within 1/8 inch of the required line.
13. Dressing: Dress edges of all plates cut by flame to remove slag, scale, irregularities and excessive hardening.
14. When bending steel plate:
 - a. Bend plates perpendicular to the rolling direction.
 - b. Grind flame cut plate edges transverse to the bend line.
 - c. Grind out nicks in plate edges transverse to the bend line.
 - d. Round sharp corners on plate edges transverse to the bend line.
15. Heat straightening: Will be permissible by the use of properly controlled heat, skilled personnel, proper equipment and in accordance with documents prepared by the fabricator and accepted. Reject materials that contain kinks or sharp angles. Material straightened prior to fabrication shall be rejected where it shows signs of distress or defects.
16. Any technique not covered by this Section shall be submitted to Architect for approval.

B. Bolting, General:

1. Bolts shall be of a length that will extend to a point at least flush with the surface of the nuts, though not more than a length equal to the height of the nut, beyond the nuts unless otherwise noted.
2. Insert bolts into holes without damaging the threads.
3. Through-hardened ASTM F436 washers shall be used on bolts. Use ASTM F436 beveled washers where bolts bear on surfaces with a slope greater than 1:20 relative to the bolt.
4. Manufacturer's symbol and grade markings shall appear on all bolts, nuts, through-hardened washers and direct tension indicators.
5. Product containers must be marked with lot numbers and traceability information so that correspondence with mill reports can be established.
6. Holes in column baseplates shall be no more than 3/8 inch larger than the nominal bolt size.
7. Circular and slotted holes shall be as per Specification for Structural Joints Using ASTM A325 or A490 Bolts. For purposes of hole fabrication assume dynamically loaded connections.
8. Where bolt holes are subject to welding shrinkage stresses the holes shall be drilled.

C. Unfinished Bolts (Machine Bolts) and Anchor Rods:

1. Install and tighten unfinished bolts in accordance with requirements for snug tightened bolts as defined in "Specification for Structural Joints Using ASTM A325 or A490 Bolts".
2. Mutilate bolt threads for unfinished bolts to prevent the nuts from backing off.

D. High-Strength Bolts

1. Install high-strength threaded fasteners in accordance with RCSC “Specifications for Structural Joints using ASTM A325 or A490 Bolts”. Contact surfaces of bolted parts shall as a minimum comply with the Class A requirements.
2. Joint type shall be as noted on drawings.
3. Tighten high-strength bolts and nuts using Direct Tension Indicator. Calibrated wrench and “Turn of Nut” methods are not acceptable. Twist-Off type Tension Control Bolt assemblies complying with ASTM F1852 are a suitable alternative to A325 structural bolt assemblies, provided that direct tension indicators are used on each assemblies for inspection purposes.
4. When connection has bolts and welds, fully tighten bolts prior to welding with the exception that in moment connections the flange welds shall be completed prior to final tightening of high strength bolts.
5. When already tensioned bolts have had their tension relaxed, replace the bolt and tension indicator and re-tighten.

E. Welding

1. Weld sizes where shown shall be assumed to be effective weld sizes.
2. Welding shall be in accordance with AWS D1.1 “Structural Welding Code”.
 - a. Contractor is responsible for selection of specific materials and procedures except as specifically noted in contract documents.
 - b. Connections have varying levels of restraint and thus necessary steps shall be taken by Contractor to control or accommodate the restraint. Sequence welds in a manner to reduce residual stresses caused by welding to a minimum value.
 - c. Welding shall not begin until joint elements are bolted or tacked in intimate contact and adjusted to dimensions shown in the Drawings, with proper allowance for any weld shrinkage.
 - d. Welding and fabrication procedures shall incorporate measures necessary to eliminate cracking. These measures shall include but are not limited to additional preheat, postheat, or retarded cooling.
 - e. When selecting materials and procedures, consideration shall be given to the need for materials and procedures in excess of code requirements.
 - f. The need for pre-heat and other procedures are to be based on the actual chemistry and mechanical properties of the steel and not solely on the specified properties of the steel.
 - g. Limit maximum interpass temperatures so as not to decrease toughness and strength of the weld metal.
 - h. Weld variables shall be consistent with the recommendations of the electrode manufacturer.
 - i. Welding Procedure Specifications (WPS) shall be readily available to all welders, inspectors, and supervisors during the production process.

- j. Weld only in accordance with the WPS.
 - k. Do not mix different electrodes in the same weld joint unless the interactions have been shown not to cause problems.
 - l. Welding procedures shall incorporate low hydrogen practices.
 - m. Use stringer beads only (no weaving).
- 3. Tack welds, which are not incorporated into a weld, shall not be allowed on the finished structure with the exception of backing plates that are not removed.
 - 4. All groove or butt welds shall be full penetration unless noted otherwise on the Drawings.
 - 5. Do not weld into the column flange to column web intersection.
 - 6. Sequence the work as necessary to accommodate testing.
 - 7. Remove run-off tabs and backup plates and grind surfaces smooth as required for inspection or testing.
 - 8. At connections of members that are a part of “eccentrically braced frame”:
 - a. Remove backing bars and apply reinforcing fillet weld per note J of figure 3.4 of AWS D1.1.
 - b. Remove weld runoff tabs and grind smooth.
 - c. Limit oscillation of FCAW electrodes to 3d, for $d \geq 3/32$ inches, and to 5d, for $d < 3/32$ inch (d = wire diameter)
 - d. Pay increased attention to uniform and adequate preheat.
 - e. Maximum interpass temperature not to exceed 550 degrees F when notch toughness properties are specified.
 - f. Complete individual weld layers prior to applying portions of subsequent layers. Ends of interrupted passes to be staggered. Minimize starts and stops within body of the weld.
 - 9. Splices of heavy sections as defined by AISC Spec Section A3.1c and A3.1d shall be made in conformance with Section J1.5 of “AISC Specification for Structural Steel Buildings.”
 - 10. Shear Studs: Install shear studs in accordance with the manufacturer's recommendations and AWS D1.1.
 - 11. Where tubes, pipes or other closed sections are exposed to the weather, provide seal welds where other specified welds do not provide a complete seal of the enclosed space.

2.7 SHOP PRIMING

- A. All structural steel exposed to the weather, classified as Architecturally Exposed Structural Steel, or not completely concealed by interior finishes shall receive a shop coat of primer except as follows:
 - 1. Steel in contact with concrete or cementitious fireproofing.
 - 2. Steel to be galvanized.
 - 3. Contact surfaces of welded connections and areas within 4 inches on each side of field welds.
 - 4. Machined surfaces.

5. Contact surfaces of high-strength bolted connections.
 6. Reinforcing steel.
- B. Prepare surfaces to be primed in accordance with the manufacturer's recommendations but not less than the following:
1. For steel that is to be enclosed or protected: SSPC-SP2 (Hand Tool Cleaning).
 2. For steel that is to be exposed in the finished work for an extended period of time due to job site conditions: SSPC-SP6 (Commercial Blast Tool Cleaning).
 3. Primer paints shall be compatible with finish paints specified elsewhere.
 4. Minimum primer thickness shall be 2 mils.
 5. Steel outside of the building envelope or exposed to the weather in the final structure shall be galvanized and painted.
 - a. All paints and coats shall be compatible
 - b. Paints shall provide a minimum protection of 50 years.
 6. Exterior or exposed surfaces around high-strength bolts and surfaces held together by high-strength bolts shall receive a primer coat compatible with slip-critical type connections.
 7. Use special care if steel is fabricated, cleaned and painted in damp weather to remove moisture from mill scale cracks.
 8. Paint applied in consecutive coats shall be of different tints sufficient to insure visual verification of application.
- C. Steel members not otherwise painted shall be painted when subjected to condensation from piping, are in shower or steam rooms, are exposed to chemical fumes or are exposed to other conditions of potentially aggressive corrosion.
- D. The following surfaces shall be temporarily protected by a thin coating of varnish or lacquer:
1. Unpainted area around field welds.
 2. Steel around high strength bolts.
 3. Machined surfaces.
- E. Surface preparation and application shall be in accordance with SSPC-PS 12.01 "One-Coat Zinc-Rich Painting System".
- F. All steel exposed to the weather in the final structure shall be galvanized or painted in accordance with the requirements of Section 09900 and the Drawings
- G. All surfaces not painted shall be cleaned as required by the Building Code.

2.8 GALVANIZING

- A. All exterior steel and steel exposed to the weather shall be galvanized and painted.

- B. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A123 and to bolts, nuts, and washers according to ASTM A153. Galvanize all items noted to be galvanized and fasteners that connect galvanized components, except that ASTM A490 bolts shall not be hot-dip galvanized. Where ASTM A490 bolts connect galvanized components, use Type 3 bolt
1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.
 2. Galvanize lintels and shelf angles attached to structural-steel frame and located in exterior walls.
 3. Roughen faying surfaces of slip-critical high-strength bolted connections to achieve Class C surface accordance with the RCSC Specifications.
 4. Perform a post-galvanizing inspection of all galvanized sections to ensure the absence of any defect or cracks in the base metals and welds. Such defects might develop from the galvanization process as a result of Liquid Metal Assisted Cracking (LMAC). Steel fabricator and galvanizing company are fully responsible for crack repairs that might arise from (LMAC).

2.9 SOURCE QUALITY ASSURANCE

- A. Operate an inspection and record system to verify that all materials, workmanship and completed work conform to the specified requirements.
- B. Testing and inspection of structural steelwork will be performed by the Testing Laboratory. Provide the Inspector with the following:
1. A complete set of accepted "Submittals".
 2. Cutting lists, order sheets, material bills and shipping bills.
 3. Information as to the time and place of all rollings and shipment of materials to the shop.
 4. Representative sample pieces as requested by the testing agency.
 5. Full and ample means and assistance for testing all material.
 6. Access and facilities, including scaffolding, temporary work platforms, etc., for testing and inspection at all places where materials or components are stored, fabricated or erected in the mill, shop or field.
- C. Scheduling of Tests and Inspections
1. The Contractor shall notify the Inspector in sufficient time prior to fabrication or erection work to allow testing and inspection without delaying the work.
 2. Shop welds shall be inspected in the shop before the work is painted or shipped.
- D. Each person installing connections shall be assigned an identifying symbol or mark and all shop and field connections shall be so identified so that the Inspector can refer back to the person making the connection.
- E. Non-destructive Testing and Inspections

1. As a minimum the inspector will make all tests and inspections as required by the code requirements and special inspections Chapter 17 of IBC. The Inspector will make all the tests and inspections indicated in the Construction Documents.
 - a. Connections shall be assumed to have been designed for stresses in excess of 50 percent of the allowable values.
2. The Inspector will make all verification tests and inspections as required by AWS D1.1 “Structural Welding Code”.
3. Do not reduce testing frequency unless permission is obtained from Architect.
4. Inspector shall be present during all welding operations.
5. Verify that welders are certified and that their certification is current.
6. Check materials, equipment and procedures. Verify that meters on welding equipment are functioning and accurate.
7. Visual Inspection:
 - a. Visually inspect all welds.
 - b. Visual inspection of multi-pass welds to be continuous.
 - c. Visually inspect welds of shapes categorized in Group 4 and 5 of ASTM A6 and plates of 1 1/2” minimum thickness, at least 72 hours after completion of welding for the presence of cracks.
 - d. Verify that the effective throat thickness of flare groove welds is consistently obtained when flush to bar or section. This verification shall be based on test sections where necessary.
8. Test Methods:
 - a. Complete joint penetration welds will be tested using magnetic particle test methods and either ultrasonic or radiographic test methods.
 - b. Complete joint penetration welds to pipes and tubes to be tested using magnetic particle tests.
 - c. Use magnetic particle test methods for fillet welds and to supplement the testing requirements for butt welds.
 - d. For radiographic testing a double film technique will be used. One copy of each film will be sent to the Architect, the other will be retained by the Inspector.
 - e. In addition to the non-destructive testing specified other non-destructive test methods recognized by AWS D1.1 may be used at the Architects discretion and the results can be used to reject work under this contract.
9. Frequency of non-destructive examination will be as follows:

<u>Type of Weld</u>	<u>Frequency</u>
- Full penetration butt welds	100 percent
- Partial penetration welds with a leg length greater than 1/2 inch	20 % minimum ultrasonic and 20% magnetic particle
- Partial penetration welds used in column splices	100 percent

- Total length of all welds joining web plates to flanges 20 percent
 - Fillet and other welds not otherwise inspected 10% magnetic
10. Selection of welds to be examined: Where there is a requirement for less than 100 percent examination, the method of selection of welds to be examined is to be agreed with the Architect and Engineer before commencement of the work. If the Architect or Engineer do not provide more specific criteria, the inspectors will select the welds to be tested. The inspectors will choose specific welds which are representative of the conditions in the structure. In addition, inspectors will emphasize those locations that experience has shown are more likely to have problems.
11. Testing of Base Metal: These provisions are in addition to other applicable requirements.
- a. For full penetration welds that are part of moment frame or eccentrically braced frames the edges of material to be welded will be ultrasonically examined for evidence of laminations, inclusions or other discontinuities.
 - b. Ultrasonically test column flanges and webs at the location of all moment connections and brace connections. Test for a distance 3 inches around the location to be welded. The test procedure and acceptance criteria is defined by ASTM A898-91, "Standard Specification for Straight Beam Ultrasonic Examination of Rolled Steel Structural Shapes" Level I.
 - c. Base metal thicker than 1-1/2 inches, when subjected to through-thickness weld shrinkage strains, shall be ultrasonically inspected for discontinuities behind and within a distance of 3 inches of such welds after joint completion. Any material discontinuities shall be accepted or rejected on the basis of the defect rating in accordance with flaw severity, Class B criteria in Table 6.2 in AWS D1.1.
12. Where inspection reveals unacceptable defects:
- a. The extent of inspection will be increased to provide confidence that all the defects in the joint being inspected have been found and to assure that the problem is not systematic.
 - b. As a minimum, examine two additional joints in the group represented by the joint. If the non-destructive examination of the two additional joints reveals unacceptable defects, examine each joint in the group. Repair unacceptable welds to comply with the requirements of this Section.
- F. Take samples of all welding consumables and store in sealed containers.
- G. Tests of High Strength Bolts, Nuts, Washers and Direct Tension Indicators:
- 1. The Inspector will make all tests and inspections of high strength bolt connections as required by RCSC "Specifications for Structural Joints Using ASTM A325 or A490 Bolts".
 - 2. Observe all Direct Tension Indicators to see if proper tightness was achieved.
 - 3. Confirm that the faying surfaces have been properly prepared before connections are assembled.
- H. Inspection Records
- 1. The inspector will maintain a daily record of the work that has been inspected and its disposition. One copy of each report will be submitted to the Owner on a weekly basis. Test reports will be made on the form suggested in the AWS D1.1 "Structural Welding Code".

2. Make systematic record of all welds, including:
 - a. Date of inspection.
 - b. Location and type of weld.
 - c. Identification marks of welders.
 - d. List of defective welds.
 - e. Manner of correction of defects.

I. Mill Reports: Testing laboratory will review mill reports for conformance to referenced standard.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Prior to commencing with the erection of structural steel inspect the job site and verify that the structural steel may be erected in accordance with the Drawings and Specifications.
- B. Check the alignment and elevation of all anchor bolts with transit and level instruments before starting erection of steelwork.
- C. Verify, with steel Erector present, elevations of concrete-and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
 1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedment showing dimensions, locations, angles, and elevations.
- D. Discrepancies:
 1. In the event of discrepancy, immediately notify the Architect and Owner's Representative in writing.
 2. Do not proceed with construction in the region of the discrepancy until all such discrepancies have been resolved.
 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
 1. The Contract Drawings indicate the completed structure. The Contractor is fully responsible for all temporary measures necessary for erection, except where specific sequences and requirements are specified on the Drawings.
- B. Secure field measurements required for proper and adequate fabrication and installation of the work covered in this Section. Assume responsibility for exact measurements.

- C. Furnish templates for exact locations of items to be embedded in concrete and masonry, and any setting instructions required for installation.

3.3 ERECTION

A. General:

1. Structural steel shall be erected in accordance with Chapter M of AISC Specifications and the Drawings and Specifications and with the AISC Code of Standard Practice.
2. Erection of Architecturally Exposed Structural Steel shall be in accordance with Section 10.5.1 and 10.5.2 of AISC "Code of Standard Practice for Steel Buildings and Bridges."
3. Dimensions shown on drawings are based on an assumed design temperature of 70 degree F. Fabrication and erection procedures shall take into account the ambient temperature range at the time of the respective operations.
4. Care shall be taken to protect work already installed from damages resulting from structural steel erection.
5. Steel erection may be allowed prior to supporting concrete reaching specified strengths if the contractor provides technical justification and the Architect or Engineer concurs.

B. Base Plates:

1. Prepare surface of existing concrete as if for a concrete construction joint. Clean the bottom surface of base plates.
2. Remove any templates used for the setting of anchor bolts.
3. Tighten anchor rods after the supported members have been positioned and plumbed and grout has achieved required strength. All wedges and shims shall be removed prior to installing grout unless otherwise approved by the Engineer of Record.

C. Base Plate Grouting

1. Base plate grout shall be mixed and applied in strict accord with manufacturer's directions.
2. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure.

D. ERECTION TOLERANCES

1. Maintain erection tolerances of structural steel within AISC 303.
2. Individual pieces, other than AECS steelwork shall be plumbed, leveled and aligned in accordance with the requirements of the "Code of Standard Practice for Steel Buildings and Bridges".
3. See Part 4 of this Section for special erection tolerances for AECS.
4. Align lintels to provide proper alignment of new masonry with adjacent masonry.

E. Temporary Shoring and Bracing:

1. The Contract Drawings indicate the completed structure. The Contractor is fully responsible for all temporary measures necessary for erection, except where specific sequences and requirements are specified on the Drawings. See the Drawings for erection sequence notes and minimum requirements.
2. Contractor is responsible for identifying need for temporary construction and for the design, installation and use of all temporary bracing and supports necessary to stabilize the framing until complete.
3. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.
4. Provide temporary works as necessary to erect the structure and achieve proper alignment as erection proceeds. In addition, provide temporary bracing and shoring to brace the incomplete structure against loads such as wind and seismic forces comparable in intensity to the design loads for the completed structure.
5. Make all necessary provisions for temporary bracing and for completion of erection where structural members are temporarily left out for erection at a later time.
6. Provide temporary floors as required to erect the structure.
7. Items installed before concrete is placed shall be properly braced to prevent distortion by pressure of concrete. Watch and maintain bracing during concrete operations.

F. Expansion Bolts:

1. Install in accordance with the manufacturer's recommendations.
2. Use washers on all bolts.
3. Use care to avoid cutting or damaging reinforcing bars.
4. When exposed to view in the final structure, bolts shall be of a length that will extend entirely through but not more than 1/4-inch beyond the nuts unless otherwise shown on the Drawings.

G. Shear Studs shall be attached in accordance with requirements of AWS D1.1 "Structural Welding Code". Shear studs through metal deck shall be welded through the deck within 1 day of laying the deck.

H. Installation of Bearing Pads: Install bearing pads in accordance with manufacturer's recommendations.

3.4 FIELD CONNECTIONS

- A. Set structural members to the lines and elevations indicated. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
- B. Before assembly clean bearing surfaces and other surfaces which will be in permanent contact after assembly.

- C. Do not enlarge unfair holes in members by burning or by the use of drift pins. Ream holes that need to be enlarged to admit bolts. Where a hole is required to be enlarged by more than 3/32-inch ream to and use next larger bolt size.
- D. Do not use gas cutting torches in the field for correcting fabricating errors in the structural framing unless accepted by the Architect. Finish gas cut sections equal to a sheared appearance when permitted.
- E. The quality of field welds or bolting shall be the same as that performed in the shop.
- F. Preheat and post-heat procedures for welded joints shall be utilized to prevent rapid cooling of welds, particularly in cold weather. Procedures are Contractor's responsibility.
- G. Erection bolts for welded connection shall be tightened securely and left in place.
- H. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts" for type of bolt and type of joint specified.
- I. Erection Bolts: On Architecturally Exposed Steel Construction, remove erection bolts, fill holes with plug welds, and grind exposed surfaces smooth.
- J. Weld Connections: Comply with AWS D1.1 and AWS D1.8 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
- K. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
- L. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.
- M. Weld in manner to prevent warping or distortion of finished product. Use jigs which will not restrain piece from moving during welding or cooling after welding. Sequence weld passes at a joint to prevent excessive heat build-up or cause shrinkage cracks to form.
- N. Auxiliary Member Connections and Temporary Welds shall be per AWS provided that preheating may be omitted on ASTM A36 steel for single pass fillet welds with low hydrogen electrodes under the following conditions: Air temperature is 60° F. or over, steel is dry, and welds to structural base material are more than 1" away from corners or ends of plates.
- O. Preheat and post-heat procedures for welded joints shall be utilized to prevent rapid cooling of welds, particularly in cold weather. Procedures are Contractor's responsibility.

3.5 FIELD QUALITY CONTROL

- A. All field welding shall be inspected by a full time independent Inspector.
- B. Field quality control shall, as a minimum, conform to the requirements specified under Source Quality Control.
- C. Erection Tolerances: Unless otherwise noted, level and plumb individual members of the structure within a tolerance of 1:500, but not to exceed 1/2" for full height of columns. Make exterior columns

and columns adjacent to elevator beams accurate within tolerance of 1:1000, but not to exceed 1/2" for full column height. Make level and plumb based on the mean operating temperature of the structure, allowing for the difference in temperature at time of erection and the mean temperature of the structure when completed and in service. Base measurements relating to tolerances on the theoretical centerline of the columns.

1. Columns: Gaps exceeding 1/8 inch between milled ends not permitted. Shim acceptable gaps with non-tapered mild steel shim stock.
- D. Bolted Connections: Bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts."
1. The Inspector shall observe all Direct Tension Indicators to see if proper tightness is achieved.
- E. Welded Connections: Field welds will be visually inspected according to AWS D1.1, the governing building code, and Part 2 of this document, by the Testing Agency.
- F. The results of those tests will be accepted, at the discretion of the Architect, as proof of adequate materials or workmanship
- G. Repair of Openings: For all members exposed to view in the final structure, close all lifting holes, access openings, etc. in such a manner that no visual evidence of the opening remains.

3.6 TOUCH-UP PAINTING

- A. Immediately after erection, clean field welds, bolted connections, and abraded areas of the shop paint, and paint all surfaces exposed to the elements with the exception of those surfaces in direct contact with concrete or fireproofing.
- B. Use same materials and standards as for shop painting.
- C. Steel that remains exposed to the weather or to a corrosive atmosphere shall receive an additional coat of metal protection of another color after erection as required by the NJ Building Code.
- D. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A780.

3.7 DEFECTIVE WORK

- A. Any special tests not specifically covered by this specification that are proposed by the Contractor as a result of failure to comply with this Section shall be at the Contractor's expense. The Contractor shall be responsible for any consequential costs or delays.
- B. The results of those tests will be accepted, at the discretion of the Architect and engineer, as proof of adequate materials or workmanship.
- C. Work deemed defective will be removed from the site at the Contractor's expense.
- D. Any special tests not specifically covered by this specification that are proposed by the Contractor as a result of failure to comply with this Section shall be at the Contractor's expense. The Contractor shall be responsible for any consequential costs or delays.

T0617-00
Material Storage Bin Installation
DOT Maintenance Yard, West Berlin, N.J.

January 25, 2024

END OF SESSION

Intentionally Blank Page

SECTION 053000 - STEEL DECK

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Fabrication and installation of metal decking and metal decking accessories.
- B. Related Sections
 - 1. Division 03 Section "Cast-in-Place Concrete" for concrete fill; Section 033000.
 - 2. Division 05 Section "Structural Steel Framing"; Section 051200.
 - 3. Division 09 Section "Paintings and Coatings" Section 099113.

1.2 REFERENCES

- A. Follow the guidelines contained in the latest editions of the following codes, specifications and standards except where more stringent requirements are shown or specified in the Contract Documents.
- B. 2021 International Building Code
- C. Standards listed below apply where designation is cited, in this Section. Where the applicable year of adoption or revision is not listed below, the latest edition applies.
- D. American Iron and Steel Institute, (AISI).
 - 1. AISI "Specification for the Design of Cold Formed Steel Structural Members."
- E. American Society for Testing and Materials (ASTM)
 - 1. ASTM A 611
 - 2. ASTM A 653
 - 3. ASTM A 36 "Specification for Carbon Structural Steel".
- F. American Welding Society (AWS).
 - 1. AWS D1.3 "Specifications for Welding Sheet Steel in Structures".
- G. Fire resistance classification shall be acceptable for use in Underwriters Laboratories Fire Resistance Design Index. All metal deck assembly and composite deck panels used in rated fire resistance designs shall bear the appropriate U. L. Classification marking.
- H. Cast-in-place concrete shall be in accordance with applicable sections of chapters 3, 4, and 5 of ACI 318 Building Code Requirement for Reinforced Concrete. Minimum compressive strength shall be as specified. Admixtures containing chloride salts shall not be used. Additionally, all concrete constituents including but not limited to aggregates, sand, and water shall be closely monitored to assure that the chlorides do not exceed the limits proscribed in ACI 318. Comply with Section 033000 and drawings.

1.3 SUBMITTALS

- A. General

1. Submit shop drawings for review and obtain acceptance prior to start of fabrication.
2. Review of submittals if of a general nature only, and responsibility for conformance with the intent of the Contract Documents shall remain with the Contractor. Review does not imply nor state that fabricator has correctly interpreted the Construction Documents.

B. Product Data

1. Submit manufacturer's literature for each style of deck provided. The manufacturer's specifications, section properties, load tables, dimensions, finishes, and noise reduction coefficients, fire resistance ratings, and U. L. full scale slab fire test reports shall be submitted.
2. Submit certified copies of mill test reports for each heat of steel and for all fasteners, including nuts and washers prior to start of fabrication.
3. Mill test reports shall include ladle analysis and tensile elongation and bend tests. Perform mechanical and chemical tests for all material regardless of thickness or use.
4. Mill reports shall be traceable to individual pieces of steel used.
5. A full width sample shall be submitted as requested to verify compliance with the specifications and the level of quality.

C. Shop Drawings

1. Prepare decking plans showing deck profile, sheet layout, method of attachment, edge details, supplemental framing, openings and reinforcement, projections and accessories. Show panel placement, profiles, material thicknesses, finishes, layout, anchorage and as dimensioned on the structural drawings.
2. Show type and location of welds and other fasteners.
3. Show where shoring of deck is needed.
4. Decking shall not be fabricated or placed before the shop drawings have been reviewed by the Architect and returned stamped either "NO EXCEPTION TAKEN" or "MAKE CORRECTIONS NOTED, RESUBMITTAL NOT REQUIRED". Shop drawings marked "REVISE AND RESUBMIT NOT ACCEPTED FOR REASONS GIVEN" shall be corrected and completed as required and resubmitted to the architect before they are used in the work.
5. Where shop drawings are resubmitted the Contractor shall cloud and identify all changes made due to additions, deletions, and corrections to the shop drawing. Shop drawings resubmitted without each change being clouded and identified will be returned for resubmission.
6. Metal deck submittal shall not be submitted prior to relevant steel framing and erection plans. Metal deck submittal shall be fully coordinated with structural steel.
7. Shop drawings shall have minimum scales as follows:
 - a. 1/8" – 1'-0" for plans
 - b. 3/4" – 1'-0" for sections and details.

D. Submit certificates of compliance for:

1. Welding electrodes including electrode specification sheets.
2. Welder has passed qualification tests.

E. Welding Procedures

1. Submit welding procedures for all welding.

F. As-Built Drawings

1. At the end of the work included in this Section submit a complete set of reproducible drawings incorporating all changes, additions and deletions to the Construction Drawings due to revisions, change orders, field conditions, or any other reason.

1.4 QUALITY ASSURANCE

- A. Testing: Testing and inspection of metal decking will be performed by a DPMC prequalified independent laboratory arranged and paid for by the contractor ("Inspector").
- B. Testing Agency: Contractor will engage a DPMC prequalified independent testing and inspecting agency to perform field tests and inspections and prepare test reports. Testing Agency will be an independent agency qualified according to ASTM E 329 for testing indicated that is arranged and paid for by the contractor.
- C. All work shall be performed by qualified operators experienced in their field of work and as otherwise required by these specifications.
- D. Qualifications of Welders:
1. All welding shall be performed by operators who are qualified for the types of welds used. Each operator shall have been qualified as prescribed by AWS D1.3, "Structural Welding Code - Sheet Steel." Welder qualification shall include passing the bend test.
 2. Require welders to retake the qualification test in, as determined by the Architect or Engineer, there is a reasonable doubt as to the proficiency of the welder. If the welder does not requalify, he shall not perform any welding on the project.
 3. Pay all costs associated with welder qualification.
- E. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- F. Recycled Content of Steel Products: Products with recycled content of steel products may be used conditional to the approval of the Architect or Engineer.
- G. Comply with applicable provisions of the following specifications and documents, except where more stringent requirements are shown or specified:
1. SDI Publication No. 31, "Design manual for Composite Decks, Form Decks, and Roof Decks".
 2. American Welding Society (AWS) D1.3, "Structural Welding Code – Sheet Steel".

1.5 DELIVERY, STORAGE AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Support material off the ground and protect from corrosion and deterioration. Materials showing evidence of damage will be rejected and shall be immediately removed from the site.

- B. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Metal deck and composite deck shall be protected from any damage during delivery, storage, and handling. Repair or replace damaged materials or structures as directed.
- C. Where deck is exposed to view in the completed structure use special care to prevent damage to decking.
- D. Each bundle of decking shall be marked or tagged to indicate material grade, style and gage of deck.
- E. If storage at the jobsite is required, metal deck and composite deck shall be elevated above the ground, sloped to provide drainage, and protected from the weather with a ventilated covering and ventilate to avoid condensation.
- F. Do not overload decking during construction period and do not use decking for storage or working platform prior to welding in position.

1.6 SUBSTITUTIONS

- A. Reference in the specification to any product, material, type or form of construction shall establish the minimum standard of quality and performance. These standards shall not be abridged or modified for any reason for the purpose of substitution.
- B. The contractor shall submit any proposed substitution in writing to the Architect and Engineer of Record for consideration no less than ten calendar days prior to the original bid date. The substitution proposal package shall include, at the architect's and Engineer's option, a sample product, structural and performance data, and finish description.
- C. This data will be coordinated and reviewed by the project design professionals. Acceptance of any submitted substitution will be so stated and defined by addendum prior to the original bid date. Substitution without addendum is not accepted.

PART 2 PRODUCTS

2.1 GENERAL

- A. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E 119 by Underwriters Laboratories (UL) as part of an assembly used in the project.
 - 1. Fire-Resistance Ratings: Indicated by design designations of applicable testing and inspecting agency.
 - 2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.

2.2 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or accepted equal:
 - 1. Steel Deck:
 - a. Englert, Inc.
 - b. Epic Metals Corporation

- c. United Steel Deck, Inc
- d. Vulcraft Manufacturing Co
- e. Or approved equal

2.3 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials (including closures, hanging devices, etc.) for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Cover plates, flashings and closures: Sheet steel ASTM A 653 Grade G60 or ASTM A 611 Grade C to match deck material, 18 gage minimum.
- D. The manufacturer's standard flexible or metal type rib profile closures shall be provided as indicated on the contract drawings.
- E. Welding Electrodes:
 - 1. Conform to AWS D1.3 and deck manufacturers recommendations. Base selection of electrodes on the actual properties of the metal connected.
 - 2. Electrodes will have a specified minimum tensile strength of at least 60 ksi.
 - 3. Use low hydrogen electrodes.
- F. Galvanizing Repair Paint: Touch up paint for galvanized sheet metal shall be Steel Structures Painting Council (SSPC) Paint-20 Type 1, Inorganic.
- G. Repair Paint: Where painted decking is used touch-up paint shall be same as recommended by the decking manufacturer.

2.6 FABRICATION

- A. Provide in lengths to be continuous for three spans and rest on a minimum of four supports, wherever steel layout permits. Where decking cannot be continuous for two spans, increase deck gauge as required to support temporary and permanent loads at acceptable deflections.
- B. Cantilevered units shall have the cantilever and at least the adjacent span in one length.
- C. Fabricate such that end joints occur over supporting members.
- D. Sheets parallel to and at the perimeter of the deck shall be full width sheets.
- E. Allowable Construction Load on Deck: Construction loads on deck shall not exceed carrying capacity of decks.
- F. Each bundle of fabricated elements shall be marked or tagged so as to show material and grade.
- G. TOLERANCES:
 - 1. Panel length: Plus or minus ½ inch.
 - 2. Thickness of deck units: Not less than 95 percent of the specified thickness.
 - 3. Panel camber: ¼ inch in 10 foot length, as required.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Prior to commencing with the erection of structural steel inspect the job site and verify that the work is sufficiently complete that this installation may properly commence.
- B. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance:
 - 1. Check supporting members for correct layout and alignment.
 - 2. Verify that surfaces to receive floor deck are free of debris.
- C. Discrepancies:
 - 1. In the event of discrepancy, immediately notify the Architect in writing.
 - 2. Do not proceed with construction in the region of the discrepancy until all such discrepancies have been resolved.
- D. Secure field measurements required for proper and adequate fabrication and installation of the work covered in this Section. Assume responsibility for exact measurements.

3.2 INSTALLATION, GENERAL

- A. General: Install deck units and accessories in strict accordance with Construction Documents and manufacturer's approved erection drawings, installation instructions, the Steel Deck Institute (SDI) Manual for Construction with Steel Deck, and all applicable safety regulations.
- B. Before installation
 - 1. The need for temporary shoring shall be investigated. Shoring tables published by the manufacturer shall be consulted to determine if shoring will be required. Unshored spans shall be reduced if greater construction loads are anticipated.
 - 2. Install temporary shoring before placing deck panels, if required to meet deflection limitations.
 - 3. The supporting frame and other work relating to metal deck shall be examined to determine if this work has been properly completed. Temporary shoring, if required, shall be in place prior to installation.
- C. Placing Deck Units:
 - 1. Position on supporting members and adjust to final position with ends bearing a minimum of 2 1/2 inches on supporting members.
 - 2. Where feasible, install with ribs at right angles to support members.
 - 3. Place units end-to-end before permanently fastening.
 - 4. Align ribs over entire length of run.
 - 5. Shore and brace decking as necessary for all construction loads.
 - 6. Locate deck bundles to prevent overloading of supporting members.
 - 7. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

8. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
9. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
10. Provide additional reinforcement and closure pieces at openings as indicated on the drawings.
 - a. Where openings do not need reinforcements (exclusive of trim bars in concrete) do not cut deck until concrete has cured.
 - b. Unless both edges of openings perpendicular to deck span are supported by a beam, do not cut opening until concrete has cured.
11. Provide supplemental miscellaneous steel to support metal deck where normal deck bearing is precluded by column flange plates or other framing members, and around minor openings where indicated. Design of this steel to support wet weight of concrete is the contractor's responsibility.
12. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

D. Fastening of Deck Units:

1. Use mechanical fasteners as required in order to ensure the structural integrity of the deck during construction and in final stage.
2. Sequence the Work as necessary to accommodate testing.
3. Before being permanently fastened, metal deck and composite deck shall be placed with ends accurately aligned and adequately bearing on supporting members or form work. Proper coverage of metal deck or composite deck shall be maintained.
7. Sidelap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals to exceeding the less of 1/2 of the span or 36 inches, and as follows:
 - a. Mechanically fastens with self drilling No. 10 diameter or larger exterior grade screws at maximum spacing of 12" on center or less as indicated on the manufacturer's erection drawings.

E. Closures:

1. Closures shall be of sufficient strength to remain in place without significant distortion. Shore where necessary.
2. Column closures, end closures, side closures, rib closures, slab edge forms, and supplied reinforcements for small openings shall be fastened as indicated on the manufacturer's erection drawings.

F. Where the underside of decking is exposed in the final structure, Prevent damage to deck that would be observed.

H. Cutting Openings:

1. Field cutting of the metal deck or composite deck shall be performed in a neat and professional manner. Only those openings shown on the structural drawings shall be cut. Other openings shall be approved by the structural engineer and cut by those requiring the opening.

I. After Installation

1. Construction loads that could damage metal deck such as heavy concentrated loads and impact loads shall be avoided.
2. Galvanizing and other coatings that are damaged must be field repaired using appropriate methods and shall be the responsibility of the contractor.
3. The determination of the time for removal of supporting shores may be controlled by the presence of construction loads or deflection limitations.

3.3 FIELD QUALITY CONTROL

- A. Testing and inspection of metal deck installation will be performed by the independent testing agency. Provide the Inspector with the following.
 1. A complete set of accepted "Submittals"
 2. Representative sample pieces as requested by the testing agency
 3. Full and ample means and assistance for testing all material.
 4. Access and facilities, including scaffolding, temporary work platforms, etc., for testing and inspection at all places where materials or components are stored or fabricated, and also in their erected position.
- B. Scheduling of Tests and Inspections: The Contractor shall notify the Inspector in sufficient time prior to fabrication or erection work to allow testing and inspection without delaying the work.
- C. Non-destructive Testing and Inspections
 1. As a minimum the inspector will make all tests and inspections as required by the Controlled Inspection provisions of the 2021 International Building Code. The Inspector will make all the tests and inspections indicated in the Construction Documents.
 2. The Inspector will make all verification tests and inspections as required by AWS D1.3.
 3. Inspector shall be present during all welding operations.
 4. Check materials, equipment and procedures.
- D. Inspection Records
 1. Make systematic record of all fasteners, including:
 - a. Location and type of fasteners.
 - b. Identification marks of fasteners.
 - c. List of defective fasteners.
 2. The Inspector will maintain a daily record of the work that has been inspected and its disposition. One copy of each of the report will be submitted to the Owner on a weekly basis. Test reports will be made on the form suggested in the AWS D1.3.
- E. Mill Reports: Testing laboratory will review mill reports for conformance to referenced standard.

3.4 PROTECTION

- A. Construction Loads on Decking:

1. Do not use deck units for storage or working platforms until permanently secured in position.
 2. Construction loads shall not exceed carrying capacity of decks. Contractor is responsible for checking the adequacy of the steel decks for its ability to support all construction loads.
 3. Shoring of deck is the responsibility of the Contractor. This includes determining whether shoring is needed, and if needed, the design of the shoring. Contractor shall consider concentrated loads from equipment and crews when investigating the need for shoring.
- B. Unless indicated in the Construction Documents, do not suspend ducts, piping, ceilings, light fixtures or other items from tabs in metal decking.

3.5 TOUCH-UP

- A. Immediately after erection, clean bolted connections, and abraded areas of the finish, and restore all surfaces exposed to the weather in the complete structure.
- B. Use same materials and standards as for shop painting.

3.6 CLEAN-UP

- A. After erection, remove metal cuttings, and construction debris from cells for entire length.
- B. Remove grease, oil, and other foreign material from all surfaces.

3.7 FIELD QUALITY CONTROL

- A. Field welds will be subject to inspection as required by AWS D1.3 and the 2021 International Building Code.
- B. Testing Agency will be provided with:
1. A complete set of accepted "Submittals".
 2. Representative sample pieces as requested by the Testing Agency.
 3. Full and ample means and assistance for testing all material.
- C. Scheduling of Tests and Inspections: The Contractor shall notify the Testing Agency in sufficient time prior to fabrication or erection work to allow testing and inspection without delaying the work.
- D. Testing Agency will:
1. Inspect the steel deck installation as required by the building code and AWS D1.3.
 2. Review WPS for compliance with the project specifications.
 3. Review Manufacturer Test Reports and Certifications for compliance with the project specifications.
 4. Review welder qualifications in accordance with the project specifications.
 5. Report inspection results promptly and in writing to Contractor and Architect.
- E. Remove and replace work that does not comply with specified requirements
- F. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

T0617-00
Material Storage Bin Installation
DOT Maintenance Yard, West Berlin, N.J.

January 25, 2024

END OF SECTION

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Load-bearing wall framing.
- B. Related Requirements:
 - 1. Section 051200 - Structural Steel Framing
 - 2. Section 074213 – Metal Wall and Roof Panels

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of cold-formed steel framing product and accessory.
- B. Shop Drawings:
 - 1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
 - 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
- C. Delegated-Design Submittal: For cold-formed steel framing.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Welding certificates.

- C. Product Test Reports: For each listed product, for tests performed by a qualified testing agency.
 - 1. Steel sheet.
 - 2. Expansion anchors.
 - 3. Power-actuated anchors.
 - 4. Mechanical fasteners.
 - 5. Vertical deflection clips.
 - 6. Horizontal drift deflection clips
 - 7. Miscellaneous structural clips and accessories.
- D. Research Reports: For non-standard cold-formed steel framing, from ICC-ES.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- B. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Dietrich Metal Framing; a Worthington Industries Company.
 - 2. MarinoWARE.
 - 3. Nuconsteel; a Nucor Company.
 - 4. Or approved Equal

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cold-formed steel framing.

- B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
 - 1. Design Loads: As indicated
 - 2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
 - a. Exterior Load-Bearing Wall Framing: Horizontal deflection of 1/600 of the wall height.
 - b. Interior Load-Bearing Wall Framing: Horizontal deflection of 1/600 of the wall height under a horizontal load of 5 lbf/sq. ft.
 - c. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/600 of the wall height.
 - d. Roof Rafter Framing: Vertical deflection of 1/360 of the horizontally projected span for live loads.
 - 3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F (67 deg C).
 - 4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
 - a. Upward and downward movement of 1/2 inch.
 - 5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
- C. Cold-Formed Steel Framing Design Standards:
 - 1. Floor and Roof Systems: AISI S210.
 - 2. Wall Studs: AISI S211.
 - 3. Headers: AISI S212.
 - 4. Lateral Design: AISI S213.
- D. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S2
- E. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.3 COLD-FORMED STEEL FRAMING, GENERAL

- A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: As required by structural performance.
2. Coating: G90 or equivalent].

2.4 LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: 0.0538 inch (1.37 mm).
 2. Flange Width: 1-5/8 inches (41 mm).
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:
1. Minimum Base-Metal Thickness: 0.0538 inch (1.37 mm).
 2. Flange Width: 1-1/4 inches
- C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: 0.0538 inch (1.37 mm)
 2. Flange Width: 1-5/8 inches (41 mm).
 3. Minimum Base-Metal Thickness: 0.0538 inch (1.37 mm).
 4. Top Flange Width: 1-5/8 inches (41 mm).

2.5 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: 0.0329 inch (0.84 mm).
 2. Flange Width: 1-5/8 inches (41 mm).
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: 0.0329 inch (0.84 mm)
 2. Flange Width: 1-1/4 inches (32 mm)
- C. Vertical Deflection Clips: Manufacturer's standard head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Dietrich Metal Framing; a Worthington Industries company.
 - b. MarinoWARE.

- c. SCAFCO Corporation.
- d. Or approved equal.

- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm).
 - 2. Flange Width: [1 inch (25 mm) plus twice the design gap.
- E. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.6 ROOF-RAFTER FRAMING

- A. Steel Rafters: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0677 inch (1.72 mm).
 - 2. Flange Width: 1-5/8 inches (41 mm).

2.7 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
 - 1. Supplementary framing.
 - 2. Bracing, bridging, and solid blocking.
 - 3. Web stiffeners.
 - 4. Anchor clips.
 - 5. End clips.
 - 6. Foundation clips.
 - 7. Gusset plates.
 - 8. Stud kickers and knee braces.
 - 9. Joist hangers and end closures.
 - 10. Hole reinforcing plates.
 - 11. Backer plates.

2.8 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

- B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts [headless, hooked bolts and carbon-steel nuts; and flat, square and round hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.
- C. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- D. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- E. Welding Electrodes: Comply with AWS standards.

2.9 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B
- B. Shims: Load bearing, high-density multi-monomer plastic, and non-leaching; or of cold-formed steel of same grade and coating as framing members supported by shims.
- C. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.10 FABRICATION

- A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
 - 1. Fabricate framing assemblies using jigs or templates.
 - 2. Cut framing members by sawing or shearing; do not torch cut.
 - 3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by no fewer than three exposed screw threads.
 - 4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
 - 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 - 2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting substrates and abutting structural framing 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. uniform bearing surface on supporting steel concrete or masonry construction.

3.3 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch (1.6 mm).
- D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

- b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- H. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.
- I. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 LOAD-BEARING WALL INSTALLATION

- A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:
 - 1. Anchor Spacing: 24 inches (610 mm)
- B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8 inch (3 mm) between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:
 - 1. Stud Spacing: [24 inches (610 mm)].
- C. Set studs plumb, except as needed for diagonal bracing.
- D. Align studs vertically. Where studs cannot be aligned, continuously reinforce track to transfer loads.
- E. Align floor and roof framing over studs according to AISI S200, Section C1. Where framing cannot be aligned, continuously reinforce track to transfer loads.
- F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.

- G. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.
 - 1. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings. Fasten jamb members together to uniformly distribute loads.
 - 2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.
- H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.
 - 1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.
- I. Install horizontal bridging in stud system, spaced vertically 48 inches (1220 mm). Fasten at each stud intersection.
 - 1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle for framing members up to 6 inches (150 mm) deep.
 - 2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
- J. Install steel sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.
- K. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: 24 inches (610 mm).
- C. Set studs plumb, except as needed for diagonal bracing.

- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 - 1. Install single deep-leg deflection tracks and anchor to building structure.
 - 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
 - 3. Connect vertical deflection clips to infill studs and anchor to building structure.
 - 4. Connect drift clips to cold-formed metal framing and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches (1220 mm) apart. Fasten at each stud intersection.
 - 1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches (305 mm) of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
 - a. Install solid blocking at centers indicated.
 - 2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
 - 3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.6 RAFTER INSTALLATION

- A. Install rafters bearing on supporting frame, with web stiffeners and a clip angle attachment at each rafter. Install level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten rafter to both flanges of rafter blocking track.
- B. Install full rafter blocking between joists with track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.
 - 1. Install welded rafters over supporting frame with a minimum bearing of 5 ½" inches with 4" clip angle.
 - 2. Reinforce clip angle connection and bearing points of rafters with 6" web stiffeners, clips, steel clip angles, or steel-stud sections as indicated on Shop Drawings.
- C. Space rafters not more than 2 inches (51 mm) from abutting walls, and as follows:
 - 1. Rafter Spacing: 24 inches (610 mm).
- D. Frame openings with built-up rafter headers consisting of c joist and joist track, or another combination of connected joists if indicated.

- E. Install rafter reinforcement at supports and rafter with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated on Shop Drawings.
 - 1. Install web stiffeners to transfer axial loads of walls above.
- F. Install bridging at intervals indicated on Shop Drawings. Fasten bridging at each rafter intersection as follows:
 - 1. Bridging: Joist-track solid blocking of width and thickness indicated, secured to rafter webs.
 - 2. Bridging: Combination of 1-1/2" flat, taut, steel sheet straps of width and thickness indicated, and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of rafters and secure solid blocking to rafter webs.
- G. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.
- H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

3.7 FIELD QUALITY CONTROL

- A. Testing: All testing and inspections required by code or included in the specifications shall be performed by a DPMC prequalified firm and arranged and paid for by the Contractor..
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Remove and replace work where test results indicate that it does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

Intentionally Blank Page

SECTION 074213 - METAL ROOF & WALL PANELS

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 01 Specification Sections, apply to this Section.

1.1 SUMMARY

- A. Section Includes: Factory-formed metal roof and wall panels, including fascia, soffit and liner panels and includes:
 - 1. Factory-formed panels in vertical installation.
 - 2. Metal flashings and trim.

Related Sections: Section(s) related to this section include:

- 1. Section 054000 - Cold Formed Metal Framing: Division Metal Framing Section.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM A653/A653M Standard Specification for Steel Sheets, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. ASTM A792/A792M Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy Coated by the Hot-Dip Process.
 - 3. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 4. ASTM D2247 Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation Meetings:

1. Schedule meeting to discuss project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements before start of work onsite. Comply with Division 1 Section 013100 - Project Management and Coordination.
2. Required attendees: Contractor, metal deck & metal installer, and any other subcontractors who have equipment penetrating the metal or work that requires access or traffic to metal roof and wall areas.

1.4 SYSTEM DESCRIPTION

A. Panel Performance Requirements: Provide panels, which have been manufactured, fabricated and installed to withstand structural and thermal movement, wind loading and weather exposure to maintain manufacturer's performance criteria without defects, damage, failure or infiltration of water.

1. Water Penetration: No uncontrolled water penetration through the panel joints at a static pressure of 12.0 psf (0.57 kPa) when tested in accordance with ASTM E1646. Fire rating: Class A
2. Uplift Tests:
 - a. UL 580 Class 90
3. Miami Dade
4. Class 4 Impact Resistance: UL 2218
5. Fire Resistance: UL 263
6. Florida State Approval
7. ICC-ES: ESR 1082

A. Finish Performance Requirements:

1. Two coat coil applied, baked on full strength (70% resin, PVF2) fluorocarbon coating:
 - a. Consisting of a nominal 0.25 mil dry film thickness primer, and a nominal dry film thickness of 0.7 -0.8 mil color coat for a total 0.9 to 1.1 mil total system dry film thickness.
 - b. Color change and fade resistance: No cracking, peeling, blistering or loss of adhesion when tested in accordance with ASTM G23; color change, after removal of surface deposits such as dirt or chalk, maximum 5 NBS units.
 - c. Humidity resistance: No blistering, peeling or loss of adhesion after 1000 hours testing, in accordance with ASTM D2247.

1.5 SUBMITTALS

A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.

- B. Product Data: Submit manufacturer's product data for specified products.
- C. Shop Drawings: Submit shop drawings showing layout, profiles and product components, including anchorage, accessories, finish colors and textures.
1. Indicate layout of metal panels and metal panel sizes, including custom-fabricated metal panels if indicated; indicate each item of trim and accessories.
 2. Indicate in detailed drawings profile and gauge of interior and exterior sheets, and locations and types of fasteners; indicate locations, gauges, shapes and methods of attachment of metal panels, trim and accessory items.
 3. Include sealant location and denote those that are factory and field applied.
 4. Indicate products/materials required for construction activities and field worked conditions of this section not supplied by manufacturer of products of this section.
- E. Samples: Submit selection and verification samples for finishes, colors and textures.
1. Selection Samples: For each product requiring color selection, 2 sets of manufacturer's sample chips representing full range of colors and finishes available.
 2. Verification Samples: For each color and finish selected, 2 chips indicating match to selected color and finish.
- F. Warranties:
1. Substrate Warranty
 2. Finish Warranty
- G. Test and Evaluation Reports: Showing compliance with specified performance characteristics and physical properties.
- H. Quality Assurance Submittals: Submit the following:
1. Contractor Certificates: Contractor's certification that:
 - a. Manufacturer of products of this section meets specified qualifications.
 - b. Installer of products of this section meets specified qualifications.
 2. Manufacturer's Instructions: Manufacturer's installation instructions.
 3. Manufacturer's Field Reports: Manufacturer's field reports if required.
- I. Buy American Certification: Manufacturer's letters of compliance that supplied products comply With requirements.
- J. Closeout Submittals: Submit the following:
1. Warranty: Warranty documents specified herein.

- a. Provide 25-year manufacturer's finish warrantee from date of substantial completion.
- b. Provide 2 original copies of official warrantee document signed by Manufacturer's rep and general contractor.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Provider of "hands on" installer training programs at manufacturer facility.
2. Comply with Section 014000 quality requirements for installer and manufacturing standards and experience in manufacturing metal roof and wall systems.
3. Provider of product produced in a permanent factory environment with fixed roll-forming equipment.

B. Installer Qualifications:

1. Employer of workers for this project who are competent in techniques required by manufacturer for installation indicated and who shall be supervised at all times when material is being installed.

C. Mock-Ups: Establish standards by which work will be judged. Install at project site a job mock-up using acceptable products and manufacturer approved installation methods. Obtain Owner's and Architect's acceptance of finish color, texture and pattern and workmanship standard.

1. Include eave, ridge, valley, gable and hip conditions.
2. Mock-Up Size: 20'x 20'
3. Maintenance: Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.
4. Incorporation: Mock-up may be incorporated into final construction upon owner's approval.

D. Buy American Compliance: Materials provided under Work of this Section shall comply with the following requirements:

1. Buy American Act of 1933 BAA-41 U.S.C §§ 10a – 10d.
2. Buy American provisions of Section 1605 of the American Recovery and Reinvestment Act of 2009 (ARRA).

1.7 DELIVERY, STORAGE & HANDLING

A. General: Comply with Division 1 Product Requirements Sections.

1. Ordering: Verify & Coordinate with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

- B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Identify fabricated components with UL 90 label where appropriate.
- C. Delivery and Acceptance Requirements: Ensure all panels are received in good condition. In cases where damage is visible, note all paperwork; inform architect and project superintendent.
- D. Packing, Shipping, Handling and Unloading:
 - 1. Bundle panels in waterproof wrapping paper when nested, or wooden crates when panels cannot be nested.
 - 2. Package trim and accessories in waterproof wrapping paper.
- E. Storage and Protection: Store materials protected from exposure to harmful conditions. Store material in dry, above-ground location.
 - 1. Stack prefabricated material to prevent twisting, bending, abrasion, scratching and denting. Elevate one end of each skid to allow for moisture runoff.
 - 2. Store products of this section in manufacturer's unopened packaging until installation of products
 - 3. Maintain dry, heated storage area for products of this section until installation of products.
 - 4. Remove strippable plastic film before storage under high-heat conditions.

1.8 PROJECT CONDITIONS

- A. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements, fabrication schedule with construction progress to avoid construction delays.
- B. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed in accordance with manufacturers' written instructions and warranty requirements.

1.9 COORDINATION

- A. Coordinate sizes and locations of roof curbs, equipment supports and roof penetrations with actual equipment provided.
- B. Coordinate metal roof panels with rain drainage work, flashing, trim and construction of decks, parapet walls and other adjoining work to provide a leakproof, secure and noncorrosive installation.

1.10 WARRANTY

- A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.
 - 1. Panel Material: Furnish manufacturers 25-year warranty covering the panel against rupture, structural failure, or perforation.

2. Panel Coating:
 - a. Polyvinylidene Fluoride: Furnish manufacturer's 40-year warranty covering cracking, checking, and peeling, and 30-year warranty covering fade and chalk on the two-coat coil applied, baked on full strength (70% resin, PVF2) fluorocarbon coating. Manufacturer's warranty may exclude surface deterioration due to physical damage and corrosive environments.
- B. Special Warranty: Installer's standard form in which installer agrees to repair or replace panels that fail due to poor workmanship or faulty installation within the specified warranty period.
 1. Applicator shall furnish written warranty for a two (2) year period from date of substantial completion of building covering repairs required to maintain roof and flashings in watertight condition.

PART 2 PRODUCTS

2.1 PANEL DESIGN

- A. General: Provide factory-formed, prefinished, lappable exposed fastener, structural ribbed metal roof/wall panel system, that has been pretested and certified by manufacturer to comply with specified requirements under installed conditions.
- B. Roof panels shall be exposed fastener with 1 1/2" high ribs at 7.2" on centers. The width of the crests shall be 2"; the width of the valleys shall be 2". Coverage for this panel shall be 36" for both roofing and wall applications.
- C. Structural Requirements: Engineer panels for structural properties in accordance with latest edition of American Iron and Steel Institute's Cold Formed Steel Design Manual using effective width concept.
- D. Forming: Use continuous end rolling method. No end laps on panels. No portable roll forming machines will be permitted on this project, no installer-owned or installer-rented machines will be permitted. It is the intent of the Architect to provide Factory-Manufactured panel systems only for this project.
- E. Panels shall be directly fastened to the substrate.
- F. The panel shall have an overlapping side lap feature.

2.2 METAL PANELS

- A. Manufacturers:

1. McElroy Metal, Inc.
 - a. Contact: 1500 Hamilton Rd., Bossier City, LA 71111; Telephone: (800) 562-3576, (318) 747-8097; Fax: (318) 747-8099; E-mail: info@mcelroymetal.com; website: www.mcelroymetal.com.
 - b. Accessory Products: McElroy Metal Preformed Wall and Metal Panels Mega-Rib.
 2. Engert:
 - a. Contact: 1200 Amboy Avenue, Perth Amboy, NJ 08861 Phone: (732) 826-8614 • Fax: (732) 826-8865 www.englertinc.com
 - b. Accessory Products: Engert Preformed Wall and Metal Panels uniline-c-36-7.2-rib.
 3. Carlisle; Petersen; Pac-Clad Panels.
 - a. Contact: 9060 Junction Drive, Annapolis Junction, MD 20701. P: 800-344-1400, F: 301-953-7627.
 - b. Accessory Products: Pac-Clad Panel products or manufacturer approved compatible products.
 4. Or Approved Equal Manufacturer with equal products and accessories approved for use by the manufacturer.
- C. Forming: Use continuous end rolling method. No end laps are permitted on panels without architect approval. No portable rollforming machines will be permitted on this project, no installer—owner or installer-rented machines will be permitted. It is the intent of the Architect to provide factory-manufactured panel systems only for this project.

2.3 MANUFACTURED UNITS

- A. McElroy Metal Mega-Rib Panel
- B. Engert Uniline C-36 7.2 Rib Panel.
- C. PAC-CLAD 7.2 panel 36" wide 1 ½" deep.
- D. Or Approved equal, conforming to these specifications.

2.4 Panels

4. Profile: Longitudinal ribs 1 1/2" (38 mm) deep, spaced 7.2" (183 mm) on center.
5. Size: 36" (914 mm) cover width, lengths indicated on drawings.
6. Finish:
 - a. Polyvinylidene fluoride color coat, minimum 70% polyvinylidene fluoride resin content, applied to sight-exposed face of sheet after pretreatment and priming in accordance with coating manufacturer's recommendations.

- b. Color: Selected from full range of manufacturer's standard colors.

2.5 MATERIALS

- A. Material: Galvalume steel sheet conforming to ASTM A792, AZ50 coating for painted; 22-gauge sheet thickness.

2.6 METAL ROOF PANEL ACCESSORIES

- A. General: Provide complete metal panel assembly incorporating trim, copings, fasciae, gutters and downspouts, and miscellaneous flashings, in profiles as indicated. Provide required fasteners, closure strips, and sealants as indicated in manufacturer's written instructions.
- B. Flashing and Trim: Match material, thickness, and finish of metal panel face sheet.
- C. Panel Fasteners: Self-tapping screws and other acceptable corrosion-resistant fasteners recommended by metal panel manufacturer. Where exposed fasteners cannot be avoided, supply fasteners with EPDM or neoprene gaskets, with heads matching color of metal panels by means of factory-applied coating.
- D. Joint Sealers: Manufacturer's standard or recommended liquid and preformed sealers and tapes, and as follows:
 - 1. Tape Sealers: Manufacturer's standard non-curing butyl tape, AAMA 809.2.
 - 2. Concealed Joint Sealant: Non-curing butyl, AAMA 809.2.
- E. Steel Sheet Miscellaneous Framing Components: ASTM C 645, with ASTM A 653/A 653M, G90 (Z180) hot-dip galvanized zinc coating.
- F. Light Transmitting Panel: Manufacturer's standard UV-resistant translucent panel, white, with haze value of not less than 90 percent when measured per ASTM D 1003
- G. Metal Accessories: Approved by metal panel manufacturer.
- H. Snow Guards: Approved by metal panel manufacturer.

2.5 FABRICATION

- A. General: Provide factory fabricated and finished metal panels and accessories meeting performance requirements, indicated profiles, and structural requirements.
- B. Fabricate metal panel joints configured to accept sealant providing weathertight seal and preventing metal-to-metal contact and minimizing noise resulting from thermal movement.

- C. Form panels in continuous lengths for full length of detailed runs, except where otherwise indicated on approved shop drawings.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's written instructions, approved shop drawings, and project drawings. Form from materials matching metal panel substrate.

2.6 FINISHES

- A. Two coat coil applied, baked on full strength (70% resin, PVF2) fluorocarbon coating consisting of a nominal 0.25 mil dry film thickness primer, and a nominal dry film thickness of 0.7 -0.8 mil color coat for a total 0.9 to 1.1 mil total system dry film thickness. Finish to be selected from manufacturer's standard color selection. The back side of the material should be 0.25 mil primer and a 0.25 mil polyester wash coat.
 - 1. Metal Panel Color:
 - a. Selected from full range of manufacturer's standard colors.
 - 2. Metal Related Trim/Accessories Color:
 - a. Selected from full range of manufacturer's standard colors.

2.7 SOURCE QUALITY

- A. Source Quality: Obtain metal panel products from a single manufacturer.
- B. Quality Control: Obtain metal panels, trim and other accessories from a manufacturer capable of providing on-site technical support and installation assistance.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- A. Compliance: Comply with manufacturer's product data, recommendations and installation instructions for substrate verification, preparation requirements and installation.
 - 1. Strippable Film: Remove manufacturer's protective film, if any, from surfaces of metal panels.
- B. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.
 - 1. Verification of Conditions:
 - a. Panel support systems are ready for construction activities of this section and within specified tolerances.

- b. Rough-in utilities are in correct locations.
 2. Installer's Examination:
 - a. Have installer of this section examine conditions under which construction activities of this section are to be performed, then submit written notification if such conditions are unacceptable.
 - b. Transmit 2 copies of installer's report to Architect within 24 hours of receipt.
 - c. Delay construction activities of this section until unacceptable conditions have been corrected.
 - d. Beginning construction activities of this section indicates installer's acceptance of conditions.

3.2 PREPARATION

- A. Coordination: Coordinate metal panel work with other trades to provide a noncorrosive and leak-free metal installation.
 1. Install substrate boards, hat channels, purlins, or furring channels in accordance with manufacturer's recommendations.
 2. Coordinate work, with installation of other associated work, to ensure quality application.
 3. Coordinate work with installation of associated metal flashings and building walls.
 4. Coordinate work to minimize foot traffic and construction activity on installed finished surfaces.
 5. Coordinate location of pipe penetrations to allow centering of pipe in panel.
 6. Coordinate location of metal curbs, to allow proper integration with metal panel.
 7. Coordinate work to minimize foot traffic and construction activity on installed finished surfaces.
 8. Dissimilar Metals: Prevent galvanic action of dissimilar metals.

3.3 INSTALLATION

- A. General: Install metal panels to profiles, patterns and drainage indicated and required for leak-free performance. Provide for structural and thermal movement of work. Seal joints for leak-free metal installation.
 1. Shim or otherwise plumb substrates receiving metal panels.
 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws.
 3. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
 4. Locate and space fasteners in uniform vertical and horizontal alignment.
 5. Install flashing and trim as metal panel work proceeds.
 6. Install continuous length panels if at all possible. If splices are required, locate panel splices over, but not attached to, structural supports and only with prior Architect approval.
 7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws.
 8. Fasten flashings and trim around openings and similar elements with self-tapping screws.

9. Provide weathertight EPDM Flashing for pipe- and conduit-penetrating panels.
10. Fix panels at location depicted on reviewed shop drawings.
11. Allow for required panel clearance at penetrations for thermal movement.
12. Align pipe penetrations to occur in the flat of the metal panel. Report and have corrected improperly placed penetrations before proceeding with panel installation. Remove and replace metal panels which have improperly placed penetration flashings.
13. Allow for required panel clearance at penetrations for thermal movement.
14. Fasteners: Conceal fasteners where possible in exposed work. Cover and seal fasteners and anchors for watertight and leak-free metal installation.
15. Sealant-Type Joints: Provide sealant-type joint where recommended by manufacturer. Provide all sealants of the type recommended by manufacturer

B. Metal Installation:

1. Install metal panels plumb, true and in correct alignment with structural framing, in accordance with shop drawings and manufacturer's printed installation instructions.
2. Install metal panels using manufacturer's concealed fastening system or non-corroding fasteners color-matched to panel.
3. Install trim using concealed fasteners where possible; sight-exposed non-corroding fasteners color-matched to trim are permitted on vertical surfaces only.

C. Installation Tolerances:

1. Variation from Plumb: Maximum 1/8" (3.2 mm) in 20 feet (6.096 m).
2. Variation from Level: Maximum 1/8" (3.2 mm) in 20 feet (6.096 m).
3. Variation from True Plane: Maximum 1/8" (3.2 mm) in 20 feet (6.096 m).

- D. Accessory Installation: Install accessories using techniques recommended by manufacturer and which will assure positive anchorage to building and weather tight mounting. Provide for thermal movement. Coordinate installation with flashings and other components
- E. Flashing and Trim Installation: Comply with performance requirements, manufacturer's written installation instructions, and the SMACNA "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and install units to true level. Install work with laps, joints, and seams that will be permanently watertight.

3.4 FIELD QUALITY REQUIREMENTS

- A. Site Tests: (Post-Installation Testing): Owner reserves right to perform post-installation testing of installed metal panel installation.
- B. Manufacturer's Field Services: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.

3.5 CLEANING

- A. Cleaning: Remove temporary coverings and protection of adjacent work areas.
- B. Repair or replace damaged installed products.
- C. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance.
- D. Remove construction debris from project site and legally dispose of debris.
- E. Remove strippable coating and perform dry wipe-down cleaning of panels as erected.

3.6 PROTECTION

- A. Protection: Protect installed product's finish surfaces from damage during construction:
 - 1. Protect installed products from damage by subsequent construction activities.
 - 2. Replace products having damage other than minor finish damage.
 - 3. Repair products having minor damage to finish in accordance with panel Manufacturer's recommendation
 - 4. Architect shall be sole judge of acceptability of repair to damaged finishes; replace products having rejected repairs

END OF SECTION

SECTION 099113 - EXTERIOR PAINTING

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 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following exterior substrates:
 - 1. Concrete Piers, & Walls
 - 2. Steel Bollards.
 - 3. Galvanized metal.
- B. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
- C. Related Requirements:
 - 1. Section 051200 "Structural Steel Framing" for Touch Up of Galvanized surfaces abd cut edges as applicable with paints specified in this Section.

1.3 DEFINITIONS

- A. Definitions of gloss levels below are from "MPI Architectural Painting Specification Manual" (hereafter, "MPI Manual").
 - 1. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
 - 2. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
 - 3. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
 - 4. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
 - 5. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
 - 6. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.
- B. The term "Painting" as used in this Section, means the application of all coatings such as paint, primer, enamel, varnish, shellac, oil, etc. as listed in the Painting Schedules.
- C. The term "Painting" also includes preparation of surfaces for such applications, and the clean-up as hereinafter specified.

- D. The term "Walls" means all surfaces from floor, or top of base, or top of wainscot, to ceiling or hung ceiling.
 - 1. Include pilasters, breaks, jambs, reveals, returns, arches.
 - 2. Include free standing columns, low partitions.
 - 3. Include masonry, concrete and enclosed spaces.
- E. The term "Ceilings" means the general overhead horizontal surfaces.
 - 1. Include cornices, arches, soffits exposed galvanized steel deck.
 - 2. Include galvanized steel beams and girders including exposed webs and flanges.
 - 3. Include primed metal cover and border strips.
 - 4. Include exposed metal frames of ceiling lights and ceiling equipment.
- F. Touching-up bare spots specified for previously primed or painted surfaces is in addition to the coats specified for the paint system.

1.4 REFERENCES

- A. References and industry standards listed in this Section are applicable to the Work. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work.
 - 1. Federal Specifications (FS)
 - 2. American Society of Testing and Materials (ASTM)
 - 3. N.Y.S. Department of Environmental Conservation
 - 4. U.S. Department of Labor
 - 5. Occupational Safety and Health Administration (OSHA)
 - 6. Steel Structures Painting Council (SSPC)
- B. Department of Defense (DOD)
- C. Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting ASTM D6386

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches (200 mm) square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
3. VOC content.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.7 QUALITY ASSURANCE

A. General

1. All painting materials shall arrive at the job ready-mixed.
2. Remove all rejected materials from the premises immediately.
3. All thinning and tinting materials shall be as recommended by the manufacturer. Generally, all paints shall not require additional tinting or thinning.
4. Verify that the specified shop prime paint for each applicable item in this Project is compatible with the total coating system, prior to application.
5. Materials selected for each system type shall be products of a single manufacturer.

B. Qualifications

1. Work of this Section shall be performed by personnel with a minimum of three years' experience in performing this type of Work.
2. The Contractor shall ensure that all employees meet the qualifications set forth in OSHA, 29 CFR 1926.62 (Lead In Construction Standard).

C. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
 - b. Other Items: Architect will designate items or areas required.
2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
 1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.9 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
- C. All painting materials shall arrive at the job ready-mixed.

PART 2 - PRODUCTS

2.1 Materials:

- A. Only materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, etc.) listed in the latest edition of the MPI Approved Product List (APL) are acceptable for use on this project. All such material shall be from a single manufacturer for each system used.
 1. Other materials such as linseed oil, shellac, thinners, solvents, etc. shall be the highest quality product of an MPI listed manufacturer and shall be compatible with paint materials being used as required.
 2. All materials used shall be lead and mercury free and shall have low VOC content where possible.
 3. Where required, use only materials having a minimum MPI "Environmentally Friendly" E2 or better rating based on VOC (EPA Method 24) content levels.

2.2 MANUFACTURERS

- 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. Benjamin Moore & Co.
 2. PPG Architectural Finishes, Inc.

3. Sherwin-Williams Company (The).
4. Or Approved Equal. Compliant with section requirements.

2.3 PAINT, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. Material Compatibility:
 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- C. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.
- D. Colors: As indicated in the color schedule.

2.4 PRIMERS/SEALERS

- A. Primer, Alkali Resistant, Water Based: MPI #3.
- B. Primer, Bonding, Water Based: MPI #17.
- C. Primer, Bonding, Solvent Based: MPI #69.

2.5 METAL PRIMERS

- A. Primer, Alkyd, Anti-Corrosive for Metal: MPI #79.
- B. Primer, Alkyd, Quick Dry, for Metal: MPI #76.
- C. Primer, Quick Dry, for Aluminum: MPI #95.

2.6 WATER-BASED PAINTS

- A. Latex, Exterior Flat (Gloss Level 1): MPI #10.
- B. Latex, Exterior Low Sheen (Gloss Level 3-4): MPI #15.
- C. Latex, Exterior Semi-Gloss (Gloss Level 5): MPI #11.
- D. Latex, Exterior, Gloss (Gloss Level 6: MPI #119.

- E. Light Industrial Coating, Exterior, Water Based (Gloss Level 3): MPI #161.
- F. Light Industrial Coating, Exterior, Water Based, Semi-Gloss (Gloss Level 5): MPI #163.
- G. Light Industrial Coating, Exterior, Water Based, Gloss (Gloss Level 6): MPI #164.

2.7 SOLVENT-BASED PAINTS

- A. Alkyd, Exterior Flat (Gloss Level 1): MPI #8.
- B. Alkyd, Exterior, Semi-Gloss (Gloss Level 5): MPI #94.
- C. Alkyd, Exterior Gloss (Gloss Level 6): MPI #9.
- D. Alkyd, Quick Dry, Semi-Gloss (Gloss Level 5): MPI #81.
- E. Alkyd, Quick Dry, Gloss (Gloss Level 7): MPI #96.
- F. Primer for Latex, Exterior, High Build: As recommended in writing by topcoat manufacturer.
- G. Intermediate Coat for Latex, Exterior, High Build: As recommended in writing by topcoat manufacturer.
- H. Latex, Exterior, High Build: MPI #40.

2.8 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
 - 1. Contractor will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 - 2. Testing agency will perform tests for compliance with product requirements.
 - 3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Galvanized-Metal Substrates: Follow recommendations of ASTM D6386 Standards. Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 - 3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Electrical, Communication, and Electronic Safety and Security Work:
 1. Paint the following work where exposed to view:
 - a. Uninsulated metal piping.
 - b. Uninsulated plastic piping.
 - c. Pipe hangers and supports.
 - d. Metal conduit.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Contractor may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. High-Build Latex System: Dry film thickness not less than 10 mils (0.25 mm).
 - a. Prime Coat: As recommended in writing by topcoat manufacturer.
 - b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
 - c. Topcoat: Latex, exterior, high build, MPI #40.

B. Steel Substrates:

1. Alkyd System:
 - a. Prime Coat: Primer, alkyd, anticorrosive for metal, MPI #79.
 - b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - c. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5), MPI #94.

C. Galvanized-Metal Substrates:

1. Alkyd System:
 - a. Prime Coat: Primer, galvanized metal, as recommended in writing by topcoat manufacturer for exterior use on galvanized-metal substrates with topcoat indicated.
 - b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - c. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5), MPI #94.

END OF SECTION 099113

Intentionally Blank Page

DPMC #T0617-00

DIVISION 10

SECTION 10 14 00 – SIGNAGE
SUBSECTION 10 14 53 TRAFFIC SIGNAGE

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for erecting signs and mounting sign panels.

1.2 RELATED DOCUMENTS

- A. The Standard Specifications of the New Jersey Department of Transportation for Road and Bridge Construction, dated 2019, as amended and augmented by the Supplementary Specifications (NJDOT Specifications) shall govern the material and construction requirements for poles, bases and accessories. Where conflicts arise between the specifications contained herein or the NJDOT specifications, the more stringent requirement shall govern.
- B. The NJDOT West Berlin Maintenance Yard is an NJDEP Site Remediation Program (SRP) site. Coordinate with the NJDOT Division of Environmental Resources/ Environmental Support & Services Unit (DER/ESSU) prior to initiating any ground disturbances.

PART 2 - PRODUCTS

2.1 MATERIALS:

Provide materials as specified:

Concrete	NJDOT Specification Section 903.03
Grout	NJDOT Specification Section 903.8.02.A
Reinforcement Steel	NJDOT Specification Section 905.01
Sign Panels	NJDOT Specification Section 911.01.02.A
Steel “U” Post Sign Supports	NJDOT Specification Section 911.02.01
Breakaway Sign Supports	NJDOT Specification Section 911.02.02
Mounting Material	NJDOT Specification Section 911.02.04

PART 3 - EXECUTION

3.1 PREPARATION

If sign placement conflicts with existing conditions, obtain Engineer approval to adjust the sign location. Determine the sign post lengths based on the final grade.

Mount sign panels on breakaway steel “U” post sign supports. For signs located behind guide rails or other roadside barriers, mount sign panels on steel “U” post sign supports without the breakaway assembly.

After mounting sign panels, notify the Engineer. The Engineer will examine the sign panels at night for glare. If directed by the Engineer, adjust the sign panels to eliminate glare. Shim signs mounted on 2 posts either at all bolts on 1 of the posts, or at the proper upper or lower bolts on both posts. Shim signs mounted on a single post at either the upper or lower bolts, whichever best minimizes glare. Install shims between the back of the sign and the post. Ensure that the sign does not deform, and that the nuts and bolts are securely tightened.

END OF SECTION 101453

DPMC #T0617-00

DIVISION 10

SECTION 10 75 00 – FLAGPOLES
SUBSECTION 10 75 16 GROUND-SET FLAGPOLES

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for erecting signs and mounting sign panels.

1.2 RELATED DOCUMENTS

- A. The Standard Specifications of the New Jersey Department of Transportation for Road and Bridge Construction, dated 2019, as amended and augmented by the Supplementary Specifications (NJDOT Specifications) shall govern the material and construction requirements for poles, bases and accessories. Where conflicts arise between the specifications contained herein or the NJDOT specifications, the more stringent requirement shall govern.
- B. The NJDOT West Berlin Maintenance Yard is an NJDEP Site Remediation Program (SRP) site. Coordinate with the NJDOT Division of Environmental Resources/ Environmental Support & Services Unit (DER/ESSU) prior to initiating any ground disturbances.

1.3 RELATED WORK

- A. 265613– Lighting Poles and Standards.

PART 2 - PRODUCTS

2.1 MATERIALS:

Provide materials as specified:

Concrete NJDOT Specification Section 903.03

Flagpole:

30' tapered pole as manufactured by Acme Lingo Flagpoles, Eder Flag, Concord American Flagpole, Or Approved Equal.

The Acme Lingo Flagpoles product has been used as the basis of design. However, poles provided by Eder Flag and Concord American Flagpole are approved equals.

10 75 16 GROUND-SET FLAGPOLES
FLAGPOLES

PART 3 - EXECUTION

3.1 INSTALLATION

Flagpole and footing to be installed per manufacturers specifications. If flagpole placement conflicts with existing conditions, obtain Engineer approval to adjust the flagpole location.

Flagpole to be installed plumb.

END OF SECTION 107516

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.

1.2 ACTION SUBMITTALS

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

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control test reports.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Copper Conductors: Comply with NEMA WC 70.
- B. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN.
- C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- D. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. American Insulated Wire Corp.; a Leviton Company.

2. General Cable Corporation.
3. Southwire Company.
4. Or approved equal

2.2 CONNECTORS AND SPLICES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Hubbell Power Systems, Inc.
 2. O-Z/Gedney; EGS Electrical Group LLC.
 3. 3M; Electrical Products Division.
 4. Or approved equal.
- C. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Exposed Feeders: Type THHN-THWN-2, single conductors in raceway.
- B. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-THWN-2, single conductors in raceway.
- C. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN-2, single conductors in raceway.
- D. Exposed Branch Circuits, Including in Crawlspace: Type THHN-THWN-2, single conductors in raceway.
- E. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.

- F. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN-2, single conductors in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.
- E. Identify and color-code conductors and cables according to Section 26 05 53 "Identification for Electrical Systems."
- F. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- G. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
 - 1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.
- H. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 05 44 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.5 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

3.6 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test conductors feeding the following critical equipment and services for compliance with requirements.
 - a. Distribution Panel
 - b. Transformers
 - c. Generators
2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.
 - a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
 - b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

C. Test Reports: Prepare a written report to record the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

D. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Grounding systems and equipment.

1.2 ACTION SUBMITTALS

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

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Alcan Products Corporation; Alcan Cable Division.
 - 2. General Cable Corporation.
 - 3. Southwire Company.
 - 4. Or approved equal.
- C. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- D. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.2 CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. IlSCO.
 2. Thomas & Betts Corporation
 3. O-Z/Gedney; a brand of EGS Electrical Group
 4. Or approved equal.
- B. Listed and labeled by an NRTL
- C. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- D. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
 1. Pipe Connectors: Clamp type, sized for pipe.

2.3 GROUNDING ELECTRODES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Alcan Products Corporation; Alcan Cable Division.
 2. General Cable Corporation.
 3. Southwire Company.
 4. Or approved equal.
- C. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet in diameter.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 3/0 AWG minimum. Bury at least 24 inches below grade.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
 - 1. Feeders and branch circuits.
 - 2. Lighting circuits.
 - 3. Receptacle circuits.

3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
 - 2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
 - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.

3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

3.4 LABELING

- A. Comply with requirements in Section 26 05 53 "Identification for Electrical Systems" for instruction signs. The label or its text shall be green.

3.5 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections and prepare test reports:
 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Make tests at ground rods before any conductors are connected.
- B. Report measured ground resistances that exceed the following values:
 1. Power Distribution Units or Panelboards Serving Electronic Equipment: 10 ohm(s).
- C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

1.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.3 ACTION SUBMITTALS

- A. Product Data: For steel slotted support systems.
- B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:
1. Trapeze hangers. Include Product Data for components.
 2. Steel slotted channel systems. Include Product Data for components.
 3. Equipment supports.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.5 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Cooper B-Line, Inc.; a division of Cooper Industries.
 - b. GS Metals Corp.
 - c. Unistrut; Tyco International, Ltd.
 - d. Or approved equal.
 - 3. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 - 4. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 - 5. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 - 6. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

- F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Hilti Inc.
 - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
 - 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
 - 5) Or approved equal.
 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated stainless steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti Inc.
 - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
 - 6) Or approved equal.
 3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 6. Toggle Bolts: All-steel springhead type.
 7. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by scheduled in NECA 1, where its Table 1 lists maximum spacings less than stated in NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with two-bolt conduit clamps.
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
 - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.

6. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69 Spring-tension clamps.
 7. To Light Steel: Sheet metal screws.
 8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- B. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 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 minimum dry film thickness of 2.0 mils.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

Intentionally Blank Page

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Metal wireways and auxiliary gutters.
4. Boxes, enclosures, and cabinets.

1.2 ACTION SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

- 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. Electri-Flex Company.
 2. Southwire Company.
 3. Thomas & Betts Corporation.
 4. Or approved equal
- B. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. GRC: Comply with ANSI C80.1 and UL 6.
- D. ARC: Comply with ANSI C80.5 and UL 6A.
- E. IMC: Comply with ANSI C80.6 and UL 1242.
- F. EMT: Comply with ANSI C80.3 and UL 797.
- G. FMC: Comply with UL 1; zinc-coated steel.

- H. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- I. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
 - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
 - 2. Fittings for EMT:
 - a. Material: die cast.
 - b. Type: compression.
 - 3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
 - 4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.
- J. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

- 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. Electri-Flex Company.
 - 2. Southwire Company.
 - 3. Thomas & Betts Corporation.
 - 4. Or approved equal
- B. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. ENT: Comply with NEMA TC 13 and UL 1653.
- D. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
- E. LFNC: Comply with UL 1660.
- F. Continuous HDPE: Comply with UL 651B.
- G. Coilable HDPE: Preassembled with conductors or cables, and complying with ASTM D 3485.
- H. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

- I. Fittings for LFNC: Comply with UL 514B.
- J. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- K. Solvent cements and adhesive primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

- 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. Cooper B-Line, Inc.
 - 2. Hoffman; a Pentair company.
 - 3. Square D; a brand of Schneider Electric.
 - 4. Or approved equal
- B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 12 unless otherwise indicated, and sized according to NFPA 70.
 - 1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

2.4 BOXES, ENCLOSURES, AND CABINETS

- 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. Adalet.
 - 2. Cooper Technologies Company; Cooper Crouse-Hinds.
 - 3. EGS/Appleton Electric.
 - 4. Or approved equal
- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, aluminum, Type FD, with gasketed cover.
- E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

- F. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.
- G. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- H. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.
- I. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- J. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.
- K. Gangable boxes are prohibited.
- L. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 12 with continuous-hinge cover with flush latch unless otherwise indicated.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - 2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- M. Cabinets:
 - 1. NEMA 250, Type 12 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 - 2. Hinged door in front cover with flush latch and concealed hinge.
 - 3. Key latch to match panelboards.
 - 4. Metal barriers to separate wiring of different systems and voltage.
 - 5. Accessory feet where required for freestanding equipment.
 - 6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
 - 1. Exposed Conduit: GRC.
 - 2. Concealed Conduit, Aboveground: EMT.
 - 3. Underground Conduit: RNC, Type EPC-40-PVC.

4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated.
1. Exposed, Not Subject to Physical Damage: EMT.
 2. Exposed and Subject to Severe Physical Damage: GRC. Raceway locations include the following:
 - a. Loading dock.
 - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
 - c. Mechanical rooms.
 3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 5. Damp or Wet Locations: GRC.
 6. Boxes and Enclosures: NEMA 250, Type 12, except use NEMA 250, Type 4.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
 3. EMT: Use compression, cast-metal fittings. Comply with NEMA FB 2.10.
 4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.
- F. Install surface raceways only where indicated on Drawings.
- G. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for hangers and supports.
- D. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- E. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.
- F. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- G. Support conduit within 12 inches of enclosures to which attached.
- H. Raceways Embedded in Slabs:
 - 1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.
 - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 - 3. Arrange raceways to keep a minimum of 1 inch of concrete cover in all directions.
 - 4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
 - 5. Change from ENT to GRC before rising above floor.
- I. Stub-ups to Above Recessed Ceilings:
 - 1. Use EMT, IMC, or RMC for raceways.
 - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- J. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

- K. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.
- L. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- M. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- N. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- O. Surface Raceways:
 - 1. Install surface raceway with a minimum 2-inch radius control at bend points.
 - 2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- P. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces.
- Q. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
 - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - 2. Where an underground service raceway enters a building or structure.
 - 3. Where otherwise required by NFPA 70.
- R. Expansion-Joint Fittings:
 - 1. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
 - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
 - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.

- c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
 - 2. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per degree F of temperature change for PVC conduits.
 - 3. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
 - 4. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
- S. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
- 1. Use LFMC in damp or wet locations subject to severe physical damage.
 - 2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.
- T. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
- U. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between the box and cover plate or the supported equipment and box.
- V. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- W. Locate boxes so that cover or plate will not span different building finishes.
- X. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- Y. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- Z. Set metal floor boxes level and flush with finished floor surface.
- AA. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.
- 3.3 INSTALLATION OF UNDERGROUND CONDUIT
- A. Direct-Buried Conduit:
- 1. Excavate trench bottom to provide firm and uniform support for conduit.

2. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction.
3. Install manufactured duct elbows for stub-up at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
4. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
 - b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
5. Underground Warning Tape: Comply with requirements in Section 26 05 53 "Identification for Electrical Systems."

3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.5 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

Intentionally Blank Page

SECTION 260544 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Silicone sealants.

1.2 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

- B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

C. Sleeves for Rectangular Openings:

1. Material: Galvanized sheet steel.
2. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches and with no side larger than 16 inches, thickness shall be 0.052 inch.
 - b. For sleeve cross-section rectangle perimeter 50 inches or more and one or more sides larger than 16 inches, thickness shall be 0.138 inch.

2.2 SILICONE SEALANTS

A.

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:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Advance Products & Systems, Inc.
 - b. CALPICO, Inc.
 - c. Metraflex Company (The).
 - d. Or approved equal

B. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
2. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.
- B. Comply with NEMA VE 2 for cable tray and cable penetrations.
- C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
 - a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint.
 - b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.

2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
 3. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed or unless seismic criteria require different clearance.
 4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
 5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches above finished floor level. Install sleeves during erection of floors.
- D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
 2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.
- E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

END OF SECTION 260544

Intentionally Blank Page

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Underground-line warning tape.
5. Warning labels and signs.
6. Instruction signs.
7. Equipment identification labels.

1.2 ACTION SUBMITTALS

- A. Product Data: For each electrical identification product indicated.

1.3 QUALITY ASSURANCE

- A. Comply with ANSI A13.1.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

PART 2 - PRODUCTS

2.1 POWER RACEWAY IDENTIFICATION MATERIALS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Thomas&Betts Corporation.

2. Klein Tools Inc.
 3. 3M; Electrical Products Division.
 4. Or approved equal.
- C. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- D. Colors for Raceways Carrying Circuits at 600 V or Less:
1. Black letters on an orange field.
 2. Legend: Indicate voltage.
- E. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- F. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- G. Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- H. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
 2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.2 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Thomas&Betts Corporation.
 2. Klein Tools Inc.
 3. 3M; Electrical Products Division.
 4. Or approved equal.
- C. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

- D. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- E. Write-On Tags: Polyester tag, 0.010-inch-thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
 - 1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
 - 2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.
- F. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- G. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

2.3 CONDUCTOR IDENTIFICATION MATERIALS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Thomas&Betts Corporation.
 - 2. Klein Tools Inc.
 - 3. 3M; Electrical Products Division.
 - 4. Or approved equal.
- C. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.
- D. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- E. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
- F. Write-On Tags: Polyester tag, 0.010-inch-thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
 - 1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.4 FLOOR MARKING TAPE

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Thomas&Betts Corporation.
 2. Klein Tools Inc.
 3. 3M; Electrical Products Division.
 4. Or approved equal.
- C. 2-inch- wide, 5-mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.5 WARNING LABELS AND SIGNS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Thomas&Betts Corporation.
 2. Klein Tools Inc.
 3. 3M; Electrical Products Division.
 4. Or approved equal.
- C. Comply with NFPA 70 and 29 CFR 1910.145.
- D. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
- E. Baked-Enamel Warning Signs:
 1. Preprinted aluminum signs punched or drilled for fasteners, with colors, legend, and size required for application.
 2. 1/4-inch grommets in corners for mounting.
 3. Nominal size, 7 by 10 inches.
- F. Metal-Backed, Butyrate Warning Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal size, 10 by 14 inches.

G. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

2.6 INSTRUCTION SIGNS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Thomas&Betts Corporation.
 2. Klein Tools Inc.
 3. 3M; Electrical Products Division.
 4. Or approved equal.
- C. Engraved, laminated acrylic or melamine plastic, minimum 1/16-inch-thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes.
 1. Engraved legend with black letters on white face.
 2. Punched or drilled for mechanical fasteners.
 3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.
- D. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch.
- E. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

2.7 EQUIPMENT IDENTIFICATION LABELS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Thomas&Betts Corporation.
 - 2. Klein Tools Inc.
 - 3. 3M; Electrical Products Division.
 - 4. Or approved equal.
- C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- D. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Thomas&Betts Corporation.
 - 2. Klein Tools Inc.
 - 3. 3M; Electrical Products Division.
 - 4. Or approved equal.
- E. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.
- F. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch.
- G. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch.

2.8 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Thomas&Betts Corporation.
 - 2. Klein Tools Inc.
 - 3. 3M; Electrical Products Division.
 - 4. Or approved equal.

- C. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- D. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Apply identification devices to surfaces that require finish after completing finish work.
- C. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- D. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- E. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- F. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.
- G. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

- A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A, and 120 V to ground: Install labels at 10-foot maximum intervals.
- B. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
 - 1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.

- a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
 - b. Colors for 208/120-V Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - c. Colors for 480/277-V Circuits:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- C. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
- D. Conductors to Be Extended in the Future: Attach marker tape to conductors and list source.
- E. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
- 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 - 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 - 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- F. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
- 1. Limit use of underground-line warning tape to direct-buried cables.
 - 2. Install underground-line warning tape for both direct-buried cables and cables in raceway.
- G. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

- H. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.
 - 1. Comply with 29 CFR 1910.145.
 - 2. Identify system voltage with black letters on an orange background.
 - 3. Apply to exterior of door, cover, or other access.
 - 4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
 - a. Power transfer switches.
 - b. Controls with external control power connections.
- I. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- J. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
 - 1. Labeling Instructions:
 - a. Indoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high.
 - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
 - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 - d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

END OF SECTION 260553

Intentionally Blank Page

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes distribution panelboards and lighting and appliance branch-circuit panelboards.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each panelboard and related equipment.
 - 1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
 - 2. Detail enclosure types and details for types other than NEMA 250, Type 1.
 - 3. Detail bus configuration, current, and voltage ratings.
 - 4. Short-circuit current rating of panelboards and overcurrent protective devices.
 - 5. Include evidence of NRTL listing for series rating of installed devices.
 - 6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
 - 7. Include wiring diagrams for power, signal, and control wiring.
 - 8. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards.

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.
- B. Panelboard schedules for installation in panelboards.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NEMA PB 1.

- C. Comply with NFPA 70.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

- A. Enclosures: Flush and surface mounted cabinets.
 - 1. Rated for environmental conditions at installed location.
 - a. Outdoor Locations: NEMA 250, Type 3R.
 - 2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
 - 3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
 - 4. Directory Card: Inside panelboard door, mounted in transparent card holder.
- B. Incoming Mains Location: Top.
- C. Phase, Neutral, and Ground Buses: [Hard-drawn copper, 98 percent conductivity.
- D. Conductor Connectors: Suitable for use with conductor material and sizes.
 - 1. Material: Hard-drawn copper, 98 percent conductivity.
 - 2. Main and Neutral Lugs: Mechanical type.
 - 3. Ground Lugs and Bus Configured Terminators: Mechanical type.
 - 4. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
 - 5. Subfeed (Double) Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
- E. Service Equipment Label: NRTL labeled for use as service equipment for panelboards with one or more main service disconnecting and overcurrent protective devices.

- F. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
- G. Panelboard Short-Circuit Current Rating: Rated for series-connected system with integral or remote upstream overcurrent protective devices and labeled by an NRTL. Include size and type of allowable upstream and branch devices, and listed and labeled for series-connected short-circuit rating by an NRTL.
- H. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.2 DISTRIBUTION PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Square D; a brand of Schneider Electric.
 - 4. Or approved equal.
- B. Panelboards: NEMA PB 1, power and feeder distribution type.
- C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
- D. Mains: Circuit breaker.
- E. Branch Overcurrent Protective Devices: For Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.
- F. Branch Overcurrent Protective Devices: For Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.
- G. Branch Overcurrent Protective Devices: Fused switches.

2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Square D; a brand of Schneider Electric.
 - 4. Or approved equal.
- B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

- C. Mains: Circuit breaker or lugs only.
- D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.
- F. Column-Type Panelboards: Narrow gutter extension, with cover, to overhead junction box equipped with ground and neutral terminal buses.

2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Square D; a brand of Schneider Electric.
 - 4. Or approved equal.
- B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with [series-connected rating] [interrupting capacity] to meet available fault currents.
 - 1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 - 2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
 - 3. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replaceable electronic trip; and the following field-adjustable settings:
 - a. Instantaneous trip.
 - b. Long- and short-time pickup levels.
 - c. Long- and short-time time adjustments.
 - d. Ground-fault pickup level, time delay, and I^2t response.
 - 4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
 - 5. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
 - 6. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip).
 - 7. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
 - 8. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
 - a. Standard frame sizes, trip ratings, and number of poles.

- b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
 - c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
 - d. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
 - e. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 55 percent of rated voltage.
 - f. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.
 - g. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.
- C. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.
- 1. Fuses, and Spare-Fuse Cabinet: Comply with requirements specified in electrical codes and standards.

2.5 ACCESSORY COMPONENTS AND FEATURES

- A. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Receive, inspect, handle, store and install panelboards and accessories according to [NECA 407] [NEMA PB 1.1].
- B. Mount top of trim 90 inches above finished floor unless otherwise indicated.
- C. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- D. Install overcurrent protective devices and controllers not already factory installed.
 - 1. Set field-adjustable, circuit-breaker trip ranges.
- E. Install filler plates in unused spaces.
- F. Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.

- G. Arrange conductors in gutters into groups and bundle and wrap with wire ties.
- H. Comply with NECA 1.

3.2 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 260553 "Identification for Electrical Systems."
- B. Create a directory to indicate installed circuit loads and incorporating Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- C. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- D. Panelboards will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 262416

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Receptacles, receptacles with integral GFCI, and associated device plates.
2. Weather-resistant receptacles.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:

1. Cooper Wiring Devices; Division of Cooper Industries, Inc. (Cooper).
2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).

3. Leviton Mfg. Company Inc. (Leviton).
4. Or approved equal.

- B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.
- C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
 1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
 2. Devices shall comply with the requirements in this Section.

2.3 STRAIGHT-BLADE RECEPTACLES

- A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.
 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. Cooper; 5351 (single), CR5362 (duplex).
 - b. Hubbell; HBL5351 (single), HBL5352 (duplex).
 - c. Leviton; 5891 (single), 5352 (duplex).
 - d. Or approved equal.

2.4 GFCI RECEPTACLES

- A. General Description:
 1. Straight blade, feed non-feed-through type.
 2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
 3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.
- B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:
 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. Cooper; VGF20.

- b. Hubbell; GFR5352L.
- c. Pass & Seymour; 2095.
- d. Or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
- B. Coordination with Other Trades:
 - 1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
 - 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 - 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 - 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
 - 1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
 - 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 - 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
 - 4. Existing Conductors:
 - a. Cut back and pigtail, or replace all damaged conductors.
 - b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pigtail existing conductors is permitted, provided the outlet box is large enough.
- D. Device Installation:
 - 1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
 - 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
 - 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
 - 4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.

5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the right.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Dimmers:

1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan speed control are listed for that application.
3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

I. Adjust locations of service poles to suit arrangement of partitions and furnishings.

3.2 GFCI RECEPTACLES

- A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Test Instruments: Use instruments that comply with UL 1436.
2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

B. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.

2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
 3. Ground Impedance: Values of up to 2 ohms are acceptable.
 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 5. Using the test plug, verify that the device and its outlet box are securely mounted.
 6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.
- C. Wiring device will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION 262726

Intentionally Blank Page

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fusible switches.
2. Nonfusible switches.
3. Receptacle switches.
4. Shunt trip switches.
5. Molded-case circuit breakers (MCCBs).
6. Enclosures.

1.2 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated.
- B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.
1. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

- A. Seismic Qualification Certificates: For enclosed switches and circuit breakers, accessories, and components, from manufacturer.
- B. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.6 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Square D; a brand of Schneider Electric.
 - 4. Or approved equal.
- B. Type HD, Heavy Duty, Single Throw, 240-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
 - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - 3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
 - 4. Lugs: Suitable for number, size, and conductor material.
 - 5. Service-Rated Switches: Labeled for use as service equipment.

2.2 NONFUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Square D; a brand of Schneider Electric.
 - 4. Or approved equal.
- B. Type HD, Heavy Duty, Six Pole, Single Throw, 600-V ac, 200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
 - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - 3. Lugs: Suitable for number, size, and conductor material.

2.3 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
 - 1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
 - 2. Outdoor Locations: NEMA 250, Type 3R.
 - 3. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
 - 4. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- C. Install fuses in fusible devices.

- D. Comply with NECA 1.

3.2 IDENTIFICATION

- A. Comply with requirements in Section 26 05 53 "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- C. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 262816

SECTION 263213 – PACKAGED ENGINE GENERATOR SYSTEMS

PART 1 - GENERAL

1.1 Description of System & Site

- A. 60 kW integrated, standby power system to supply electrical power at 120/240 Volts, 60 Hertz, 1 Phase. The system will utilize an alternator rated 80 kW. The generator shall consist of a liquid cooled diesel engine, a synchronous AC alternator, and system controls with all necessary accessories for a complete operating system, including but not limited to the items as specified hereinafter.
- B. The site is an NEC ordinary location with no specific harsh environment requirements.
- C. The genset shall be applied at the listed ambient and elevation. Bidders to submit the generators rated power output at 104 ambient (°F) and 500 elevation (Ft).
- D. Bidders are to submit the genset's sound level in dBA at 23 ft based on the configuration specified.

1.2. Requirements of Regulatory Agencies

- A. An electric generating system, consisting of a prime mover, generator, governor, coupling and all controls, must have been tested, as a complete unit, on a representative engineering prototype model of the equipment to be sold.
- B. The generator set must conform to applicable NFPA requirements.
- C. The generator set must include a listing for the UL2200 standard for stationary engine generator assembly.
- D. The generator set must meet EPA federal emission guidelines for stationary emergency power generation.

1.3. Manufacturer Qualifications

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Generac Industrial Power
 - 2. Caterpillar; Engine Div.
 - 3. Kohler Power Systems; Generator Division.
 - 4. Or approved equal.
- B. The manufacturer shall have printed literature and brochures describing the standard series specified, not a one-of-a-kind fabrication.
- C. Manufacturer's authorized service representative shall meet the following criteria:
 - 1. Certified, factory trained, industrial generator technicians
 - 2. Service support 24/7

3. Service location within 200 miles
4. Response time of 4 hours
5. Service & repair parts in-stock at performance level of 95%

1.4 Submittals

- A. Engine Generator specification sheet
- B. Controls specification sheet(s)
- C. Installation / Layout dimensional drawing
- D. Wiring schematic
- E. Sound data
- F. Emission certification
- G. Warranty statement

PART 2 - ENGINE

2.1 Engine Rating and Performance

- A. The prime mover shall be a liquid cooled, diesel fueled, turbocharged after-cooled engine of 4-cycle design. It will have adequate horsepower to achieve rated kW output with at an operating speed of 1800 RPM.
- B. The engine shall support a 100% load step.
- C. The generator system shall support generator start-up and load transfer within 10 seconds.

2.2 Engine Oil System

- A. Full pressure lubrication shall be supplied by a positive displacement lube oil pump. The engine shall have a replaceable oil filter(s) with internal bypass and replaceable element(s).
- B. The engine shall operate on mineral based oil. Synthetic oils shall not be required.
- C. The oil shall be cooled by an oil cooler which is integrated into the engine system.

2.3 Engine Cooling System

- A. The engine is to be cooled with a unit mounted radiator, fan, water pump, and closed coolant recovery system. The coolant system shall include a coolant fill box which will provide visual means to determine if the system has adequate coolant level. The radiator shall be designed for operation in 122 degrees F, (50 degrees C) ambient temperature.
- B. The engine shall have a unit mounted, thermostatically controlled water jacket heater to aid in quick starting. The wattage shall be as recommended by the manufacturer.

- C. Engine coolant and oil drain extensions, equipped with pipe plugs and shut-off valves, must be provided to the outside of the mounting base for cleaner and more convenient engine servicing.
- D. A radiator fan guard must be installed for personnel safety that meets UL and OSHA safety requirements.

2.4 Engine Starting System

- A. Starting shall be by a solenoid shift, DC starting system.
- B. The engine's cranking batteries shall be lead acid. The batteries shall be sized per the manufacturer's recommendations. The batteries supplied shall meet NFPA 110 cranking requirements of 90 seconds of total crank time. Battery specifications (type, amp-hour rating, cold cranking amps) to be provided in the submittal.
- C. The genset shall have an engine driven, battery charging alternator with integrated voltage regulation.
- D. The genset shall have an automatic dual rate, float equalize, 10-amp battery charger. The charger must be protected against a reverse polarity connection. The chargers charging current shall be monitored within the generator controller to support remote monitoring and diagnostics. The battery charger is to be factory installed on the generator set. Due to line voltage drop concerns, a battery charger mounted in the transfer switch will be unacceptable.

2.5 Engine Fuel System

- A. The engine fuel system shall be designed for operation on #2 diesel fuel and cold weather diesel blends.
- B. The engine shall include a primary fuel filter, water separator, manual fuel priming pump, and engine flexible fuel lines must be installed at the point of manufacture. Element shall be replaceable paper type.
- C. The engines suction line shall be fitted with a check valve to secure prime for the engine's injection pump.

2.6 Engine Controls

- A. Engines that are equipped with an electronic engine control module (ECM), shall monitor, and control engine functionality and seamlessly integrate with the genset controller through digital communications. ECM monitored parameters shall be integrated into the genset controllers NFPA 110 alarm and warning requirements. All ECM fault codes shall be displayed at the genset controller in standard language – fault code numbers are not acceptable.
- B. For engines without ECM functionality or for any additional genset controller monitoring, sensors are to be conditioned to a 4-20ma signal level to enhance noise immunity and all sensor

connections shall be sealed to prevent corrosion.

- C. Engine speed shall be controlled with an integrated isochronous governor function with no change in alternator frequency from no load to full load. Steady state regulation is to be 0.25%.

2.7 Engine Exhaust & Intake

- A. The engine exhaust emissions shall meet the EPA emission requirements for standby power generation.
- B. The manufacturer shall supply its recommended stainless steel, flexible connector to couple the engine exhaust manifold to the exhaust system. A rain cap will terminate the exhaust pipe after the silencer. All components must be properly sized to assure operation without excessive back pressure when installed.
- C. The manufacturer shall supply a critical grade exhaust silencer as standard. For applications with site specific sound requirements (reference section 1.1), the silencer shall be selected to achieve site sound levels.
- D. For gensets in a weather or sound attenuated enclosure, all exhaust piping from the turbo-charger discharge to the silencer shall be thermally wrapped to minimize heat dissipation inside the enclosure.
- E. The engine intake air is to be filtered with engine mounted, replaceable, dry element filters.

PART 3 - ALTERNATOR

- 3.1 The alternator shall be the voltage and phase configuration as specified in section 1.1.1.
- 3.2 The alternator shall be a 4-pole, revolving field, stationary armature, synchronous machine. The excitation system shall utilize a brushless exciter with a three phase full wave rectifier assembly protected against abnormal transient conditions by a surge protector. Photo-sensitive components will not be permitted in the rotating exciter.
- 3.3 The alternator shall include a **permanent magnet generator (PMG) for excitation support**. The system shall supply a minimum short circuit support current of 300% of the rating (250% for 50Hz operation) for 10 seconds.
- 3.4 The alternator shall support 71skVA with a maximum voltage dip of 35 %.
- 3.5 Three phase alternators shall be 12 lead, broad range capable of supporting voltage reconnection. **Single phase alternators shall be four lead** and dedicated voltage designs (600v) shall be six lead. All leads must be extended into a NEMA 1 connection box for easy termination. A fully rated, isolated neutral connection must be included by the generator set manufacturer.
- 3.6 The alternator shall use a single, sealed bearing design. The rotor shall be connected to the engine flywheel using flexible drive disks. The stator shall be direct connected to the engine to

ensure permanent alignment.

- 3.7 The alternator shall meet temperature rise standards of UL2200 (120 degrees C). The insulation system material shall be class "H" capable of withstanding 150 degrees C temperature rise. The alternator shall be protected against overloads and short circuit conditions by advanced control panel protective functions. The control panel is to provide a time current algorithm that protects the alternator against short circuits. To ensure precision protection and repeatable trip characteristics, these functions must be implemented electronically in the generator control panel -- thermal magnetic breaker implementation are not acceptable.

PART 4 - CONTROLS

- 4.1 The generator control system shall be a fully integrated microprocessor based control system for standby emergency engine generators meeting all requirements of NFPA 110 level 1.
- 4.2 The generator control system shall be a fully integrated control system enabling remote diagnostics and easy building management integration of all generator functions. The generator controller shall provide integrated and digital control over all generator functions including: bi-fuel control, engine protection, alternator protection, speed governing, voltage regulation and all related generator operations. The generator controller must also provide seamless digital integration with the engine's electronic engine control module (ECM) if so equipped. Generator controller's that utilize separate voltage regulators and speed governors or do not provide seamless integration with the engine management system are considered less desirable.
- 4.3 Communications shall be supported with building automation via the Modbus protocol without network cards. Optional internet and intranet connectivity shall be available.
- 4.4 The control system shall provide an environmentally sealed design including encapsulated circuit boards and sealed automotive style plugs for all sensors and circuit board connections. The use of non-encapsulated boards, edge cards, and pc ribbon cable connections are considered unacceptable.
- 4.5 Circuit boards shall utilize surface mount technology to provide vibration durability. Circuit boards that utilize large capacitors or heat sinks must utilize encapsulation methods to securely support these components.
- 4.6 A predictive maintenance algorithm that alarms when maintenance is required. The controller shall have the capability to call out to the local servicing dealer when maintenance is required.
- 4.7 Diagnostic capabilities should include time-stamped event and alarm logs, ability to capture operational parameters during events, simultaneous monitoring of all input or output parameters, callout capabilities, support for multi-channel digital strip chart functionality and .2 msec data logging capabilities.
- 4.8 In addition to standard NFPA 110 alarms, the application loads should also be protected through instantaneous and steady state protective settings on system voltage, frequency, and power levels.

- 4.9 The control system shall provide pre-wired customer use I/O: 4 relay outputs (user definable functions), communications support via RS232 and RS485. Additional I/O must be an available option.
- 4.10 Customer I/O shall be software configurable providing full access to all alarm, event, data logging, and shutdown functionality. In addition, custom ladder logic functionality inside the generator controller shall be supported to provide application support flexibility. The ladder logic function shall have access to all the controller inputs and customer assignable outputs.
- 4.11 The control panel will display all user pertinent unit parameters including engine and alternator operating conditions; oil pressure and optional oil temperature; coolant temperature and level alarm; fuel level (where applicable); engine speed; DC battery voltage; run time hours; generator voltages, amps, frequency, kilowatts, and power factor; alarm status and current alarm(s) condition per NFPA 110 level 1.

PART 5 - ENGINE / ALTERNATOR PACKAGING

- 5.1 The engine/alternator shall be isolated from the generator frame with rubber isolators. The packaging shall not require the addition of external spring isolators.
A mainline, 250A thermal magnetic circuit breaker carrying the UL mark shall be factory installed. The line side connections are to be made at the factory. Output lugs shall be provided for load side connections.
- 5.3 The generator shall include a unit mounted auxiliary power load center. All ancillary AC devices (block heater, battery charger, alternator strip heater, etc.) shall have a dedicated breaker within the load center.
- 5.4 Enclosure
 - A. The genset shall be packaged with a Level 2 sound attenuating enclosure which will limit the sound pressure to 70.3 dBA at a distance of 7 meters.
 - B. The enclosure shall be completely lined with sound deadening material. This material must be of a self- extinguishing design with a reflective surface for enhanced serviceability.
 - C. The enclosure shall be made of steel with a minimum thickness of 16 gauge. The enclosure is to have hinged, removable doors to allow access to the engine, alternator, and control panel. The hinges shall allow for door fit adjustment. Hinges and all exposed fasteners will be stainless steel or Sermagard coated. The use of pop-rivets weakens the paint system and not allowed on external painted surfaces. Each door will have lockable hardware with identical keys.
 - D. The enclosure shall be coated with electrostatic applied powder paint, baked, and finished to manufacturer's specifications. The color will be manufacturer's standard.
The enclosure shall utilize an upward discharging radiator hood. Due to concerns relative to radiator damage, circulating exhaust, and prevailing winds, equipment without a radiator discharge hood will not be acceptable.

- E. The genset silencer shall be mounted on the discharge hood of the enclosure. Due to architectural concerns, silencers mounted on the top of the generator enclosure are not acceptable. Gensets with silencers mounted inside the main generator compartment are acceptable only if the silencer is thermally wrapped to minimize heat stress on the surrounding components.

5.5 Sub-base fuel tank

- A. The packaging shall include a double wall, sub-base mounted, UL142 listed fuel tank. The tank shall be sized to provide **39 hours** of run time at full load.
- B. The tank shall include fuel suction and return connections, normal and emergency vents, secondary containment emergency vent and rupture basin sensor, mechanical fuel level indication and a stub-up area convenient for electrical conduit entry.
- C. The fuel tank shall use an electric fuel sensor to provide an analog indication of fuel level. The controller shall have a warning indication on low fuel level and provide optional shutdown functionality for low, low fuel level.
- D. The fuel tank must be supplied by the engine-generator set manufacturer and be installed before shipment.

PART 6 - LOOSE ITEMS

- 6.1 Supplier to itemize loose parts that require site mounting and installation. Preference will be shown for gensets that factory mount items like mufflers, battery chargers, etc.
- 6.2 Spare Parts:
 - A. Fuses: One spare set
 - B. Filters One spare set (air, fuel, oil)

PART 7 - ADDITIONAL PROJECT REQUIREMENTS

- 7.1 Factory testing
 - A. Before shipment of the equipment, the engine-generator set shall be tested under rated load for performance and proper functioning of control and interfacing circuits. Tests shall include:
 - 1. Verify voltage & frequency stability.
 - 2. Verify transient voltage & frequency dip response.
 - 3. Load test the generator for 2 hours.
- 7.4 Manuals
 - A. Three (3) sets of owner's manuals specific to the product supplied must accompany delivery of the equipment. General operating instruction, preventive maintenance, wiring diagrams, schematics and parts exploded views specific to this model must be included.

7.5 Installation

- A. Contractor shall install the complete electrical generating system including all external fuel connections in accordance with requirements of NEC, NFPA, and the manufacturer's recommendations as reviewed by the Engineer.

7.6 Service

- A. Supplier of the genset and associated items shall have permanent service facilities in this trade area. These facilities shall comprise a permanent force of factory trained service personnel on 24 hour call, experienced in servicing this type of equipment, providing warranty and routine maintenance service to afford the owner maximum protection. Delegation of this service responsibility for any of the equipment listed herein will not be considered fulfillment of these specifications. Service contracts shall also be available.

7.7 Warranty

- A. The standby electric generating system components, complete genset and instrumentation panel shall be warranted by the manufacturer against defective materials and factory workmanship for a period of five (5) years. Such defective parts shall be repaired or replaced at the manufacturer's option, free of charge for parts, labor, and travel.
- B. The warranty period shall commence when the standby power system is first placed into service. Multiple warranties for individual components (engine, alternator, controls, etc.) will not be acceptable. Satisfactory warranty documents must be provided. Also, in the judgment of the specifying authority, the manufacturer supplying the warranty for the complete system must have the necessary financial strength and technical expertise with all components supplied to provide adequate warranty support.

7.8 Startup and Commissioning

- A. The supplier of the electric generating plant and associated items covered herein shall provide factory trained technicians to validate the completed installation and to perform an initial startup inspection to include:
 - 1. Ensuring the engine starts (both hot and cold) within the specified time.
 - 2. Verification of engine parameters within specification.
 - 3. Verify no load frequency and voltage, adjusting if required.
 - 4. Test all automatic shutdowns of the engine-generator.
 - 5. Perform a load test of the electric plant, ensuring full load frequency and voltage are within specification by using a resistive load bank. The load bank testing shall be conducted per NFPA 110 requirements.

7.7. Training

- A. Training is to be supplied by the start-up technician for the end-user during commissioning. The training should cover basic generator operation and common generator issues that can be managed by the end-user.
- B. Training is to include manual operation of system.

END OF SECTION 263213

Intentionally Blank Page

SECTION 263600 - TRANSFER SWITCHES

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 SCOPE

- A. Furnish and install the low voltage automatic transfer switches having the ratings, features/accessories and enclosures as specified herein and as shown on the contract drawings.
Two Pole Switches

1.3 REFERENCES

- A. The automatic transfer switches and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of UL and NEMA as follows:
 - 1. UL 1008 – Transfer Switches
 - 2. UL 991 - Tests for Safety-Related Controls Employing Solid-State Devices
 - 3. NFPA 70 – National Electrical Code
 - 4. NFPA 99 – Essential Electrical Systems of Health Care Facilities
 - 5. NFPA 110 – Emergency and Standby Power Systems
 - 6. NEMA ICS 10 – AC Transfer Switch Equipment
 - 7. IEEE 446 – Recommended Practice for Emergency and Standby Power Systems

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, weights, operating characteristics, furnished specialties, and accessories.
 - 1. Technical data on all major components of all transfer switches and other products described in this section. Data is required for the transfer switch mechanism, control system, cabinet, and protective devices specifically listed for use with each transfer switch. Include steady state and fault current ratings weights, operating characteristics and furnished specialties and accessories. The following information shall be submitted to the Engineer for each switch specified:
 - a. Dimensioned outline drawings of assembly, including elevations, sections, and details including minimal clearances, conductor entry provisions, gutter space, installed features and devices and material lists for each switch specified.
 - b. Schematic diagram and internal electrical wiring drawings
 - c. Conduit space locations within the assembly
 - d. Assembly ratings including:

1. Withstand and Closing rating
 2. Voltage
 3. Continuous current rating
 4. Short-Time rating if applicable
 5. Short-circuit rating if ordered with integral protection
- e. Cable terminal sizes
 - f. Product Specification Sheets
 - g. Installation and mounting instructions, including information for proper installation of equipment to meet seismic requirements.

1.5 INFORMATIONALSUBMITTALS

A. Manufacturer and Supplier Qualification Data

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Emerson; ASCO Power Technologies, LP.
 - b. Generac Power Systems, Inc.
 - c. Kohler Power Systems; Generator Division.
 - d. Spectrum Detroit Diesel.
 - e. Or approved equal.
2. The transfer switch manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation, and service, in accordance with ISO 9001.
3. This system shall be supplied by an original equipment manufacturer (OEM) who has been regularly engaged in the production of engine-alternator sets, automatic transfer switches, and associated controls for a minimum of 25 years, thereby identifying one source of supply and responsibility.
 - a. The manufacturer of this equipment shall have produced similar equipment for a minimum period of 10 years.
 - b. Operation and Maintenance Data: For each switch to include in operation and maintenance manuals.
 - c. Warranty documents demonstrating compliance with the project's contract requirements.

1.6 QUALITY ASSURANCE

A. Only approved bidders shall supply equipment provided under this contract.

1. Manufacturer Qualifications: The equipment supplier shall maintain a service center capable of providing training, parts, maintenance and emergency repairs to equipment, including transfer switch, generator sets and remote monitoring equipment (if applicable) at the site within a response period of less than four hours from time of notification.

2. The transfer switch shall be serviced by technicians employed by, and specially trained and certified by, the generator set supplier and the supplier shall have a service organization that is factory-certified in both generator set and transfer switch service.
3. The manufacturer shall maintain model and serial number records of each transfer switch provided for at least 10 years.
4. Source Limitations: All transfer switches are to be obtained through one source from a single manufacturer. The generator set manufacturer shall warrant transfer switches to provide a single source of responsibility for products provided.
5. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked as suitable for use in emergency, legally required or optional standby use as appropriate for the connected load.

1.7 PROJECT CONDITIONS

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service:
 1. Notify (Architect/Construction Manager/Owner) no fewer than (insert appropriate number) days in advance of proposed interruption of electrical service.
 2. Do not proceed with interruption of electrical service without (Architect/Construction Manager/Owner's) written permission.
 3. Do not energize any new service or distribution equipment without notification and permission of the (Architect/Construction Manager/Owner).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- a. Emerson; ASCO Power Technologies, LP.
- b. Generac Power Systems, Inc.
- c. Kohler Power Systems; Generator Division.
- d. Spectrum Detroit Diesel.
- e. Or approved equal.

2.2 CONSTRUCTION

- A. All breaker transfer switches shall be UL listed for application in their intended enclosures for 100% of their continuous ampere rating.
- B. The automatic transfer switch shall be of double throw construction operated by a reliable electrical mechanism momentarily energized.
- C. Each transfer switch shall be positively interlocked both mechanically and electrically to prevent simultaneous closing of both sources under either automatic or manual operation.

- D. Main contacts shall be silver composition and mechanically held in both normal and emergency positions.
- E. Switches shall operate delayed transition, with a time delay in the neutral position adjustable from 0 to 120 seconds
- F. The switching panel shall consist of completely enclosed contact assemblies and a separate control or transformer panel. Control power for all transfer operations shall be derived from the line side of the source to which the load is being transferred. The transformer shall be multi-tap for ease of voltage adjustment in the field.
- G. Transfer switches shall be capable of being operated manually under full rated load conditions. Manual operation shall be accomplished by a permanently attached manual operator, or by integrally mounted pushbuttons. Removable manual operating handles, and handles that may move in the event of an electrical operation during the manual operation, are not acceptable. Manual operators requiring source or load disconnection prior to manual operation are not acceptable.
- H. **On transfer switches requiring a switched neutral, the neutral shall be fully rated.**

2.3 MICROPROCESSOR LOGIC

- A. The controller shall be hardened against potential problems from transients and surges. Operation of the transfer switch and monitoring of both sources shall be managed by the controller.
- B. The automatic transfer switch controllers shall meet or exceed the following standards in addition to the basic switch standards:
 - 1. IEC 61000-4-2 - EMC Testing and Measurement Techniques - Electrostatic Discharge Immunity Test
 - 2. IEC 61000-4-3 - EMC Testing and Measurement Techniques - Radio-frequency, Electromagnetic Field Immunity Test
 - 3. IEC 61000-4-4 - EMC Testing and Measurement Techniques - Electrical Fast Transient/Burst Immunity Test
 - 4. IEC 61000-4-5 - EMC Testing and Measurement Techniques - Surge Immunity Test
 - 5. IEC 61000-4-6 - EMC Testing and Measurement Techniques - Immunity to Conducted Disturbances, Induced by Radio-frequency Fields
 - 6. IEC 61000-4-11 - EMC Testing and Measurement Techniques - Voltage Dips, Short Interrupts and Voltage Variations Immunity Tests
 - 7. CISPR11, Class B - Industrial, Scientific and Medical Radio-frequency Equipment - Electromagnetic Disturbance Characteristics - Limits and Methods of Measurement
 - 8. FCC Part 15, Subpart B, Class B

2.4 ENCLOSURE

- A. Each transfer switch shall be provided in a **NEMA 3R** enclosure suitable for use in environments indicated in the drawings.

- B. NEMA 3R enclosures shall be painted with the manufacturer's standard light gray ANSI 61 paint.

2.5 CONTROLLER DISPLAY AND KEYPAD

- A. The microprocessor-based controller display shall be UV resistant and include Color TFT, backlit display. The controller shall be capable of displaying transfer switch status, parameters, and diagnostic data. All set point parameters shall be password protected and programmable using the controller keypad, USB port, or remotely using serial port access. Limited abbreviations or codes shall be used for transfer switch functions.
- B. The microprocessor-based controller shall include a mimic bus display consisting of six (6) individual LED's for indicating the following:
1. Availability status of source 1
 2. Availability status of source 2
 3. Connection status of source 1
 4. Connection status of source 2
 5. Source 1 Preferred
 6. Source 2 Preferred

2.6 VOLTAGE AND FREQUENCY SENSING

- A. The controller shall have a voltage range of 0-790 volts (50/60 Hz) with an accuracy of +/- 1% of the reading and a frequency range of 40-70 Hz with an accuracy of +/- .3 Hz.
- B. Voltage and frequency dropout and pickup parameters are set as a percentage of the nominal voltage as indicated in the table below.

Setpoint	Sources	Dropout	Pickup
Undervoltage	Source 1 and 2	70 – 97%	(DO + 2%) - 99%
Overvoltage	Source 1 and 2	105 – 110%	103% - (DO – 2%)
Underfrequency	Source 1 and 2	90 – 97%	(DO + 1Hz) – 99%
Overfrequency	Source 1 and 2	103 – 105%	101% - (DO – 1Hz)
Voltage Unbalance	Source 1 and 2	5 – 20%	(UNBAL DO% - 2) – 3%

- C. The normal and emergency sources shall include phase reversal protection. The preferred rotation is programmable as ABC or CBA.

2.7 TIME DELAYS

- A. A time delay shall be provided on transfer to source 2, adjustable from 0 to 166 minutes.
- B. A time delay shall be provided to override a momentary power outage or voltage fluctuation, adjustable from 0 to 120 seconds.

- C. A time delay shall be provided on retransfer from source 2 to source 1, adjustable from 0 to 166 minutes.
- D. A time delay shall be provided after retransfer that allows the generator to run unloaded prior to shutdown, adjustable from 0 to 166 minutes.
- E. A time delay shall be provided for engine failure to start, adjustable 0- 6 seconds.
- F. A pre and or post transfer time delay output adjustable from 0-120 seconds. The contact shall be a form-c contact rated for 10-Amp at 250-Vac and 10-Amp at 30-Vdc.
- G. All delays shall be field adjustable from the microprocessor-based controller without the use of special tools.

2.8 ADDITIONAL FEATURES

- A. One Form C contact for closure of the source 1 generator start circuit for optional use with a dual generator system. The contacts shall be rated for 5-Amp at 250-Vac and 5-Amp at 30-Vdc.
- B. One Form C contact for closure of the source 2 generator start circuit. The contacts shall be rated for 5-Amp at 250-Vac and 5-Amp at 30-Vdc.
- C. The controller shall include two independently programmable Engine Exercisers, selectable as disabled, 7, 14, or 28 day interval, or by calendar date. Run time shall be adjustable for 0-600 minutes, with or without load. Upon loss of source 2 power, the ATS shall automatically return to source 1. Transfer time delays shall also be independently programmable for test events.
- D. The controller shall include a keypad pushbutton to initiate a system test.
- E. The controller shall include 4 user configurable inputs. Each input provides 50 volts at 10ma and can be user configured to one of the following features:
 - 1. Input to accept a remote contact which closes to initiate a transfer to source 2. This feature shall be failsafe and an automatic retransfer shall occur in the event that source 2 power is lost.
 - 2. Input to accept a remote contact which opens to inhibit transfer to source 2.
 - 3. Input to enable monitor mode to disable automatic operation of the transfer switch while continuing to display status. Monitor mode allows set point programming at the controller display.
 - 4. Input to enable lockout feature to disable automatic operations of the transfer switch following an overcurrent trip of an integral circuit breaker.
 - 5. Input to enable or disable manual retransfer to source 1.
 - 6. Input to initiate manual retransfer to source 1.
 - 7. Input to initiate a remote engine test. The test will run using the programmed engine test set points.
 - 8. Input to select source 1 or source 2 as the preferred source.
 - 9. Input to initiate a remote load test.
 - 10. Input to bypass time delays

- F. The controller shall include 4 user configurable outputs rated for 10-Amp at 250-Vac and 10-Amp at 30-Vdc. Each input can be user configured to one of the following features:
 - 1. Source 1 connected
 - 2. Source 2 connected
 - 3. ATS in test
 - 4. ATS not in automatic mode (Monitor Mode)
 - 5. General Alarm indication for failure to transfer, mechanical fault, or electrical fault.
 - 6. Engine Test Aborted
 - 7. Engine cool down in process
 - 8. Engine start contact status
 - 9. Emergency inhibit on
 - 10. Load sequence – Output used to signal select loads to disconnect prior to transfer and reconnect 0-120 seconds after. Loads are reconnected sequentially.
 - 11. Selective load shed – Output used to shed low priority loads when the load reaches a programmed threshold value. A load shed and load restore set point (measured in kW) are associated with this feature.
 - 12. Load bank control – Output to disconnect a load bank during an engine run test if a transfer to a source 2 generator is required.
 - 13. Pre and/or post transfer signal - A pre and or post transfer time delay output adjustable from 0-120 seconds.
- G. One Form C auxiliary contact to indicate Source 1 position and one Form C contact to indicate source 2 position. The contacts shall be rated for 10-Amp, 1/3-Horsepower at 250-Vac and 10-Amp at 30-Vdc.
- H. One Form C contact for Source 1 Available. The contacts shall be rated for 10-Amp, 1/3-Horsepower at 250-Vac and 10-Amp at 30-Vdc.
- I. One Form C contact for Source 2 Available. The contacts shall be rated for 10-Amp, 1/3-Horsepower at 250-Vac and 10-Amp at 30-Vdc.
- J. Data Logging
 - 1. Historical Data Storage to include:
 - a. Engine Run Time
 - b. Source 1 Available time
 - c. Source 2 Available time
 - d. Source 1 Connected time
 - e. Source 2 Connected time
 - f. Source 1 Engine Run Time
 - g. Source 2 Engine Run Time
 - h. Load Energized Time
 - i. Number of Transfers
 - 2. Event Summary shall include up to 100 date and time stamped events. All metered values are logged for each event. Event summaries include:
 - a. Transfer events
 - b. Alarms
 - c. Changes to the set points
 - d. Changes to the time/date
 - e. Resetting a historical counter

- f. Engine Run test
- 3. Event Details shall include up to 350 date and time stamped events. All metered values are logged for each event. Event details include detailed sequence of operations of a transfer event.
- 4. Event recording shall capture 4 seconds of metered data, stored every 20 msec for certain events. The data is captured 2 seconds before and 2 seconds after the event. Oscillographic data for 10 events is stored and may be downloaded over USB. Events Include:
 - a. Source unavailability actions that initiate a transfer sequence (Undervoltage, Overvoltage, etc.)
 - b. Successful transfers (at the point of breaker/contact closure)
 - c. Unsuccessful transfers (at the point of breaker/contact failure to close or open)

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Floor-Mounting Switch: Anchor to floor by bolting.

Concrete Bases: 4 inches (100 mm) high, reinforced, with chamfered edges. Extend base no more than 4 inches (100 mm) in all directions beyond the maximum dimensions of switch, unless otherwise indicated or unless required for seismic support. Construct concrete bases according to Division 26 Section "Hangers and Supports for Electrical Systems."

- C. Annunciator and Control Panel Mounting: Flush in wall, unless otherwise indicated.
- D. Identify components according to Division 26 Section "Identification for Electrical Systems."
- E. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

3.2 CONNECTIONS

- A. Wiring to Remote Components: Match type and number of cables and conductors to control and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.
- B. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- C. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

- B. Perform the following tests and inspections in conjunction with factory-authorized service representative:
 - 1. After installing equipment and after electrical circuitry has been energized, test for compliance with requirements.
 - 2. Perform each visual and mechanical inspection and electrical testing as outlined below:
 - a. Measure insulation resistance phase-to-phase and phase-to-ground with insulation- resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.
 - 1. Check for electrical continuity of circuits and for short circuits.
 - 2. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
 - 3. Verify that manual transfer warnings are properly placed.
 - 4. Perform manual transfer operation.
 - 3. After energizing circuits, demonstrate interlocking sequence and operational function for each switch at least three times.
 - a. Simulate power failures of normal source to automatic transfer switches and of emergency source with normal source available.
 - b. Simulate loss of phase-to-ground voltage for each phase of normal source.
 - c. Verify time-delay settings.
 - d. Verify pickup and dropout voltages by data readout or inspection of control settings.
 - e. Test bypass/isolation unit functional modes and related automatic transfer-switch operations.
 - f. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.
- C. Coordinate tests with tests of generator and run them concurrently.
- D. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.
- E. Remove and replace malfunctioning units and retest as specified above.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment as specified below.
- B. Coordinate this training with that for generator equipment.

4.1 SERVICE – MAINTENANCE AGREEMENT

- A. Engage a factory-authorized service representative to perform Service Maintenance activities as specified below.

Coordinate this to coincide with that for generator equipment.

- 1. Check general appearance
- 2. Inspect and check wiring/connections
- 3. Inspect and check normal & emergency power monitors

4. Inspect control relays
5. Record time delay engine start, time delay normal to emergency,
& time delay engine cool down
6. Visually inspect main and auxiliary contacts
7. Inspect cabinet lamps & exerciser clock
8. Inspect annunciator, and general enclosure

END OF SECTION 263600

DPMC #T0617-00

DIVISION 26

SECTION 26 56 00 – EXTERIOR LIGHTING
SUBSECTION 26 56 13 – LIGHTING POLES AND STANDARDS

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

This Section describes the requirements for providing and installing a complete site lighting system.

1.2 RELATED DOCUMENTS

- A. The Standard Specifications of the New Jersey Department of Transportation for Road and Bridge Construction, dated 2019, as amended and augmented by the Supplementary Specifications (NJDOT Specifications) shall govern the material and construction requirements for poles, bases and accessories. Where conflicts arise between the specifications contained herein or the NJDOT specifications, the more stringent requirement shall govern.
- B. The NJDOT West Berlin Maintenance Yard is an NJDEP Site Remediation Program (SRP) site. Coordinate with the NJDOT Division of Environmental Resources/ Environmental Support & Services Unit (DER/ESSU) prior to initiating any ground disturbances.

1.3 RELATED WORK

- A. 312316 – Excavation.

PART 2 - PRODUCTS

2.1 MATERIALS:

Provide materials as specified in:

Concrete	NJDOT Specification Section 903.03
Grout	NJDOT Specification Section 903.08.02.A
Reinforcement Steel	NJDOT Specification Section 905.01
Anchor Bolts	NJDOT Specification Section 908.01.03
Miscellaneous Pole Hardware	NJDOT Specification Section 908.04
Coal Tar Epoxy Paint	NJDOT Specification Section 912.01.03
Standard Lighting Mast Arm.....	NJDOT Specification Section 918.12

Provide materials as specified in the Contract and in the New Jersey Electrical Materials Specifications that are available on the NJDOT's website. A listing of pre-qualified materials is

26 56 13 LIGHTING POLES AND STANDARDS
EXTERIOR LIGHTING

also available from the Department's website.

Site lighting luminaire shall be D-Series Size 2 by Lithonia Lighting, or Ratio Series Size 1 by Hubbell Outdoor Lighting, or Altitude Alt2 by Kim Lighting, or approved equal.

The proposed D-Series Size 2 site lighting fixture by Lithonia Lighting has been used as the basis of design. However, the Ratio Series Size 1 by Hubbell Outdoor Lighting and Altitude Alt2 by Kim Lighting are approved equals.

Flagpole lighting luminaire shall be SolarRFL, FL05 Solar 108 LED by SolarIlluminations, or SLFK2 by Sun-In-One, or approved equal.

The proposed SolarRFL flagpole lighting fixture has been used as the basis of design. However, the FL05 Solar 108 LED by SolarIlluminations and SLFK2 by Sun-In-One are approved equals.

Follow the accepted standards of ANSI, NEMA, UL, NEC, ITE, and ASTM for materials not specified in the Contract. For fittings and mounting hardware not specified, follow the manufacturer's recommendations.

Include with each shipment and its invoice a list of all the parts on that specific shipment. Either box or bundle bolts, nuts, and other hardware, and identify each by the packing list.

2.2 EQUIPMENT:

Provide equipment as specified:

Vibrator.....NJDOT Specification Section 1005.04
Concrete Batching Plant NJDOT Specification Section 1010.01
Concrete Trucks.....NJDOT Specification Section 1010.02

PART 3 - EXECUTION

3.1 JUNCTION BOXES

Comply with the requirements specified in NJDOT Specification Section 701.03.01. Excavate as specified in NJDOT Specification Section 202.03.02. Place precast junction boxes on 6 inches of coarse aggregate No. 57. With each junction box, provide 4 cable racks, inserts and fasteners, and a ground rod and clamp. Do not provide the cable racks with the circular 20 inch junction boxes.

With RE approval, use precast junction boxes in areas where the slope is less than 22H:1V. Submit working drawings for approval for those locations approved.

Place backfill as specified in NJDOT Specification Section 203.03.02.B.3. Restore disturbed areas to original conditions, the conditions specified in the Contract, or as directed by the RE.

3.2 FOUNDATIONS

Comply with the requirements specified in NJDOT Specification Section 701.03.01. Excavate as specified in NJDOT Specification Section 202.03.02.

Set or finish the top of foundations to a level elevation 1 inch above curb or sidewalk. Where curbs or sidewalks are not constructed or do not exist, finish the top of foundations to an elevation 2 inches above the surrounding lawn or earth. For foundations used with lighting, finish the top of foundations to grade when installed with curb or sidewalk. Where curbs or sidewalks are not constructed or do not exist, finish the top of foundations to an elevation 1 inch above the surrounding lawn or earth.

With approval, the Contractor may use precast foundations for lighting standards in areas where the slope is less than 22H:1V. Submit working drawings for approval for those locations approved.

Place backfill as specified in NJDOT Specification Section 203.03.02.B.3. Restore disturbed areas to original conditions, the conditions specified in the Contract, or as directed by the RE.

3.3 LIGHTING STANDARD

Leave the factory installed wrapping on the standard for as long as the manufacturer recommends. Install the standard with the wrapping in place, and maintain the standard and other material in original factory appearance. When erecting the standard and other material, use methods that prevent scratching or abrasion. Repair abrasions and scratches.

Bolt the standard securely to the foundation, and erect the standard with sufficient rake to assume a vertical position after all attachments and appurtenances are in place. For aluminum standards, the Contractor may install leveling shims to a maximum height of 1/4 inch. Provide and install the standard with ground studs either in the base for aluminum or in the standard for steel. Install a ground wire that extends to the ground rod from the standard.

3.4 LUMINAIRE

Attach the luminaire plumb to the end of the arm or on the standard. Ensure proper and accurate placement of the luminaire reflector.

Provide and install lamp, ballast terminals, cable connectors (fused and nonfused), and 2 No. 10 AWG color-coded, multiple-lighting wires extending from the ballast terminals to the distribution wires in the base of the standard or in the adjacent junction box.

Tag lighting wire by identifying the area, circuit, and luminaire number.

Use color-coded, single-conductor, multiple-lighting wire for lighting circuits. Pull conductors through conduit and junction boxes to allow racking and connection to luminaire and meter cabinet. Seal the underground conduit entrance to meter cabinets or transformer enclosures with a sealing compound.

Except for neutral and ground circuits, color-code lighting wire with plastic, colored tape overlapped from duct edge to duct edge within each junction box. Clearly identify neutral (white) and ground (green) circuits with continuous color compound along their entire lengths within the junction box.

Identify the circuit number of conductors by attaching cable identification tags to each

conductor in all junction boxes and at the meter cabinets of the load centers. Secure tags to the conductor using nylon cable ties.

If pulling multiple-lighting wire through existing junction boxes not equipped with cable racks, install cable racks.

For cable splices in boxes, use a Type C copper pressure connector, and mechanically and electrically secure splices with the proper tool. Clean the conductors with a minimum of insulation removed.

For multiple-lighting wire splices, use a resin splicing kit as follows:

1. Use an in-line type splicing kit for joining a single conductor to another to form 1 continuous through conductor.
2. Use a tap or wye-type splicing kit where it is necessary to obtain a tap connection at a through conductor or where it is necessary to join together more than 2 conductors.

Keep the conductors and splicing connector centered within the mold, so an even amount of resin surrounds the splice.

If fastening electrical boxes to masonry with expansion fasteners, provide fasteners of sufficient size and strength to provide adequate support. Use stainless steel mounting bolts and anchors. If not using a boss, secure conduit entering electrical boxes to the box using lock nuts on the inside and outside of the box.

END OF SECTION 265613

DPMC #T0617-00

DIVISION 31

SECTION 31 12 00 – SELECTIVE CLEARING

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

This section describes the requirements for clearing site, clearing site for structures, disposal, and demolishing buildings.

1.2 RELATED DOCUMENTS

- A. The Standard Specifications of the New Jersey Department of Transportation for Road and Bridge Construction, dated 2019, as amended and augmented by the Supplementary Specifications (NJDOT Specifications) shall govern the material and construction requirements for poles, bases and accessories. Where conflicts arise between the specifications contained herein or the NJDOT specifications, the more stringent requirement shall govern.
- B. The NJDOT West Berlin Maintenance Yard is an NJDEP Site Remediation Program (SRP) site. Coordinate with the NJDOT Division of Environmental Resources/ Environmental Support & Services Unit (DER/ESSU) prior to initiating any ground disturbances.

1.3 RELATED WORK

- A. 311413 – Soil Stripping and Stockpiling.
- B. 312316 – Excavation.
- C. 312514 – Stabilization Measures for Erosion and Sediment Control.

PART 2 - PRODUCTS

2.1 MATERIALS:

Provide materials as specified in NJDOT Specification Section 201.02:

Soil Aggregate (I-14) NJDOT Specification Section 901.11
Concrete NJDOT Specification Section 903.03
Caution Fence.....NJDOT Specification Section 913.02.02
Polyethylene Sheeting NJDOT Specification Section 919.12

PART 3 - EXECUTION

3.1 CLEARING SITE

- A. Preparation. Construct SESC measures, as specified in NJDOT Specification Section 158.03.02, before clearing site. Before beginning excavation or embankment construction, clear the site

31 12 00 SELECTIVE CLEARING

within limits of construction. Clear the ground surface of designated trees, brush, weeds, roots, matted leaves, small structures, debris, and other objectionable material, vegetation, and growth.

- B. Clearing and Grubbing. In cut sections, grub out tree stumps within the limits of the total cut area. In fill sections, the Contractor may leave tree stumps extending less than 1 foot above the original ground surface in those areas where the proposed subgrade, or proposed finished grade in non-pavement sections, is greater than 3 ½ feet above the original ground surface. Grub out tree stumps that lie within 5 feet horizontally or vertically from any proposed structure, pipe, or duct.

Do not remove trees, shrubs, and other landscape features that do not interfere with the Work or are designated for preservation. Prevent damage or injury to existing trees, plants, and other vegetation that are to remain within or adjacent to the Project Limits.

Backfill and compact depressions in excavation areas that lie below the finished subgrade to finished subgrade using the directed method as specified in NJDOT Specification Section 203.03.02.B.3.

Conduct clearing and removal activities in areas identified as containing regulated material according to the pre-excavation plans as specified in NJDOT Specification Section 202.03.05.1.

Dispose of material and debris as specified in NJDOT Specification Section 201.03.01.H.

- C. Removing Sidewalks, Driveways, Curbs, and Gutters. Sawcut full depth at the limits of removal. Remove sidewalks, driveways, vertical curb designated for removal and reuse as specified in NJDOT Specification Section 202.03.03.C. Repair damage to adjacent pavement courses caused by removal operations.
- D. Removing Electrical Material and Equipment. Remove existing foundations and junction boxes that are abandoned under the Contract to a minimum depth of 2 feet below the finished grade. Remove foundations or junction boxes that interfere with the installation of a new system and backfill as specified in NJDOT Specification Section 203.03.02.B.3. Reuse concrete from foundations and junction boxes as specified in NJDOT Specification Section 202.03.03.C.1. Dispose of castings as specified in NJDOT Specification Section 201.03.01.H.

Remove other electrical material and equipment that are designated for removal, and dispose of as specified in NJDOT Specification Section 201.03.01.H. Obtain Engineer approval of methods of removal, and ensure remaining electrical equipment is left undamaged. Salvage and deliver to the Department removed, above-ground electrical material as required.

- E. Disposal of Materials. Dispose of or recycle removed materials and debris according to Solid Waste Management Act (N.J.S.A. 13:1E-1) and N.J.A.C. 7:26 *et seq.* and according to the solid waste management plan developed by the solid waste management district of origin. Submit proper documentation from the disposal facility to the Engineer and the county of origin within 15 days of acceptance at the disposal facility.
- F. Demolition. Refer to NJDOT Specification Section 108.12 of the Special Provisions for occupied properties and vacation dates and availability dates. Demolish and remove the required buildings in place. Only remove small structures and appurtenances outside the area to be cleared that are designated for removal.

Existing laws, ordinances, and regulations govern the parking, loading, and operation of trucks on existing highways or streets.

The NJDOT assumes no responsibility for the condition of the various buildings or loss of fixtures, equipment, materials, or other objects between the submittal of the Proposal and the time of actual possession of the buildings.

On a daily basis, remove and dispose of, as specified in NJDOT Specification Section 201.03.01.H, materials, including fixtures, equipment, debris, and rubbish, and do not store removed materials within the Project Limits. Do not sell materials within the Project Limits.

Where others have removed buildings, arrange to disconnect and terminate remaining utility services. Remove foundation walls and steps to at least 3 feet below ground level. Remove detached buildings and fixtures, wood, and debris from the site and dispose of as specified in NJDOT Specification Section 201.03.01.H.

Remove heating oil tanks according to N.J.A.C. 7:14B and N.J.A.C. 7:26E, and Federal, State, and local laws, rules, and regulations.

Confine demolition operations to the limits shown, and perform work as specified by the following:

1. Demolition Safety Plan. Submit a Demolition Safety Plan to the RE for approval, 10 days before demolition. Include the following provisions in the plan:
 - a. Type and location of warning signs, **KEEP OUT** signs, and barricades.
 - b. Type and location of barrier around operations and openings in the ground.
 - c. Type and location of lights and footway shelter platforms in the vicinity of pedestrian walkways.
 - d. Methods for controlling dust from demolition operations.

Follow the Demolition Safety Plan until the RE approves the removal of protective devices.

For demolition of buildings having more than 3 floors, submit an additional plan to the RE for approval at least 10 days before beginning demolition. Include the demolition methods to be used and methods of protecting adjacent building and structures.

2. Utility Disconnections. Before demolishing any building, arrange to disconnect and terminate all utilities and facilities that are connected to the building, as specified by the municipalities and companies owning or controlling them.

If only a portion of an occupied structure is to be demolished, conduct demolition and related operations so that service is not interrupted to the portion of the structure that is not demolished. Where it is necessary to reconnect any facilities to the undemolished portion of the structure, make reconnections permanent.

Notify, in writing, the municipalities and companies concerned when such disconnections, terminations, or reconnections are required and provide copy to RE. Perform this work according to the municipalities and companies standard practices and requirements and under their supervision; otherwise arrange for the work to be performed with their forces.

3. Rodent Control and Extermination. Before beginning demolition operations, retain a qualified sanitation inspector to conduct a survey for evidence of current rodent activity. Initiate a control program by a certified pest control operator if the survey indicates that it is necessary.

Apply exterminating materials according to N.J.A.C 7:30, *et seq.*

At least 10 days before beginning demolition of any structures, ensure the pest control operator begins ridding the structure and adjacent areas within the Project Limits of rodents or their carcasses and prevents their migration to other adjacent areas.

Where there is no competing water supply, the Contractor may use liquid anticoagulant baits at the discretion of the certified pesticide applicator.

Place toxic bait in the form of a 1 pound paraffinized block in each manhole or inlet of storm or combination drains located on the same street as the building to be demolished and within the same block, including the entire intersections of the nearest cross streets. Place bait in suitable locations within the drainage structures, as determined by the pest control operator. Fasten the bait block in its location with wire.

Inspect and renew toxic bait in structures or drains as necessary after initial baiting. Remove and dispose of carcasses to the satisfaction of the RE.

After the initial treatment and each follow-up inspection, submit a signed statement, from the pest control operator, reporting the amount and type of bait placed in each location and stating the visible results obtained from the rodent control program.

Ensure that the pest control operator is aware of the antidote noted on the rodenticide label.

4. Demolition Operations. Before demolishing buildings, remove and dispose of chemicals, miscellaneous cylinders, drums, above ground and underground heating oil tanks per NJDEP Unregulated Heating Oil Tank Program, asbestos, and garbage from the building according to applicable Federal, State, and local laws, rules, and regulations. Remove and recycle materials that are required to be recycled by the Federal, State, and local laws, rules, and regulations. Before beginning demolition operations, pump out and clean basements, wells, cesspools, and outbuildings within the areas to be cleared in a sanitary manner. After being disinfected as required by the health authorities, backfill to adjacent ground level as specified in NJDOT Specification Section 201.03.07.5.

Maintain wells, cisterns, cesspools, and other openings in the ground outside the area to be cleared without hindering their functionality. Cap well casings securely and permanently as specified in 201.03.06, and cutoff and cap pipes leading into or out of the well.

Leave adjacent buildings in a safe condition, and do not deface, mar, or jeopardize them in any way. Repair or restore damaged buildings to the satisfaction of the RE.

Ensure that the phases of demolition are performed within the designated limits and without hazard to adjacent properties or to the public. Do not set any structure on

fire.

Do not demolish or disturb chimneys common to adjacent properties other than to give them the necessary support for their continued stability. If necessary, repoint and cap them.

When demolishing a portion of a building, shore, brace, and support the remaining part so that the integrity and support of all remaining walls, floors, roofs, and their supporting members are maintained and continued in such a way that shoring, bracing, and support is outside the ROW. Board up and seal the remaining portion of such a partially demolished building along the ROW, and weatherproof the new closure and its connections to the remaining portion of the severed building. Ensure the material for closure consists of adequately braced studding of 2 × 4 inch timbers placed no more than 16 inches on center with wood facing nailed to the studding without any holes appearing therein. Cover the wood facing with 2 layers of smooth-finished, 65 pounds per roll, roofing material according to ASTM D 224 and having an overlap of at least 4 inches.

5. Backfilling. Backfill and compact subsurface areas including cellars using the directed method as specified in NJDOT Specification Section 203.03.02.B.3. The RE may require compaction using the density control method as specified in NJDOT Specification Section 203.03.02.B.4. Use all available excavated material from within the Project Limits before bringing additional material for backfill to the Project Limits. If sufficient material is not available, backfill with I-14 soil aggregate. If excavated material or I-14 soil aggregate are recycled material, place the recycled material at least 2 foot above the water table.

Ensure backfilling and grading establishes proper drainage. Before placing the first lift, break existing cellar floors and other surfaced areas into pieces having areas of less than 4 square feet with well-defined cracks through the full depth of the floors, or make holes of more than 1 square foot area through the floors on approximately 10 foot centers to provide vertical drainage. Remove wooden cellar floors.

Clean, point, and apply 2 coats of waterproofing material to party wall foundations before backfilling against. If necessary, grade around the ground surface to eliminate water pockets.

Backfill and level cellars and all other subsurface spaces to the adjacent ground elevation.

END OF SECTION 311200

Intentionally Blank Page

DPMC #T0617-00

DIVISION 31

SECTION 31 14 00 – EARTH STRIPPING AND STOCKPILING
SUBSECTION 31 14 13 SOIL STRIPPING AND STOCKPILING

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. This Section describes the requirements for stripping, excavating, removing pavement, reusing excavated material for backfill and disposing of excess material.

1.2 RELATED DOCUMENTS

- A. The Standard Specifications of the New Jersey Department of Transportation for Road and Bridge Construction, dated 2019, as amended and augmented by the Supplementary Specifications (NJDOT Specifications) shall govern the material and construction requirements for poles, bases and accessories. Where conflicts arise between the specifications contained herein or the NJDOT specifications, the more stringent requirement shall govern.
- B. The NJDOT West Berlin Maintenance Yard is an NJDEP Site Remediation Program (SRP) site. Coordinate with the NJDOT Division of Environmental Resources/ Environmental Support & Services Unit (DER/ESSU) prior to initiating any ground disturbances.

1.3 RELATED WORK

- A. 312514 – Stabilization Measures for Erosion and Sediment Control.

PART 2 - PRODUCTS

2.1 MATERIALS:

Provide materials as specified:

Coarse Aggregate (No. 57 or 67)	NJDOT Specification Section 901.03
Pulverized Limestone	NJDOT Specification Section 917.02.03
Topsoil Stabilization Matting	NJDOT Specification Section 917.06
Silt Fence	NJDOT Specification Section 919.01
Haybales	NJDOT Specification Section 919.03
Polyethylene Sheeting	NJDOT Specification Section 919.12

PART 3 - EXECUTION

3.1 PREPARATION

- A. Stripping. Before beginning the operations, obtain the Engineer's approval for stripping operations scheduled between November 15 and March 1. The Engineer will base approval on the Contractor's alternate method for stabilizing disturbed areas when seeding is not feasible due to seasonal constraints.

Strip vegetation and underlying soil to a depth of 4 to 6 inches below the existing ground surface. Confirm the thickness of stripping with the Engineer based on field conditions. Temporarily store in stockpiles, as specified in NJDOT Specification Section 202.03.03.B, stripped material including excess that is determined suitable for the future use of the Department. The Department will sample and analyze stripped material in stockpiles to determine suitability for use as topsoil. Store suitable stripped material within the Project Limits until placement. Reuse or dispose of unsuitable stripped material as specified in NJDOT Specification Section 202.03.03.C.

- B. Excavating. The Department, as the generator, is solely responsible for the designation of excavated material. Unclassified excavation consists of excavation and management of material of whatever nature encountered, except for regulated material, pavement removal and acid producing soil.

Excavate using equipment and methods that remove material to the specified excavation limits without disturbing the material outside of the excavation limits. While excavating, protect facilities, structures and existing vegetation from damage and disturbance. Ensure that material outside excavation limits is not disturbed. If any material outside the excavation limits becomes disturbed, restore the area as directed by the Engineer. Excavate and grade to ensure proper drainage.

Notify the Engineer if excavation to the finished grade section results in unstable subgrade or slopes. Obtain Engineer approval before removing unstable material and backfilling the area with suitable material. Backfill with excavated material and compact using the direct method as specified in NJDOT Specification Section 203.03.02.B.3.

- C. Temporarily Storing. Temporarily store soil in stockpiles in well-drained areas no closer than 50 feet from streams, wetlands, floodplains, other waterbodies, and as shown on the Plans. Construct stockpiles on polyethylene sheeting. Do not commingle different types or classifications of material. Overlap joints in the underlying polyethylene sheeting a minimum of 12 inches. Contain stockpiles with haybales or silt fence placed continuously at the perimeter of the stockpiles. Construct stockpiles to heights not exceeding 15 feet and with side slopes no steeper than 2H:1V. Segregated material of differing types and levels of contamination depending on reuse or disposal.

Protect and maintain the stockpile and embankment until reuse or disposal. Provide protection for the stockpile to control the stormwater run-off, erosion, and unauthorized contact. Where the material in the stockpile is saturated, pitch the bottom polyethylene sheeting towards a discharge basin to collect water drained from the stockpile. Manage the collected water in the same manner as that generated during dewatering operations.

Maintain the polyethylene sheeting or replace it as needed for as long as the stockpile remains. Periodically inspect stockpiles to ensure that material is not released into the surrounding environment.

When temporarily storing soil is not possible within the Project Limits, the Contractor may temporarily store soil at a site provided by the Contractor outside the Project limits as approved by the Engineer and meeting the requirements of NJDOT Specification Section 105.08 and NJDOT Specification Section 108.04.

If the stockpile remains exposed for more than 15 days, temporarily seed, as specified in NJDOT Specification Section 806.03.01, and mulch stockpiles as specified in NJDOT Specification Section 809.03.01 or NJDOT Specification Section 809.03.02.

When the stockpile is removed, restore the area to the original condition.

D. Reuse or Disposal of Excess Material

1. Reuse. Before using other excess materials, reuse regulated material and APS as shown on the Plans or with Engineer approval.

The Contractor may use excavated material, if the requirements specified in NJDOT Specification Section 901.11 are met, to construct Items requiring soil aggregates. Submit written notification at least 15 days before reuse.

Upon Engineer's approval, reuse excavated soil to widen or flatten slopes of embankment, to fade embankments into cuts, or as approved at other locations. Ensure that the excess material is not reused within a wetland, a transition area, a riparian zone, a flood hazard area or other regulated area without obtaining an appropriate NJDEP permit.

The Contractor may reuse broken concrete, HMA pieces, and millings in the lower portion of I-14 soil aggregate. Spread out pieces in layers, with the pieces lying flat and not arching, with spaces between the pieces filled with soil. Use pieces with a maximum individual size of 2 cubic feet, with a 2 foot maximum dimension on any side. Do not place the broken concrete, HMA pieces and milling within 2 feet of the final subgrade, less than 2 feet above the highest seasonal high ground water table or within 2 feet of any underground utility. Compact material using the directed method as specified in NJDOT Specification Section 203.03.02.B.3.

Dispose of excavated material that will not be reused as specified in NJDOT Specification Section 202.03.03.C.2.

2. Disposal. Dispose of excess regulated material as specified in NJDOT Specification Section 202.03.09. Dispose of excess APS at approved landfills according to applicable Federal, State, and local laws, rules, and regulations. For excavation not designated as regulated material or APS, provide the following before removing the excess excavation from the Project Limits.
 - a. At least 10 days before disposing, submit the disposal procedure and location to the

Engineer for approval. Do not dispose of excavation on property proposed to be or used for parks, playgrounds, and other recreational purposes; residential facilities; education facilities; environmentally sensitive areas such as wetlands; historic sites; or within sight of a State highway during all seasons.

- b. Obtain the potential owner's notarized authorization of the acceptance of the excess material. If the potential owner requires environmental material sampling, obtain Engineer's approval at least 7 days before sampling for oversight only. Approval of the sampling does not imply agreement with the sampling results and the Department reserves the right to sample the material for classification. Provide the Engineer all testing results and documentation associated with the sampling. When sampling results indicate that the material is regulated, and with Engineer approval, dispose of the material as specified in NJDOT Specification Section 202.03.09.
- c. Load and transport excess material that the Engineer determines to be excess, unusable or unsuitable for the project according to Federal, State, and local law, rules and regulations.

Once material leaves the Project Limits, the Contractor is responsible for ensuring that the handling procedures, placement method, and disposal location are according to applicable Federal, State, and local laws, rules, and requirements, including permits that may be issued for the Project. If the disposal of excess material results in a violation notice from any governmental authority, immediately correct the violation. Indemnify and defend the Department for any violation incurred, penalty assessed, or any claims, suits, losses, demands or damages of whatever kind or nature arising out of, or claimed to arise out of, the improper disposal of excess materials.

If the Contractor does not correct the violation to the satisfaction of the governmental authority that issued the violation notice, the Contractor is responsible for assessed penalties including costs incurred by the Department to remedy the violations.

Dispose of other material or debris as specified in NJDOT Specification Section 201.03.01.H.

- E. Measuring Elevation. Using Contractor established grade stakes set outside the pavement box and at breaklines, the Engineer will check elevations within the roadbed limits using a stringline drawn taut between these stakes. Ensure that grade stakes indicate the vertical cut or fill measurement referenced to the finish grade. The Engineer will check elevations longitudinally every 50 feet and transversely at the edges, breaklines, and the center of each line and shoulder. The Engineer may direct additional grade stakes in areas with rapid changes in grade so that intermediate longitudinal checks can be made.

END OF SECTION 311413

DIVISION 31

SECTION 312000 - EARTH MOVING

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating designated crushed stone areas.

1.2 RELATED DOCUMENTS

- A. The Standard Specifications of the New Jersey Department of Transportation for Road and Bridge Construction, dated 2019 as amended and augmented by the Supplementary Specifications (NJDOT Specifications) shall govern the material and construction requirements for poles, bases and accessories. Where conflicts arise between the specifications contained herein or the NJDOT specifications, the more stringent requirement shall govern.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
1. All imported soil and fill materials shall meet certified clean fill requirements in accordance with the latest versions of New Jersey Department of Environmental Protection (NJDEP) N.J.A.C. 7:26E, Technical Requirements for Site Remediation and Fill Material Guidance for SRP Sites Technical Guidance.
 2. All related clean fill documentation to be provided to and approved by the NJDOT's LSRP and NJDOT DER/ESSU prior to bringing material onsite.

PART 3 - EXECUTION

3.1 PREPARATION

- A. The NJDOT West Berlin Maintenance Yard is an NJDEP Site Remediation Program (SRP) site. Coordinate with the NJDOT Division of Environmental Resources/ Environmental Support & Services Unit (DER/ESSU) prior to initiating any ground disturbances.
1. The Contractor shall thoroughly review existing soil, groundwater and/or surface water data to properly prepare the Materials Handling Plan (MHP)/Health & Safety Plan (HASP) and to be aware of potential off-site disposal costs and groundwater discharge permit requirements. The Contractor shall submit the MHP/HASP to NJDOT DER/ESSU and NJDOT's LSRP for review and approval. The Contractor shall prepare and implement the MHP that describes the proposed methods for the

management of materials designated for off-site disposal, testing and use of off-site borrow material and certification for clean fill documents.

2. **Site-Specific Health and Safety Program (HASP).** Perform a hazard assessment of each proposed work task, and make independent evaluations regarding the appropriate level of health and safety requirements.
 - B. Employ a Certified Industrial Hygienist (CIH) or Certified Safety Professional (CSP) to develop and oversee the Site-Specific HASP. Ensure the CIH/CSP prepares the Site-Specific HASP to protect the Contractor's employees, the subcontractor's employees, the Department's employees and consultants, and the public from contamination present in the areas requiring excavation as shown on the Plans. Ensure that the Site-Specific HASP complies with Federal, State, and local laws, rules, and regulations, including the health and safety requirements of OSHA 29 CFR 1910 and 29 CFR 1926. Implement the Site-Specific HASP, as approved by the owner, at the beginning of construction operations.
 - C. Ensure that the CIH/CSP reviews site-specific data and addresses the proposed activities to the level of detail needed to ensure that site-specific data, appropriate regulations, and a description of the site conditions are incorporated into the Site-Specific HASP.
 - D. Describe workplace and emergency procedures so that the Project is constructed in a safe manner. The Site-Specific HASP governs all facets of the Project and encompass the activities of all persons who enter or work on the Project. Incorporate procedures that conform to Federal, State, and local laws, rules, and regulations pertaining to employee working conditions where appropriate, National Institute for Occupational Safety and Health, OSHA, USCG, EPA, and NJDEP.
 - E. Include requirements for a health and safety coordinator to monitor the working conditions during excavation procedures and during the handling of regulated material to ensure conformance with the approved Site-Specific HASP. Ensure the CIH/CSP evaluates the need for air monitoring during excavation and loading operations of regulated material. If deemed necessary, ensure the CIH/CSP or an assigned coordinator, suitably trained and approved by the CIH/CSP for the work required, implements the air monitoring program. Ensure the CIH/CSP includes in the Site-Specific HASP applicable training and qualifications documentation for each health and safety coordinator.
 - F. If deemed necessary by the CIH/CSP, provide initial and annual training and medical monitoring for Contractor employees scheduled to work in or with regulated material and, per the owner's request, up to 10 Department employees or their authorized representatives as specified in OSHA 29 CFR 1910. Provide the initial training for State employees or their authorized representatives 30 days before excavating
1. Ensure the MHP includes the following:
 - a. Techniques to be used in managing regulated material to protect adjoining properties and workers and visitors to the Project Limits against exposure to regulated material and to prevent release of regulated material to the environment.
 - b. Standard operating procedures for excavation, stockpiling, transporting, measurement, and disposal of regulated material.
 - c. Current receiving facility certification and permits.
 - d. Qualifications of the licensed hauler.

- e. Proposed routes to receiving facilities and weighing facilities.
- f. Waste characterization forms.
- g. A sampling and analysis protocol for characterizing the regulated material for off-site disposal. Include the name, address, and telephone number of the contact for the proposed environmental laboratory and the name and experience of the proposed environmental sampling technician. Also include the NJDEP Laboratory Certification number. The proposed environmental laboratory and proposed environmental sampling technician are subject to the owner's review and approval. Reference the November 2021 Whitman Summary of October 2021 Environmental Investigation for initial waste pre-characterization results.
- h. Requirements of the receiving facility to accept the regulated material.

Implement the MHP, as approved by the owner, at the beginning of excavation. Perform planning, administrative, and control functions required to implement the MHP.

3.2 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock and gravel, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory materials.
 - 2. If excavated material intended for fill and backfill, the material shall be tested in accordance with the latest versions of NJDEP N.J.A.C. 7:26E, Technical Requirements for Site Remediation and Fill Material Guidance for SRP Sites Technical Guidance. The test results should be submitted to NJDOT DER/ESSU and NJDOT's LSRP for review.

3.3 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Temporarily store regulated or hazardous material in stockpiles in well-drained areas no closer than 50 feet from streams, wetlands, floodplains, or other waterbodies within the Project Limits. Cover to prevent windblown dust.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.
- B. All excavated soil material shall be placed on one (1) layer of 10-mil (at a minimum) thick each PVC, polyethylene sheeting, or equivalent material and weighted down with hay bales, straw bales or Engineer-approved weights.
- C. All stockpiled soil material shall be covered during adverse weather conditions and when not being constructed by a 10-mil (at a minimum) thick PVC, polyethylene sheeting, or equivalent material. The cover shall be secured in place by a method approved by the Engineer.

- D. Drainage control such as trenches and/or dikes shall be constructed in such a way as to divert all runoff around and away from the stockpiled soil material.
- E. Any water that is exposed to the excavated soil material in the stockpiles must be collected and treated by the Contractor at no additional expense to the State.

3.4 DISPOSAL OF REGULATED MATERIALS

- A. Excess soil will need to be characterized and disposed of offsite as regulated material. All related documentation shall be provided to the NJDOT's LSRP, via the NJDOT DER/ESSU. The disposal facility will need to be approved by the LSRP and NJDOT DER/ESSU.
- B. Remove surplus satisfactory soil materials, including unsatisfactory soil and legally dispose of them off Owner's property.
- C. Load, transport, and dispose of regulated material and/or soils that have been determined to be excess, unusable, or unsuitable for the project according to Federal, State, and local laws, rules, and regulations.
 - 1. Contractor shall pay all fees associated with testing, removal and disposal of regulated materials and soils. Perform soil sampling and analyses according to disposal facility requirements and the Site-Specific HASP.
 - 2. Provide a copy of sampling log, chain of custody form, and analytical report to the Owner. Procedures for sampling should be in accordance with the NJDEP Field Sampling Procedures Manual, NJDEP Technical Requirements for Site Remediation.
 - 3. Submit the waste facility applications and acceptance documentation, and fee payment requirements to the Owner at least 15 days before planned removal of regulated material. Submit to the Owner a bill of lading/waste manifest for each truckload of regulated material removed from the Project Limits. Ensure that the bill of lading and waste manifest include the following information:
 - a. Transport subcontractor name, address, permit number, and telephone number.
 - b. Type and quantity of material removed.
 - c. Weight of vehicle with weigh slip.
 - d. Recycling or disposal facility name, address, permit number, and telephone number.
 - e. Date removed from the Project Limits.
 - f. Signature of transport vehicle operator.
 - 4. Submit 1 copy of the bill of lading/waste manifest to the Owner by the end of each working day that the transport vehicle leaves the site.
 - 5. Ensure the licensed hauler transports the regulated material to the disposal/recycling facility with no unauthorized stops in between, except as required by regulatory authority. Ensure the hauler uses appropriate vehicles and operating practices to prevent spillage or leakage from occurring during transport. Remove excess soil adhering to the wheels or under carriage of the vehicles before leaving the Project Limits. If soil or water escapes to the public roads, immediately clean the road to restore it to the original condition and immediately notify the Owner. Do not transport regulated material over public roads if they contain free liquid or are sufficiently wet to be potentially flowable

- during transport.
6. Submit 1 copy of the documentation of the disposal facility's acceptance of the regulated material, including the weight ticket slips, to the Owner and the county of origin within 15 days of acceptance at the disposal facility.
 7. Immediately submit written notification to the Owner if problems arise, regarding the facility chosen to accept the regulated material for off-site management, that would require the return of waste, or if the chosen facility has violated any environmental regulation that may result in regulatory enforcement action. Propose an alternate disposal facility, and obtain the Owner's written approval of off-site management at such facility.

END OF SECTION 312000

Intentionally Blank Page



Corporate Headquarters
100 Franklin Square Drive, Suite 200
Somerset, NJ 08873

Tel: 732.390.5858 • Fax: 732.390.9496
www.whitmanco.com

TO: Stonewater Architecture, LLC
350 Springfield Ave, Suite #200
Summit, NJ 07901

FROM: Philip Kao, Project Manager
Whitman

DATE: November 17, 2021

SUBJECT: Summary of October 2021 Environmental Investigation
NJDOT West Berlin Maintenance Facility
50 Walker Avenue
West Berlin Township, Camden County, New Jersey
Whitman Project #21-09-24T

1.0 **BACKGROUND**

The Site is located at 50 Walker Avenue in West Berlin Township, NJ, and serves as a New Jersey Department of Transportation (NJDOT) Maintenance Facility. See **Figure 1**.

The objective of the project is the demolition of an existing Pole Barn Structure and the installation of a six (6) bay concrete bin structure that will be used for the storage of road maintenance materials and/or equipment.

In anticipation of the project generating subsurface soil waste for disposal, waste classification/characterization of the top portion of subsurface, 0 to 5 feet below grade surface (bgs) was conducted on October 25, 2021, to identify how it was to be handled and disposed in accordance with Federal, NJDEP and local laws, rules and regulations. Ground water was also sampled during the event as dewatering may be required during subsurface excavation. The results of the sampling activities will be included in Earthwork Specifications in a subsequent submission.

The property currently has Remedial Action Permits (RAPs) for an area remediated approximately 75 feet west of the project area. There is a RAP for benzene ground water contamination above standard and another RAP for benzene, benzo(a)pyrene and naphthalene soil contamination above standards. A licensed site remediation professional (LSRP) is retained by the facility for compliance with the RAPs.

Environmental • Engineering • Energy • Waste Management • EH&S Compliance

2.0 SAMPLING

As the actual area to be excavated and the depth of the excavation have yet to be determined, it is assumed that less than 800 cubic yards of soil will be generated for disposal/recycling. However, samples representative of up to 1,600 cubic yards of soil for waste disposal characterization was collected. If the quantity of soil requiring removal exceeds this amount, then additional sampling may be required. See **Figure 2** for the project area.

Soil disposal/recycling facilities typically require the collection of composite samples to characterize the waste soil. Several facilities commonly require a composite sample for every 800 cubic yards for a variety of parameters based on the facility's acceptance criteria.

Waste classification samples were collected from the project area to comply with a broad range of testing protocols from various local waste disposal facilities. It was proposed that a composite sample be collected for Target Analyte List/Target Compound List +30 (TAL/TCL+30) including cyanide, hexavalent chromium, Full TCLP with beryllium, nickel, copper and zinc, RCRA Characteristics, Paint Filter, TOX and sulfur analyses. The samples for volatile organic compounds (VOCs) were collected as grab samples not as composites. Also, two (2) composite soil samples were collected for extractable petroleum hydrocarbon (EPH) – category 2 and gas range organics (GRO). The above sampling list was collected for every anticipated 800 cubic yards of soil to be disposed of.

On October 20, 2021, Jaimeson Graf of Geo-Graf, Inc. (GGI) conducted a nonintrusive geophysical survey in which a comprehensive search was performed for: utilities such as water, sewer, gas, etc lines as well as any other subsurface objects of interest. Unknown utilities or subsurface anomalies were field marked in white spray paint. A total of eight (8) soil boring (SB) locations, referred to as B1 through B8, were installed for sample collection. GGI created a 10' x 10' reference grid centered over each proposed soil boring or temporary well (TW) location. This "box", field-marked in pink paint, represented the investigated area encompassing the proposed SB/TW. Of the 8 SB/TW locations, GGI found and marked an unknown utility in white paint located within the 10'x 10' box of B-3. This area was cleared, and not expected to interfere with the advancement of B-3 and the soil boring was subsequently advanced a safe distance from the marked utility.

On October 25, 2021, Whitman mobilized to the Site and eight (8) soil borings were installed in and adjacent to the Pole Barn Structure. The borings were extended to a depth of five (5) feet below grade with two (2) samples collected from each boring. The samples collected were used to create two composite samples (WC-1 and WC-2). WC-1 represented the top 0-2.5 feet bgs and WC-2 represented 2.5-5 feet bgs. Two (2) grab samples, named WC-1 VOC and WC-2 VOC, were collected for volatile organic compounds and were obtained from soil exhibiting the highest field instrument reading (Photo-ionization detector). Soil was also collected for use in creating four (4) EPH-category 2 composite samples, two (2) for WC-1 and two (2) for WC-2. It was found that the surface in the location of the borings generally consisted of up to three (3) inches of concrete or asphalt that was drilled or cored through. The boring holes were backfilled, and the surface was properly patched upon completion.

Temporary well points (TWPs) were installed at B-1 and B-3 to evaluate ground water for possible disposal in case dewatering is necessary during excavation activities. Ground water was encountered at a depth of approximately eight (8) feet bgs at two (2) of the soil borings, B-1

and B-3. These borings were extended to a depth of fifteen (15) feet below grade and temporary well points were installed to collect the ground water samples.

The ground water analysis included VOCs and base/neutral/acid extractable organic compounds (BNAs) with SIMS. Following collection of the ground water samples, the temporary well points were removed and the borings properly sealed.

3.0 WASTE CLASSIFICATION SAMPLE RESULTS

3.1 Soil

The analytical results indicated that VOCs were either non-detect (ND) or below NJDEP Soil Remediation Standards (SRS) for WC-1 VOC and WC-2 VOC of the grab samples. Further results indicated for both WC-1 and WC-2 composite samples that there were no exceedances for PCBs, Pesticides, Metals, and Hexavalent Chromium for the NJDEP SRS. Extractable Petroleum Hydrocarbon (EPH) was below standards in the composite samples. In the WC-1 composite sample, it was found that dibenz(a,h)anthracene was above the NJDEP residential SRS (0.51 mg/Kg) with a result of 1.51 mg/Kg, all other BNAs did not have an exceedance compared to the NJDEP SRS. It should be noted that the waste classification samples are being compared to the NJDEP SRS for qualitative purposes only. Please see the Conclusions and Recommendations below.

TCLP VOCs, TCLP SVOCs, TCLP Pesticides/Herbicides were all ND. Only barium and lead had detections for TCLP metals, and both were well below the EPA Hazardous Waste Criteria. The remaining TCLP metals were ND.

WC-1 and WC-2 were also analyzed for RCRA characteristics. The results for WC-1 and WC-2 were found to be non-hazardous in terms of ignitability, corrosivity, and reactivity. Paint Filter test had a result of 'No' and Extractable Organic Halides (EOX), and sulfur were ND.

3.2 Ground Water

The analytical results for groundwater indicated a single BNA library search compound was detected over 100 ug/L at B-3 TWP, exceeding the single Synthetic Organic Compound (SOC) standard. Dodecanoic acid was detected at 198 ug/L. There were no exceedances of the NJDEP Ground Water Quality Standards (GWQS) for any other VOCs or BNAs collected from B1-TWP and B3-TWP.

Please see **Figure 2** for ground water analytical results.

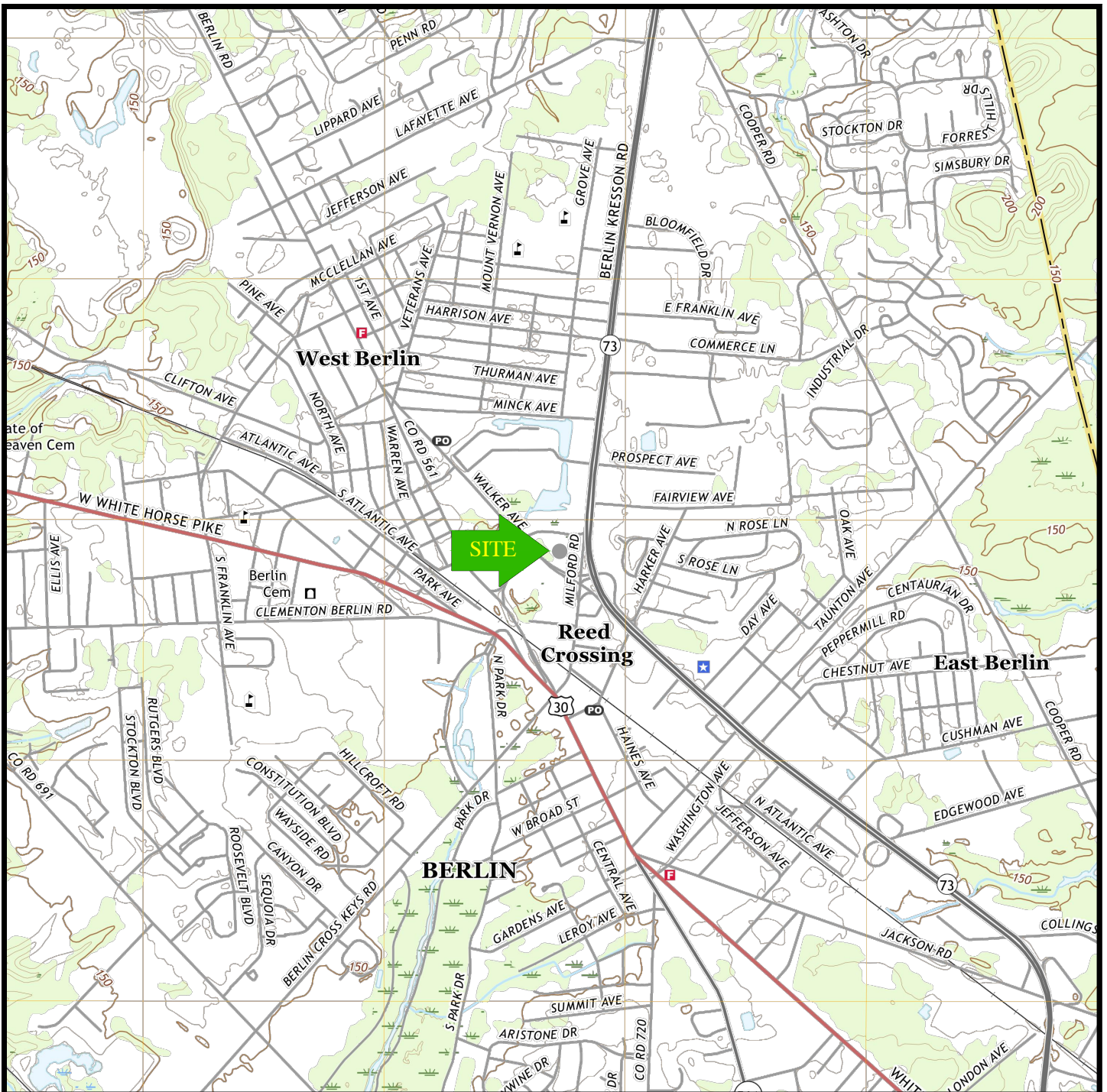
4.0 CONCLUSIONS AND RECOMMENDATIONS

A review of the waste classification/characterization analytical results indicated the soil is likely suitable for disposal as non-hazardous soil, as no characteristically hazardous limits were exceeded. Ground water is also likely suitable for disposal as non-hazardous if dewatering is necessary. Proper submittal of the results to appropriate facilities is needed to confirm classification for both soil and ground water.

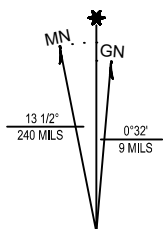
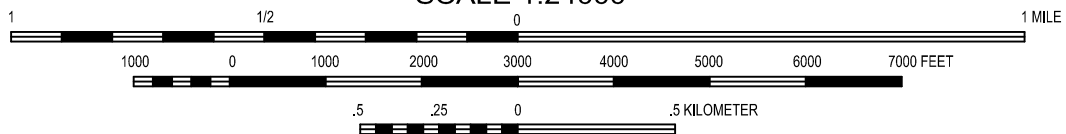
Dibenz(a,h)anthracene was above the residential soil remediation standard (0.51 mg/Kg) with a result of 1.51 mg/Kg, however it was collected from a composite sample. Dodecanoic acid was detected at 198 ug/L at B-3TWP exceeding the single Synthetic Organic Compound (SOC) standard. This may be considered a confirmed discharge according to the NJDEP Site Remediation Program (SRP).

The results from this report may provide a supplement to the 2017 environmental findings conducted by Dresdner Robin.

FIGURES



SCALE 1:24000



UTM GRID AND 1981 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET



QUADRANGLE LOCATION



ORIGINAL BY: C.O.

CHECKED BY: S.S.

STONEWATER ARCHITECTURE
50 WALKER AVE,
WEST BERLIN, NJ, 08091

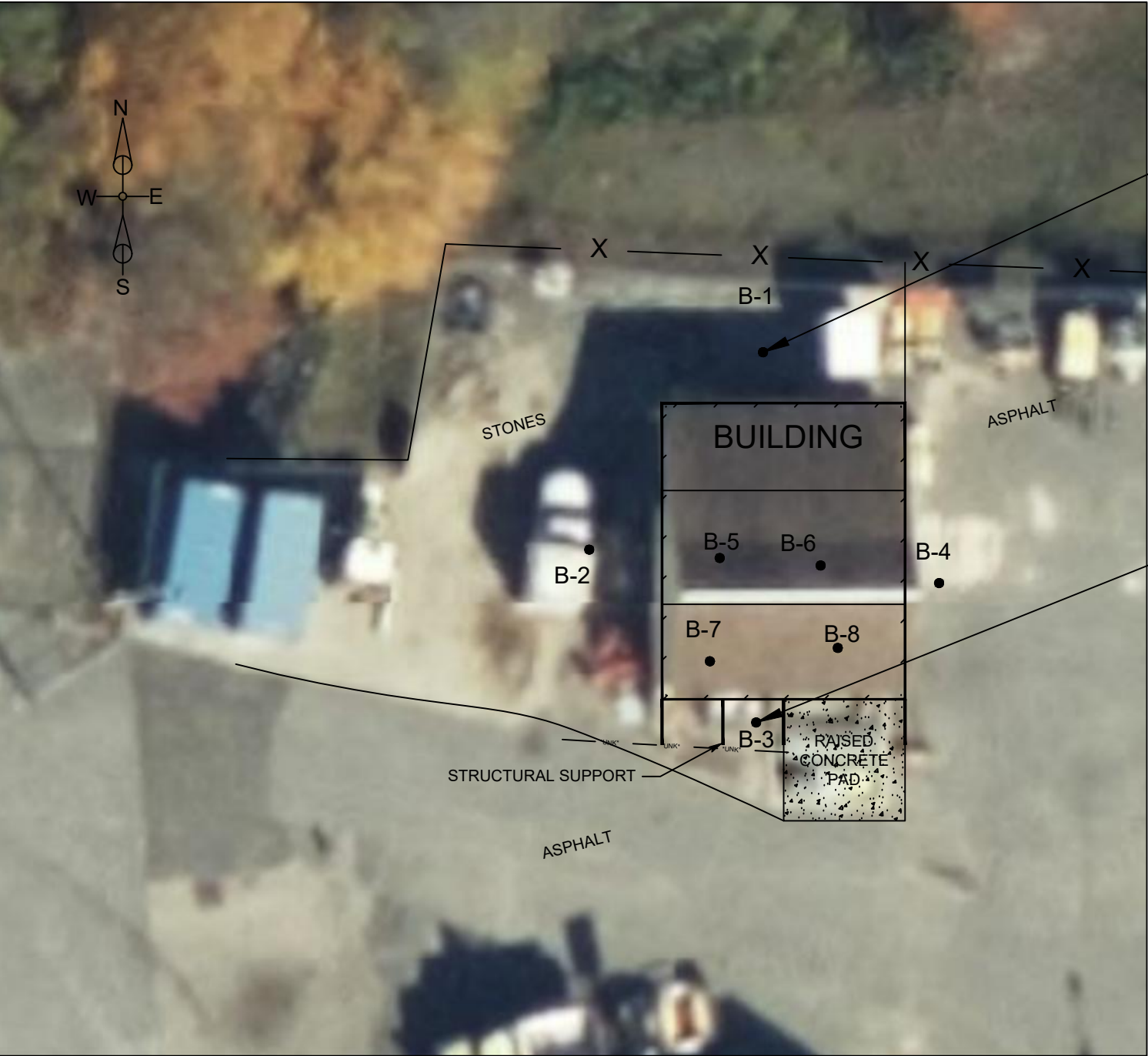
SITE LOCATION ON USGS
CLEMENTON, NJ QUADRANGLE

DRAWN BY: C.O.

DATE: NOVEMBER 2021

PROJECT NO: 21-09-24T

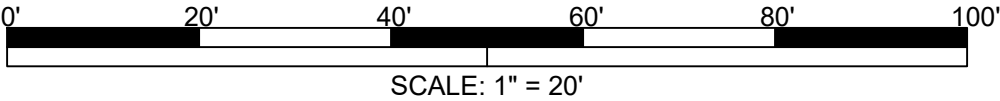
FIGURE NO: 1



B1-TWP	10/25/2021
VOCs	<GWQS
BNAs	<GWQS

B3- TWP	10/25/2021
VOCs	<GWQS
BNAs	
Dodecanoic acid*	198
Total BNA TICs*	203
Target List BNAs	<GWQS

LEGEND
-VOCs - VOLATILE ORGANIC COMPOUNDS
-BNAs - BASE/NEUTRAL/ACID EXTRACTABLES ORGANIC COMPOUNDS



LEGEND:
● SOIL BORING LOCATION

NOTES:
-Waste classification samples were taken from B-1 through B-8 to characterize the top 5 feet of subsurface soils for disposal
-B1-TWP and B3- TWP reflect groundwater results in ug/L
* - Dodecanoic acid was detected at 198 ug/L at B-3 TWP exceeding the single Synthetic Organic Compound (SOC) standard of 100 ug/L

 WHITMAN CERTIFICATE OF AUTHORIZATION No. 24GA0000600	NJDOT WEST BERLIN MAINTENANCE FACILITY 50 WALKER AVE WEST BERLIN, NJ, 08091	
	WASTE CLASSIFICATION SOIL BORING LOCATIONS	
	PROJECT MANAGER: PK	DRAWN BY: CO
CHECKED BY: SS	DATE: NOVEMBER 2021	PROJECT NO: 21-09-24T
		FIGURE NO: 2

DPMC #T0617-00

DIVISION 31

SECTION 31 23 00 – EXCAVATION AND FILL
SUBSECTION 31 23 16 EXCAVATION

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. This Section describes the requirements for stripping, excavating, removing pavement, reusing excavated material for backfill and disposing of excess material.

1.2 RELATED DOCUMENTS

- A. The Standard Specifications of the New Jersey Department of Transportation for Road and Bridge Construction, dated 2019, as amended and augmented by the Supplementary Specifications (NJDOT Specifications) shall govern the material and construction requirements for poles, bases and accessories. Where conflicts arise between the specifications contained herein or the NJDOT specifications, the more stringent requirement shall govern.
- B. The NJDOT West Berlin Maintenance Yard is an NJDEP Site Remediation Program (SRP) site. Coordinate with the NJDOT Division of Environmental Resources/ Environmental Support & Services Unit (DER/ESSU) prior to initiating any ground disturbances.

1.3 RELATED WORK

- A. 265613 – Lighting Poles and Standards.
- B. 312514 – Stabilization Measures for Erosion and Sediment Control.
- C. 321613 – Curbs and Gutters.
- D. 321623 – Sidewalks.

PART 2 - PRODUCTS

2.1 MATERIALS:

Provide materials as specified:

Coarse Aggregate (No. 57 or 67) NJDOT Specification Section 901.03
Pulverized Limestone NJDOT Specification Section 917.02.03
Topsoil Stabilization Matting NJDOT Specification Section 917.06
Silt Fence NJDOT Specification Section 919.01
Haybales NJDOT Specification Section 919.03

31 23 16 EXCAVATION
EXCAVATION AND FILL

T0617-00
Material Storage Bin Installation
DOT Maintenance Yard, West Berlin, N.J.

January 25, 2024

Polyethylene Sheeting NJDOT Specification Section 919.12

31 23 16 EXCAVATION
EXCAVATION AND FILL

312316-2

PART 3 - EXECUTION

3.1 EXCAVATION, UNCLASSIFIED

- A. Excavating. The Department, as the generator, is solely responsible for the designation of excavated material. Unclassified excavation consists of excavation and management of material of whatever nature encountered, except for regulated material, pavement removal and acid producing soil.

Excavate using equipment and methods that remove material to the specified excavation limits without disturbing the material outside of the excavation limits. While excavating, protect facilities, structures and existing vegetation from damage and disturbance. Ensure that material outside excavation limits is not disturbed. If any material outside the excavation limits becomes disturbed, restore the area as directed by the RE. Excavate and grade to ensure proper drainage.

Do not excavate more than 15 feet in depth without stabilizing the slope either by temporarily seeding and mulching, or by topsoil spreading, permanently seeding, and mulching as specified in NJDOT Specification Section 806.03.01. Submit alternate methods for stabilizing slopes when seeding is not effective due to seasonable constraints. Obtain RE approval of alternate methods before beginning embankment construction. Repair damaged seeded areas as specified in NJDOT Specification Section 806.03.01.

Notify the RE if excavation to the finished grade section results in unstable subgrade or slopes. Obtain RE approval before removing unstable material and backfilling the area with suitable material. Backfill with excavated material and compact using the directed method as specified in NJDOT Specification Section 203.03.02.B.3.

If a slope failure develops during excavation, immediately cease operations. Determine the limits of unstable material, and start backfilling immediately. Once the slope has been stabilized, resume excavation by RE approved methods.

The RE will check elevations of the roadbed subgrade as specified in NJDOT Specification Section 202.03.03.D. Ensure that the elevation is within $\pm 1/2$ inch of the specified elevation.

1. Wet Areas. If required, submit a dewatering plan including method of dewatering and controlling sediment and contaminants from entering adjacent waterbodies, wetlands, environmentally sensitive areas and preserved trees, and other vegetation. Obtain RE approval for dewatering operations before beginning the work. Excavate wet areas down to firm bottom within the lateral limits. Test the bottom of the excavation area at frequent intervals as the excavation progresses, by taking soundings, samples, or other tests, to determine when firm bottom is reached. The Department may require the Contractor to take additional borings or samples to determine if unsuitable material remains or is entrapped within the excavation limits.

Excavate using equipment and methods to the specified elevation without disturbing the material below that elevation. If the methods and equipment disturb the material below the specified elevation, immediately stop operations. Resume excavation using alternate methods and equipment as approved by the RE.

The RE may allow the use of dikes, well points, or other means for dewatering the excavation areas if cofferdams are not shown on the Plans. If permits are required for this work, submit a copy of approvals, as specified in NJDOT Specification Section 107.01.02, to the RE before proceeding with the work.

2. Foundation Areas. Excavate for footings to the limits shown in the plans causing minimal disturbance to the remaining embankment. If the underlying material is disturbed, compact it using the directed method as specified in NJDOT Specification Section 203.03.02.B.3. Backfill and compact the remaining excavated area using the density control method as specified in NJDOT Specification Section 203.03.02.B.4. Restore the embankment to the final section.

Remove boulders or rock fingers projecting into the bottom of the excavation to a minimum depth of 6 inches below the bottom of footing. Backfill the space with coarse aggregate, and compact it using the directed method as specified in NJDOT Specification Section 203.03.02.B.3.

In areas where the footing rests partly on soil and partly on rock, excavate the rock to 2 feet below the footing. Backfill the space with coarse aggregate, and compact it using the directed method as specified in NJDOT Specification Section 203.03.02.B.3.

In areas where the footing rests entirely on rock, excavate to a firm, level, roughened surface. Clean out seams, and fill them with concrete or mortar before placing concrete for foundations.

If shale is encountered at the bottom of the footing and the footing is not poured the same day, leaving the shale exposed to air or water, undercut the shale at least 4 inches. Seal the undercut with the same class of concrete as the overlying footing to the bottom of the footing elevation, and provide a rough finish.

If during the course of the excavation, rock is shattered below the foundation elevation, remove the shattered rock and fill the void with the same class of concrete as the overlying footing.

The RE may order, in writing, changes in dimensions or elevation of footings as necessary to secure an acceptable foundation.

After completing the excavation to the elevation of the bottom of the footing, obtain the RE's approval before beginning footing construction or placement of coarse aggregate.

When specified, place coarse aggregate following the completion of the excavation. Shape the material on which the coarse aggregate is to be placed to an even surface. Place coarse aggregate in 6 inch lifts and compact using the directed method as specified in NJDOT Specification Section 203.03.02.B.3.

- B. Temporarily Storing. Temporarily store soil in stockpiles in well-drained areas no closer than 50

feet from streams, wetlands, floodplains, other waterbodies, and as shown on the Plans. Construct stockpiles on polyethylene sheeting. Do not commingle different types or classifications of material. Overlap joints in the underlying polyethylene sheeting a minimum of 12 inches. Contain stockpiles with haybales or silt fence placed continuously at the perimeter of the stockpiles. Construct stockpiles to heights not exceeding 15 feet and with side slopes no steeper than 2H:1V. Segregate material of differing types and levels of contamination depending on reuse or disposal.

Protect and maintain the stockpile and embankment until reuse or disposal. Provide protection for the stockpile to control the stormwater run-off, erosion, and unauthorized contact. Where the material in the stockpile is saturated, pitch the bottom polyethylene sheeting towards a discharge basin to collect water drained from the stockpile. Manage the collected water in the same manner as that generated during dewatering operations.

Maintain the polyethylene sheeting or replace it as needed for as long as the stockpile remains. Periodically inspect stockpiles to ensure that material is not released into the surrounding environment.

When temporarily storing soil is not possible within the Project Limits, the Contractor may temporarily store soil at a site provided by the Contractor outside the Project Limits as approved by the RE and meeting the requirements of NJDOT Specification Section 105.08 and NJDOT Specification Section 108.04.

If the stockpile remains exposed for more than 15 days, temporarily seed, as specified in NJDOT Specification Section 806.03.01, and mulch stockpiles as specified in NJDOT Specification Section 809.03.01 or NJDOT Specification Section 809.03.02. When the stockpile is removed, restore the area to the original condition.

C. Reuse or Disposal of Excess Material.

1. Reuse. Before using other excess materials, reuse regulated material and APS as shown on the Plans or with RE approval.

The Contractor may use excavated material, if the requirements specified in NJDOT Specification Section 901.11 are met, to construct Items requiring soil aggregates. Submit written notification at least 15 days before reuse.

Upon RE's approval, reuse excavated soil to widen or flatten slopes of embankment, to fade embankments into cuts, or as approved at other locations. Ensure that the excess material is not reused within a wetland, a transition area, a riparian zone, a flood hazard area or other regulated area without obtaining an appropriate NJDEP permit.

The Contractor may reuse broken concrete, HMA pieces, and millings in the lower portion of I-14 soil aggregate. Spread out pieces in layers, with the pieces lying flat and not arching, with spaces between the pieces filled with soil. Use pieces with a maximum individual size of 2 cubic feet, with a 2 foot maximum dimension on any side. Do not place the broken concrete, HMA pieces and milling within 2 feet of the final subgrade, less

than 2 feet above the highest seasonal high ground water table or within 2 feet of any underground utility. Compact material using the directed method as specified in NJDOT Specification Section 203.03.02.B.3.

Dispose of excavated material that will not be reused as specified in NJDOT Specification Section 202.03.03.C.2.

2. Disposal. Dispose of excess regulated material as specified in NJDOT Specification Section 202.03.09. Dispose of excess APS at approved landfills according to applicable Federal, State, and local laws, rules, and regulations. For excavation not designated as regulated material or APS, provide the following before removing the excess excavation from the Project Limits.
 - a. At least 10 days before disposing, submit the disposal procedure and location to the RE for approval. Do not dispose of excavation on property proposed to be or used for parks, playgrounds, and other recreational purposes; residential facilities; educational facilities; environmentally sensitive areas such as wetlands; historic sites; or within sight of a State highway during all seasons.
 - b. Obtain the potential owner's notarized authorization of the acceptance of the excess material. If the potential owner requires environmental material sampling, obtain RE's approval at least 7 days before sampling for oversight only. Approval of the sampling does not imply agreement with the sampling results and the Department reserves the right to sample the material for classification. Provide the RE all testing results and documentation associated with the sampling. When sampling results indicate that the material is regulated, and with RE approval, dispose of the material as specified in NJDOT Specification Section 202.03.09.
 - c. Load and transport excess material that the RE determines to be excess, unusable or unsuitable for the project according to Federal, State, and local law, rules and regulations.

Once material leaves the Project Limits, the Contractor is responsible for ensuring that the handling procedures, placement method, and disposal location are according to applicable Federal, State, and local laws, rules, and requirements, including permits that may be issued for the Project. If the disposal of excess material results in a violation notice from any governmental authority, immediately correct the violation. Indemnify and defend the Department for any violation incurred, penalty assessed, or any claims, suits, losses, demands or damages of whatever kind or nature arising out of, or claimed to arise out of, the improper disposal of excess materials.

If the Contractor does not correct the violation to the satisfaction of the governmental authority that issued the violation notice, the Contractor is responsible for assessed penalties including costs incurred by the Department to remedy the violations.

Dispose of other material or debris as specified in NJDOT Specification Section 201.03.01.H.

END OF SECTION 312316

31 23 16 EXCAVATION
EXCAVATION AND FILL

DPMC #T0617-00

DIVISION 31

SECTION 31 25 00 – EROSION AND SEDIMENTATION CONTROLS
SUBSECTION - 31 25 14 STABILIZATION MEASURES FOR EROSION AND SEDIMENTATION
CONTROLS

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. This Section describes the requirements for: providing pollution control measures to maintain water quality; constructing and maintaining permanent SESC measures; and constructing, maintain, and removing temporary SESC measures.

1.2 RELATED DOCUMENTS

- A. The Standard Specifications of the New Jersey Department of Transportation for Road and Bridge Construction, dated 2019, as amended and augmented by the Supplementary Specifications (NJDOT Specifications) shall govern the material and construction requirements for poles, bases and accessories. Where conflicts arise between the specifications contained herein or the NJDOT specifications, the more stringent requirement shall govern.
- B. The NJDOT West Berlin Maintenance Yard is an NJDEP Site Remediation Program (SRP) site. Coordinate with the NJDOT Division of Environmental Resources/ Environmental Support & Services Unit (DER/ESSU) prior to initiating any ground disturbances.

1.3 RELATED WORK

- A. 311413 – Soil Stripping and Stockpiling.
- B. 312316 – Excavation.
- C. 321623 – Sidewalks
- D. 329119.13 – Topsoil Placement and Grading
- E. 329219 – Seeding
- F. 334241 – Gratings and Frames for Stormwater Drainage Inlets
- G. 350150.71 – Channel Excavation, Cleaning and Deepening

PART 2 - PRODUCTS

2.1 MATERIALS:

Provide materials as specified in:

Coarse Aggregate (No. 2 and No. 8).....NJDOT Specification Section 901.03
Temporary Riprap (6 to 9 inches) NJDOT Specification Section 901.08
Soil Aggregate (I-14) NJDOT Specification Section 901.11

31 25 14 STABILIZATION MEASURES FOR EROSION AND SEDIMENTATION CONTROLS
EROSION AND SEDIMENTATION CONTROLS

Welded Wire Reinforcement.....	NJDOT Specification Section 905.01.03
Temporary Slope Drain Pipe.....	NJDOT Specification Section 909.02.03
Caution Fence.....	NJDOT Specification Section 913.02.02
Posts	NJDOT Specification Section 913.02.02.2
Seed Mixtures.....	NJDOT Specification Section 917.03
Mulch	NJDOT Specification Section 917.06
Sod.....	NJDOT Specification Section 917.07
Miscellaneous Landscape Materials.....	NJDOT Specification Section 917.09
Geotextiles.....	NJDOT Specification Section 919.01
Inlet Filter, Type 2.....	NJDOT Specification Section 919.01
Haybales	NJDOT Specification Section 919.03
Polyethylene Sheeting	NJDOT Specification Section 919.12
Floating Turbidity Barrier	NJDOT Specification Section 919.13

Provide wood stakes and wood posts that are solid, reasonably knot free and conform to the nominal size shown on the Plans.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL MANAGER

Assign a supervisory-level employee experienced in all aspects of soil erosion and sediment control, water quality control, and work site waste control. Submit the name and applicable experience of this employee to the RE for approval at least 15 days before beginning any construction operations, except construction layout, on the Project. Submit written notification and obtain approval from the RE before changing the environmental manager.

The environmental manager shall have the responsibility and sufficient authority for implementing the approved SESC and water quality methods of operations. The environmental manager shall coordinate, oversee, and supervise SESC and water quality operations on the Project. This includes both on-site and off-site activities, including those involving subcontractors. The environmental manager shall oversee and supervise all site waste control operations for the Project.

The environmental manager shall attend SESC and water quality meetings. The environmental manager, with the RE, shall inspect SESC and site waste control measures at least weekly. Perform additional inspections immediately after precipitation and other weather events that may damage SESC measures or cause uncontrolled erosion to occur. During extended periods of precipitation, perform inspections every 24 hours until the precipitation has ended. Submit original Environmental Compliance Check List and Inspection Form to the RE the same day that the inspection is performed. Perform corrective actions, if required, within 24 hours of the inspection, and resubmit the Environmental Compliance Check List and Inspection Form to the RE within 2 days indicating that the corrective action has been completed.

3.2 PREPARATION

Construct SESC measures, as required, before starting construction operations. With the approval of the RE, the Contractor may fell trees or cut other vegetation not designated to be preserved using hand methods before constructing SESC measures. Coordinate temporary SESC measures with the permanent measures and with other construction operations to ensure effective and continuous erosion and sediment control. Construct temporary SESC measures to correct unforeseen conditions that develop during construction. If the Contractor fails to comply with SESC or site waste control provisions, the RE will suspend the Work as specified in NJDOT Specification Section 108.13.

Maintain SESC measures regardless of construction season or other times when the Project is closed down or suspended to ensure that the SESC measures function properly. Immediately correct or replace non-functioning SESC measures to meet the specified functionality. If the Contractor fails to maintain SESC or site waste control measures, the RE will suspend the Work as specified in NJDOT Specification Section 108.13.

Ensure that clearing and grubbing does not interfere with the construction of permanent SESC measures or other operations. When unstabilized areas caused by site development, grading, or other soil disturbing activities exist beyond 14 days, seed and mulch the disturbed areas. The RE may limit the size of unstabilized areas due to clearing, grubbing, grading, or other soil disturbing activities based on site conditions and the Contractor's ability to install and maintain SESC measures. Upon completion of soil disturbing activities, permanently stabilize disturbed areas within 7 days as specified in NJDOT Specification Section 807.03.01. If seasonal limitations preclude permanent stabilization, provide temporary SESC measures as approved by the RE.

When excavation or embankment construction reaches the finished subgrade, areas where pavement is to be placed are exempt from the above stabilization requirements. Roadways and haul roads actively used for daily conveyance of equipment, as well as areas between temporary berms, except median areas, are also exempt.

Employ construction methods to minimize airborne dust and prevent soils and other materials from being deposited on existing roadways. Apply water or other RE approved materials to unpaved areas to control dust caused by hauling or other construction operations. Reuse, as specified in NJDOT Specification Section 202.03.03.C.1, dirt and other materials that have been spilled, washed, or tracked onto existing roadways by hauling or other construction operations.

Remove temporary SESC measures when necessary to allow for the installation of permanent measures, or as permanent measures become functional. Notify the RE 10 days before removing temporary SESC measures. Between Substantial Completion and Completion, remove temporary SESC measures unless the RE directs that specific Items remain in place.

Construct SESC measures as follows:

- A. Caution Fence. Install caution fence at locations shown on the Plans to delineate wetlands and other environmentally sensitive areas. Space posts at least every 10 feet.
- B. Silt Fence. Install silt fence with geotextile buried securely in the existing soil. Join sections of the geotextile so that they work effectively as a continuous fence. The Contractor may install haybales instead of silt fence when approved by the Department.

- C. Haybale. Embed haybales in the ground and place end to end to form a continuous line without gaps. Anchor haybales in place with wood stakes.
- D. Temporary Slope Drains. Install temporary drainage pipe, minimum of 8 inches in diameter, on embankment slopes to intercept surface runoff where concentrated runoff will cause excessive erosion of the slope. Stake the drainpipe to the slope or secure it with temporary riprap to prevent movement or displacement. Attach a flared end section at each end of the pipe, and install elbows that conform with the existing changes in slopes. Ensure that end sections and elbows are of the same material as the pipe to which they are joined.

Construct a temporary berm using suitable material, and place haybales at the top of slope in the vicinity of the slope drain to intercept runoff and channel the runoff to the slope drain. Embed the haybales into the ground, and anchor them with wood stakes.

Place temporary riprap loosely on geotextile at both ends of the pipe to prevent scour. Drape the geotextile over the top of the earth berm and anchor it as necessary. When joining sections of the geotextile, overlap the sections a minimum of 18 inches in the direction of flow.

- E. Inlet Filters. Provide Type 2 inlet filters as follows:
 - a. Type 2. Remove the inlet grate and place the inlet filter in the opening, holding out approximately 6 inches of the filter outside the frame. Replace the inlet grate to hold the filter in place. Empty the filter according to the manufacturer's recommendations. When removing the filter, ensure that sediment does not enter into the drainage system. Clean out the filter, dispose of the sediment as specified in NJDOT Specification Section 202.03.03.C.2, rinse and return the filter to its original shape, and replace the filter inside the inlet.
- F. Temporary Inlet Sediment Traps. Construct temporary inlet sediment traps when the elevation of the surface runoff is lower than the inlet structure. Create a 6 inch diameter opening in the inlet and place a 3 x 3 foot piece of Type 1 inlet geotextile and No. 2 coarse aggregate over the opening to prevent sediment from entering the inlet. Place temporary inlet sediment traps in each flow line upgrade of the inlet structure.

Before raising the elevation of the surface runoff, remove and dispose of the temporary inlet sediment trap and repair the opening in the inlet.

- G. Floating Turbidity Barriers. At least 10 days before installation, submit floating turbidity barrier design and placement locations for Department approval. Install floating turbidity barrier in streams or other waterbodies to contain discharge from drainage pipes and construction operations before beginning work in that area. Install floating turbidity barriers radially from the point of discharge of drainage pipes, or from construction operations that could potentially impact the waterbody. Install floating turbidity barriers parallel and as close to the shore as possible while still enabling it to float. Ensure that at least 5 feet of each end of the floating turbidity barrier is anchored on shore. When floating turbidity barrier will not work in shallow water because of fluctuating water levels or heavy currents, stake the floating turbidity barrier in a fixed position which may also include a fixed height. Provide detail for Department approval.

Clean out floating turbidity barriers and keep them free from debris. Ensure floating turbidity barriers remain in place until all of the work in the area is completed, the cofferdam is removed (if applicable), and the adjacent ground area has established a firm stand of vegetation (if applicable). Remove floating turbidity barriers in such a manner as to minimize the release of sediment and debris.

- H. Dewatering Basin. At least 10 days before installation, submit to the RE for approval a plan detailing the size, materials, and location for all dewatering basins. Size dewatering basins to contain the expected discharge of water and sediment based on the flow rate of the pump to be used and the volume of area to be dewatered. Contain the turbid discharge from dewatering activities in a dewatering basin to control sediment and provide water filtration. As specified in N.J.A.C. 7:9B or other applicable jurisdictional regulations, provide filtration to release clean and clear water into adjacent streams or other waterbodies. Install floating turbidity barriers where the basin outfall flows into a receiving waterbody. Ensure that the outfall of the basin does not cause erosion to or scour of the area onto which the water is being discharged.

At the end of dewatering operations, remove the dewatering basin. Restore the disturbed area to the original condition.

- I. Sediment Control Bag. At least 10 days before installation, submit to the RE for approval a plan detailing the size, location, details of aggregate base, anticipated discharge flow, and manufacturer's catalog cuts. If the outfall of the sediment control bag flows into receiving waterbody, ensure that floating turbidity barriers are installed as specified in NJDOT Specification Section 158.03.02.11.

Install and maintain sediment control bags according to the manufacturer's recommendations. Size sediment control bags to accommodate anticipated sediment and flow rates. Place the sediment control bag on the slope to allow water to flow downhill through the bag. Place the discharge hose into the neck of sediment control bag and fasten to ensure that water does not leak at the connection. To increase the efficiency of filtration, place the bag on an aggregate bed to maximize water flow through the surface area of the bag. Size aggregate to prevent puncture of sediment control bags. Ensure that the discharge from the sediment control bag does not cause erosion to, or scour of, the area onto which the water is being discharged.

When the sediment control bag is 90 percent full, can no longer efficiently filter sediment, or does not allow water to pass at a reasonable rate, remove and replace.

Remove sediment control bags according to the manufacturer's recommendations and dispose as specified in NJDOT Specification Section 202.03.09. Restore the disturbed area to the original condition.

- J. Construction Driveway. To minimize tracking of dirt and other materials onto existing roadways, provide a construction driveway at each location where vehicles exit the work site as approved by the Engineer. Construct driveways using No. 2 coarse aggregate placed on geotextile. Ensure that the driveway is at least 15 feet wide. The Contractor may make driveways wider if approved by Engineer. Maintain the driveway by top dressing or by excavating and top dressing, as directed by the Engineer, with additional No. 2 coarse aggregate. When the driveway is no longer required, remove the driveway, backfill to the adjacent ground elevation, and restore the disturbed area to the original condition.

- K. Concrete Washout System. At least 10 days before the first concrete placement, submit to the RE for approval a plan for the concrete washout system. Design the concrete washout system to fully contain the concrete washout needs, concrete slurry, and the Department's concrete testing of the Work.

Ensure that each concrete washout facility prevents discharge from concrete trucks and equipment cleaning from entering into inlets and into surface or groundwater. Ensure that the location of concrete washout facilities are no closer than 50 feet from environmentally sensitive areas such as streams, wetlands, or other areas shown on the Plans. Use signs to designate concrete washout areas. Ensure that concrete washout facilities are limited to the designated areas.

Ensure that the concrete washout system is in place before delivery of concrete to the site. Ensure that a secure, non-collapsing, non-water collecting cover over each concrete washout facility is in place during precipitation so that precipitation does not accumulate and cause the washout areas to overflow. If the concrete washout facility becomes 50 percent full, discontinue pouring concrete until the concrete washout facility is cleaned out. Remove hardened concrete and reuse as specified in NJDOT Specification Section 202.03.03.C.1. Allow slurry to evaporate, or dispose of as specified in NJDOT Specification Section 202.03.03.C.2.

If a lined basin is used, replace the liner if it becomes damaged or compromised. Remove concrete washout facilities when no longer needed. Restore the disturbed area to original condition.

- L. Oil-Only Emergency Spill Kit. Before start of construction operations, place Oil-Only Emergency Spill Kits within the Project Limits, with each kit capable of cleaning up at least 95 gallons of spill. Include Oil-Only Emergency Spill Kit, Type 1 consisting of the following:
- An instruction manual and emergency response guide.
 - Ten 5 inch × 1 foot oil-only absorbent booms.
 - Ten 3 inch × 10 foot oil-only absorbent booms.
 - One hundred 20 × 16 inch oil-only absorbent pads.
 - Twenty temporary disposal bags and ties.
 - A 40 pound bag of loose absorbent pellets.
 - A wheeled container for the above.

If a spill occurs, immediately contain the spill and notify the NJDEP Hotline (1-877-927-6337) and the RE. Clean up and remediate the spill as directed by the NJDEP. Separately stockpile, as specified in 201.03.03.3, the contaminated material and dispose of the contaminated material as specified in 202.03.09. Submit an incident report to the RE within 10 days after clean-up that includes a summary of the incident, the clean-up and containment measures taken, the time and date of the incident, and the NJDEP case number.

Replenish the kits to ensure that the specified number of complete kits are on-site at all times during construction operations.

- M. Tree Protection. Before start of construction operations, install tree protection by surrounding trees and other vegetation with chain-link fence. Place the tree protection a minimum of 2 feet outside the dripline of tree or vegetation canopy. Do not park vehicles or equipment, or store

materials within the area of tree protection. In situations where tree protection conflicts with excavation or other construction, request permission to modify tree protection and provide a protection plan for approval by the Department.

3.3 REMOVAL

Remove sediment from sediment traps and dewatering basins when they are 50 percent filled. Remove sediment from silt fences, stone outlet structures, dams, and haybales when the sediment reached 50 percent of the height of the SESC measure. Remove the coarse aggregate and riprap from check dams when removing the sediment. Reuse the removed material as specified in NJDOT Specification Section 202.03.03.C.1. Replace the coarse aggregate and riprap removed from check dams.

END OF SECTION 312514

Intentionally Blank Page

DPMC #T0617-00

DIVISION 32

SECTION 32 01 00 – OPERATION AND MAINTENANCE OF EXTERIOR IMPROVEMENTS
SUBSECTION 32 01 16.71 – COLD MILLING ASPHALT PAVING

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. This Section describes the requirements for milling, preparing HMA for paving, constructing base course, intermediate course, and surface course of HMA.

1.2 RELATED DOCUMENTS

- A. The Standard Specifications of the New Jersey Department of Transportation for Road and Bridge Construction, dated 2019, as amended and augmented by the Supplementary Specifications (NJDOT Specifications) shall govern the material and construction requirements for poles, bases and accessories. Where conflicts arise between the specifications contained herein or the NJDOT specifications, the more stringent requirement shall govern.
- B. The NJDOT West Berlin Maintenance Yard is an NJDEP Site Remediation Program (SRP) site. Coordinate with the NJDOT Division of Environmental Resources/ Environmental Support & Services Unit (DER/ESSU) prior to initiating any ground disturbances.

1.3 RELATED WORK

- A. 312316 – Excavation.
- B. 311116.16 – Aggregate Subbase Courses.
- C. 321213 – Preparatory Coats.
- D. 321216 – Asphalt Paving.

PART 2 - PRODUCTS

2.1 MATERIALS:

Provide materials as specified in:

Tack Coat 64-22, PG 64-221	NJDOT Specification Section 902.01.01
Prime Coat, Grade CSS-1.....	NJDOT Specification Section 902.01.02
Tack Coat:	
Emulsified Asphalt, Grade RS-1, RS-1h, CRS-1, or CRS-1h.....	NJDOT Specification Section 902.01.02
Polymer Modified Tack Coat:	
Polymer Modified Emulsified Asphalt	NJDOT Specification Section 902.01.03
HMA.....	NJDOT Specification Section 902.02
HMA HIGH RAP	NJDOT Specification Section 902.13

32 01 16 FLEXIBLE PAVING REHABILITATION
OPERATION AND MAINTENANCE OF EXTERIOR IMPROVEMENTS

Joint Sealer, Hot-Poured	NJDOT Specification Section 914.02
Polymerized Joint Adhesive	NJDOT Specification Section 914.03

Use HMA specified for the roadway surface as patching material for HMA pavement repair. The Contractor may use a commercial type of cold mixture as patching material for filling core holes if HMA surface course is not being placed when coring. The Contractor may use an approved HMA surface course to fill core holes, provided the material remains hot enough to compact.

2.2 EQUIPMENT:

Provide equipment as specified:

Materials Transfer Vehicle (MTV)	NJDOT Specification Section 1003.01
HMA Paver	NJDOT Specification Section 1003.03
HMA Compactor	NJDOT Specification Section 1003.05
Vibratory Drum Compactor	NJDOT Specification Section 1003.06
Bituminous Material Distributor	NJDOT Specification Section 1003.07
Sealer Application System	NJDOT Specification Section 1003.08
Milling Machine	NJDOT Specification Section 1008.01
Mechanical Sweeper	NJDOT Specification Section 1008.03
Hot-Air Lance	NJDOT Specification Section 1008.06
HMA Plant	NJDOT Specification Section 1009.01
HMA Trucks	NJDOT Specification Section 1009.02

Provide a thin-lift nuclear density gauge according to ASTM D 2950.

Note: A Spray Paver as specified in 1003.04 may be used in lieu of a HMA Paver.

PART 3 - EXECUTION

3.1 PREPARATION

- A. HMA Milling. Mill HMA to the specified depth, profile, and cross slope. Operate milling machine to produce milled material that passes a 3 inch sieve. Use automatic grade controls to control the line and grade of the milling machine. Use either a stringline or ski reference system. Replace teeth in the milling drum that become dislodged, broken, or unevenly worn. Perform milling operation, including removal of the milled material, in a manner that prevents dust and other particulate matter from escaping into the air.

Ensure that the milled area is free from gouges, continuous grooves, ridges, and delaminated areas and has a uniform texture consisting of discontinuous longitudinal striations. Ensure that the striations do not deviate more than 1 inch in 200 feet from a line parallel to the center of the traveled way and do not exceed 3/8 inch in depth. Check at least every 25 feet to ensure that the depth of milling is within 1/4 inch of the indicated depth.

Mill HMA to the depth specified without damaging underlying HMA. If HMA below the specified milling level becomes dislodged or delaminated, remove and replace. If unbound aggregate material is encountered within the specified milling depth, mill unbound aggregate material without damaging the underlying material.

Sawcut at the limit of paving in driveways and at other limits requiring a neat edge between new and existing HMA.

Using a mechanical sweeper, clean the milled area before opening to traffic and before subsequent construction or resurfacing. Reuse millings and sweepings as specified in NJDOT Specification Section 202.03.03.C.1.

If the milled area is opened to traffic, ensure that water can drain from the surface and does not become trapped. If the longitudinal edge height of a milled surface exceeds 2 inches, slope the edge to provide a smooth transition from the milled surface to the remaining pavement. At transverse edges of milled areas, provide a smooth transition from the milled surface to the remaining pavement.

In areas inaccessible to the milling machine, remove HMA with other equipment.

The Department will provide the time interval for resurfacing the milled areas in the Special Provisions.

END OF SECTION 320116.71

Intentionally Blank Page

DPMC #T0617-00

DIVISION 32

SECTION 32 11 00 – BASE COURSES
SUBSECTION - 32 11 16.16 AGGREGATE SUBBASE COURSES

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. This Section describes the requirements for constructing aggregate base courses.

1.2 RELATED DOCUMENTS

- A. The Standard Specifications of the New Jersey Department of Transportation for Road and Bridge Construction, dated 2019, as amended and augmented by the Supplementary Specifications (NJDOT Specifications) shall govern the material and construction requirements for poles, bases and accessories. Where conflicts arise between the specifications contained herein or the NJDOT specifications, the more stringent requirement shall govern.
- B. The NJDOT West Berlin Maintenance Yard is an NJDEP Site Remediation Program (SRP) site. Coordinate with the NJDOT Division of Environmental Resources/ Environmental Support & Services Unit (DER/ESSU) prior to initiating any ground disturbances.

1.3 RELATED WORK

- A. 312316 – Excavation.
- B. 311116.16 – Aggregate Subbase Courses.
- C. 321213 – Pepatory Coats.
- D. 321216 – Asphaltic Paving.
- E. 321613 – Curbs and Gutters.

PART 2 - PRODUCTS

2.1 MATERIALS:

Provide materials as specified in:

Dense-Graded Aggregate NJDOT Specification Section 901.10
Soil Aggregate (I-5) NJDOT Specification Section 901.11

Where I-5 soil aggregate is specified, the Contractor may substitute DGA with the approval of the Engineer.

2.2 EQUIPMENT:

Provide equipment as specified:

32 11 16.16 AGGREGATE SUBBASE COURSES
BASE COURSES

Pneumatic-Tired Compactor	NJDOT Specification Section 1002.01
Dynamic Compactor	NJDOT Specification Section 1002.02
Steel-Wheel Roller	NJDOT Specification Section 1002.03
Padfoot Roller	NJDOT Specification Section 1002.04

PART 3 - EXECUTION

3.1 PREPARATION

- A. Preparing Subgrade or Subbase. Before placing base course on subgrade or subbase, prepare surfaces as specified in NJDOT Specification Section 301.03.01.
- B. Density Control Strip. Obtain Engineer approval of the underlying surface before constructing the density control strip. Before constructing the aggregate base course, construct a density control strip using the same type of material from the same source as the aggregate base course. Construct additional density control strips if a change is made in the type or source of material, if a significant change occurs in the composition of the material from the same source, or if a change is made in the type of compaction equipment used, as determined by the Engineer. Provide at least 400 square yards for each density control strip. Construct a density control strip for each thickness specified for the aggregate base course. Ensure that the moisture content for the test strip material is within 2 percent of its optimum moisture content according to AASHTO T 99, Method C, including replacement option.

Place and spread aggregate base course as specified in NJDOT Specification Section 301.03.01.B. Place the base course and compact within a tolerance of $\pm 1/2$ inch of the require elevation. Ensure that no compacted lift exceeds a thickness of 8 inches. For base courses greater than 8 inches thick, construct the base course in 2 or more lifts of approximately equal thickness.

Compact the density control strip using the same type and weight of equipment that will be used for compaction of the aggregate base course. Compact the density control strip with a minimum of 2 passes of the compaction equipment. A pass is defined as 1 passage of each compacting element in use of the compaction equipment over the entire surface of the course. After each pass of the compaction equipment transverses the density control strip, the Engineer will make 3 density determinations according to AASHTO T 310. Continue compacting until no appreciable increase in density is obtained by additional passes.

After the Contractor completes compaction of the control strip, the Engineer will take at least 10 density tests at random locations to determine the average in-place dry density of the density control strip. If the average density of the material in the density control strip is equal to or greater than 95 percent of its maximum density, as determined according to AASHTO T 99, Method C, including replacement option, then use the value of this average as the reference maximum density for courses of the same materials and thicknesses. Establish a density control strip satisfying the 95 percent density requirement, according to AASHTO T 99, Method C, before constructing additional base courses. If this density level in the density control strip is not achieved, the Engineer will reject the compaction equipment, its method of use, or both. If approved by the Engineer, the density control strips may remain in place and become a portion of the completed base course.

The Engineer will check elevations, as specified in NJDOT Specification Section 202.03.03.D, of roadbed base course to ensure that base course elevations are within $\pm 1/2$ inch.

- C. Aggregate Subbase Course Placement. Construct the aggregate subbase course in the same manner as the approved density control strip.

If less than 500 contiguous square yards of aggregate base course is being constructed, place and spread the aggregate base course as specified in NJDOT Specification Section 301.03.01.B. Place the base course and compact within a tolerance of $\pm 1/2$ inch of the required elevation. Compact the base course areas as specified in NJDOT Specification Section 203.03.02.B.4 and ensure that no compacted lift exceeds a thickness of 8 inches. For base courses greater than 8 inches thick, construct the base course in 2 or more lifts of approximately equal thickness.

- D. Thickness Requirements. The Engineer will measure thickness, by test holes or by calculating the difference in elevations between the subbase course and the underlying layer. Refill test holes with subbase course material and recompact using the directed method as specified in NJDOT Specification Section 203.03.02.B.3.

If the total thickness of base course differs from specified thickness by more than $1/2$ inch, correct deficient areas as follows:

1. Scarify the base course to a depth of 3 to 4 inches.
2. Ensure that remaining material is contaminant free.
3. Add or remove base course material to obtain the required grade while the existing surface is in a loose, scarified condition.
4. Compact using the same method used for the density control strip.

END OF SECTION 321116

Intentionally Blank Page

DPMC #T0617-00

DIVISION 32

SECTION 32 12 00 – FLEXIBLE PAVING
SUBSECTION 32 12 13 - PREPATORY COATS

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. This Section describes the requirements for milling, preparing HMA for paving, constructing base course, intermediate course, and surface course of HMA.

1.2 RELATED DOCUMENTS

- A. The Standard Specifications of the New Jersey Department of Transportation for Road and Bridge Construction, dated 2019, as amended and augmented by the Supplementary Specifications (NJDOT Specifications) shall govern the material and construction requirements for poles, bases and accessories. Where conflicts arise between the specifications contained herein or the NJDOT specifications, the more stringent requirement shall govern.
- B. The NJDOT West Berlin Maintenance Yard is an NJDEP Site Remediation Program (SRP) site. Coordinate with the NJDOT Division of Environmental Resources/ Environmental Support & Services Unit (DER/ESSU) prior to initiating any ground disturbances.

1.3 RELATED WORK

- A. 312316 – Excavation.
- B. 321216 – Asphalt Paving.
- C. 321116.16 – Aggregate Subbase Courses.
- D. 320116.71 – Cold Milling Asphalt Paving.

PART 2 - PRODUCTS

2.1 MATERIALS:

Provide materials as specified in:

Tack Coat 64-22, PG 64-221 NJDOT Specification Section 902.01.01
Prime Coat, Grade CSS-1.....NJDOT Specification Section 902.01.02
Tack Coat:
Emulsified Asphalt, Grade RS-1, RS-1h, CRS-1,
or CRS-1h.....NJDOT Specification Section 902.01.02
Polymer Modified Tack Coat:
Polymer Modified Emulsified Asphalt NJDOT Specification Section 902.01.03
HMA.....NJDOT Specification Section 902.02

32 12 13 PREPATORY COATS
FLEXIBLE PAVING

HMA HIGH RAP NJDOT Specification Section 902.13

Use HMA specified for the roadway surface as patching material for HMA pavement repair. The Contractor may use a commercial type of cold mixture as patching material for filling core holes if HMA surface course is not being placed when coring. The Contractor may use an approved HMA surface course to fill core holes, provided the material remains hot enough to compact.

2.2 EQUIPMENT:

Provide equipment as specified:

Materials Transfer Vehicle (MTV) NJDOT Specification Section 1003.01
HMA Paver NJDOT Specification Section 1003.03
HMA Compactor NJDOT Specification Section 1003.05
Vibratory Drum Compactor NJDOT Specification Section 1003.06
HMA Plant NJDOT Specification Section 1009.01
HMA Trucks NJDOT Specification Section 1009.02

Provide a thin-lift nuclear density gauge according ASTM D 2950.

Note: A Spray Paver as specified in NJDOT Specification Section 1003.04 may be used in lieu of a HMA Paver.

PART 3 - EXECUTION

3.1 PREPARATION

Clean the surface of foreign and loose material. Immediately before beginning paving operations, ensure that the surface is dry. Do not place tack coat unless the weather restrictions, as specified in NJDOT Specification Section 401.03.07.B., are met.

Do not apply tack coat to asphalt-stabilized drainage course.

For curbs, gutters, manholes, and other similar structures, do not apply tack coat. Clean the exposed surfaces of these structures and apply a uniform coating of polymerized joint adhesive to contact surfaces before paving as specified in NJDOT Specification Section 401.03.07.E.

A spray paver may be used to apply tack coat, or polymer modified tack coat, and HMA in a single operation. When paving HMA with a spray paver, use tack coat. When paving polymer modified HMA with a spray paver, use polymer modified tack coat. When using a spray paver, apply tack coat at a rate of 0.10 to 0.15 gallons per square yard and at a temperature as specified in Table NJDOT Specification Section 40.103.05-1.

In areas inaccessible to distributor spray bars, use hand spraying equipment for tack coat. Do not allow traffic on tack coated surfaces. Treat surfaces as follows:

1. Tack Coat. Uniformly spray tack coat when placing HMA on paved surfaces. Apply tack coat only to areas to be paved in the same day. Apply tack coat as specified in Table NJDOT Specification Section 401.03.05-1:

Table 401.03.05-1 Tack Coat

Material	Application		Season
	Spraying Temp, °F	Gallons per Square Yard	
Emulsified Asphalt:			
RS-1, RS-1h	125 to 185	0.05 to 0.15	All year
CRS-1, CRS-1h	125 to 185	0.05 to 0.15	All year

Correct uncoated or lightly coated areas. Blot areas showing an excess of tack coat with sand or other similar material. Remove blotting material before paving. Ensure that the material is not streaked or ribboned.

Before paving, allow tack coat to cure to a condition that is tacky to the touch.

2. Tack Coat 64-22. When precipitation has occurred within 24 hours before application, the Engineer will determine whether to allow the work to proceed, or to wait until the surface is completely dry. Only apply tack coat that can be paved over in the same day. Apply tack coat 64-22 at a rate of 0.06 to 0.14 gallons per square yard and at a spraying temperature of 325°F. Adjust the spraying temperature and application rate to produce a uniform coating, with no excess material.

Correct uncoated or lightly coated areas and remove excess tack coat from affected areas. Ensure that the material is not streaked or ribboned.

3. Polymer Modified Tack Coat. When paving polymer modified HMA, apply polymer modified tack coat with a spray paver at a temperature of 140 to 185°F. Continuously monitor rate of spray, ensuring a uniform application rate over entire width to be overlaid. Apply at the rate of 0.10 to 0.15 gallons per square yard. For ultra-thin friction course, modified open-graded friction course and asphalt-rubber open-graded friction course, apply at a rate of 0.30 to 0.25 gallons per square yard. For bridge deck waterproof surface course, apply at a rate of 0.15 to 0.20 gallons per square yard. Do not allow traffic, equipment, tools, or any other disturbance to the polymer modified tack coat before placing the HMA material.

Clean and remove any tack coat material displaced or tracked in any areas as directed by the Engineer.

END OF SECTION 321213

Intentionally Blank Page

DPMC #T0617-00

DIVISION 32

SECTION 32 12 00 – FLEXIBLE PAVING
SUBSECTION 32 12 16 - ASPHALT PAVING

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. This Section describes the requirements for preparing for paving of base course HMA and surface course HMA.

1.2 RELATED DOCUMENTS

- A. The Standard Specifications of the New Jersey Department of Transportation for Road and Bridge Construction, dated 2019, as amended and augmented by the Supplementary Specifications (NJDOT Specifications) shall govern the material and construction requirements for poles, bases and accessories. Where conflicts arise between the specifications contained herein or the NJDOT specifications, the more stringent requirement shall govern.
- B. The NJDOT West Berlin Maintenance Yard is an NJDEP Site Remediation Program (SRP) site. Coordinate with the NJDOT Division of Environmental Resources/ Environmental Support & Services Unit (DER/ESSU) prior to initiating any ground disturbances.

1.3 RELATED WORK

- A. 312316 – Excavation.
- B. 320116.71 – Cold Milling Asphalt Paving.
- C. 321116.16 – Aggregate Subbase Courses.
- D. 321213 – Preparatory Coats.

PART 2 - PRODUCTS

2.1 MATERIALS:

Provide materials as specified in:

Tack Coat 64-22, PG 64-221 NJDOT Specification Section 902.01.01
HMA.....NJDOT Specification Section 902.02

Polymerized Joint Adhesive.....NJDOT Specification Section 914.03

32 12 16 ASPHALTIC PAVING
FLEXIBLE PAVING

Base Course: 19M64 HMA
Surface Course: 9.5M64 HMA

Use HMA specified for the roadway surface as patching material for HMA pavement repair. The Contractor may use a commercial type of cold mixture as patching material for filling core holes if HMA surface course is not being placed when coring. The Contractor may use an approved HMA surface course to fill core holes, provided the material remains hot enough to compact.

2.2 Equipment

Provide equipment as specified:

Materials Transfer Vehicle (MTV)	NJDOT Specification Section 1003.01
HMA Paver	NJDOT Specification Section 1003.03
HMA Compactor	NJDOT Specification Section 1003.05
Vibratory Drum Compactor	NJDOT Specification Section 1003.06
Bituminous Material Distributor	NJDOT Specification Section 1003.07
Sealer Application System	NJDOT Specification Section 1003.08
Milling Machine	NJDOT Specification Section 1008.01
Mechanical Sweeper	NJDOT Specification Section 1008.03
Hot-Air Lance	NJDOT Specification Section 1008.06
HMA Plant	NJDOT Specification Section 1009.01
HMA Trucks	NJDOT Specification Section 1009.02

Provide a thin-lift nuclear density gauge according to ASTM D 2950.

Note: A Spray Paver as specified in 1003.04 may be used in lieu of a HMA Paver.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Paving Plan. At least 20 days before beginning placing HMA, submit a detailed plan of operation to the Engineer for approval that includes the following:
1. Asphalt paving construction technologist (APCT), certified by the Society of Asphalt Technologists of New Jersey, Inc. The Department will accept the equivalent certification by the Mid-Atlantic Regional Technician Certification Program.
 2. Size and description of crew.
 3. Number, type, and model of equipment. Innovative equipment features to be utilized such as but not limited to intelligent compaction rollers, paver mounted infrared thermal profile system, and other Global Position System (GPS) located construction equipment.

4. Lighting plan for nighttime operations as specified in NJDOT Specification Section 108.06.
5. Longitudinal joint layout plan, quality control, and construction practices.
6. Manufacturer's recommendations for heating and applying joint sealant.
7. Paving procedures for maintaining continuous operation as specified in NJDOT Specification Section 401.03.07.D.
8. Manufacturer's recommended laydown temperature for modified bunders.
9. Paving sequence and paver automation use plan. Ensure that the HMA surface course is constructed for the full width of the traveled way, shoulder, and auxiliary lanes as a single paving operation.
10. Schedule, hours of operation, and production rates for the Project.
11. Plant locations.
12. Method of maintaining HMA temperature during transportation.
13. Method of constructing and compacting joints as specified in NJDOT Specification Section 401.03.07.E.
14. Quality control plan outlining the test strip, the use of the thin lift nuclear density gauge, quality control cores, and the control of the compaction process.
15. If applicable, the warm mix asphalt additive or process being used.
16. Proposed location for test strip.

Do not begin paving until the Engineer approves this plan. Submit an adjusted pavement plan before making adjustments to the paving operation.

- B. Weather Limitations. Do not place HMA if it is precipitating. Do not allow trucks to leave the plant when precipitation is imminent. The Contractor may resume operations when the precipitation has stopped and the surface is free of water.

When placing HMA, ensure that the base temperature meets the minimum temperature requirements specified in Table - NJDOT Specification Section 401.03.07-1.

Table 401.03.07-1 Minimum Base Temperature	
Lift Thickness, inches (t)	Minimum Base Temperature, °F

32 12 16 ASPHALTIC PAVING
FLEXIBLE PAVING

$t \leq 1$	50
$1 < t < 2$	41
$t \geq 2$	32

- C. Test Strip. Construct a test strip for each HMA mix for contract with more than a total of 5,500 tons of HMA. Test strips are not necessary for temporary pavement. Ensure that the tack coat or prime coat has been placed as specified in NJDOT Specification Section 401.03.05 and 401.03.06, before placing HMA. Transport and deliver, spread and grade, and compact as specified in NJDOT Specification Sections 401.03.07.D, 401.03.07.E, and 401.03.07.F, respectively, and according to the approved paving plan. Construct a test strip for the first 700 to 1,200 square yards placed for each job mix formula. While constructing the test strip, record the following information and submit to the Engineer.

1. Ambient Temperature. Measure ambient temperature at the beginning and end of each day's paving operation.
2. Base Temperature. Measure the surface temperature of the existing base before paving.
3. HMA Temperature. Measure the temperature of the HMA immediately after placement.
4. Roller Pattern. Provide details on the number of rollers, type, and number of passes used on the test strip.
5. Nuclear Density Gauge Readings. Obtain the maximum density from the plant and input it into the nuclear density gauge. Use the nuclear density gauge to read the bulk density and percent air voids.
6. Quality Control Core Density Test Results. Take 5 randomly selected quality control cores to test for the bulk specific gravity and the maximum specific gravity.

Use drilling equipment with a water-cooled, diamond-tipped masonry drill bit that produces 6 inch nominal diameter cores for the full depth of the pavement. Remove the core from the pavement without damaging it. After removing the core, remove all water from the hole. Fill the hole with HMA or cold patching material, and compact the material so that it is ¼ inch above the surrounding pavement surface.

Compare the nuclear density gauge readings and the core test results to establish a correlation. Use this correlation as a guide for the continued use of the nuclear density gauge for density control.

- D. Transportation and Delivery of HMA. Deliver HMA using HMA trucks in sufficient quantities and at such intervals to allow continuous placement of the material. Do not allow trucks to leave the plan within 1 hour of sunset unless nighttime lighting is provided as specified in NJDOT Specification Section 108.06. The Engineer will reject HMA if the HMA trucks do not meet the

requirements specified in NJDOT Specification Section 1009.02. The Engineer will suspend construction operations if the Contractor fails to maintain a continuous paving operation. Before the truck leaves the plant, obtain a weigh ticket from a fully automatic scale. Before unloading, submit for each truckload a legible weigh ticket that includes the following:

1. Name and location of the HMA plant.
2. Contractor.
3. Project title.
4. Load time and date.
5. Truck number.
6. Mix designation.
7. Item and item number.
8. Plant lot number.
9. Tare, gross, and net weight.

Ensure that weight tickets are signed and sealed by a certified weighmaster.

In the event of breakdown of an automatic printer system, the Engineer will accept weigh tickets showing the tare, gross, and net weight of each truck, as entered and certified by a weighmaster for a period not exceeding the necessary repair time as certified by a licensed repairman.

When using an automated batching plant, obtain weigh tickets from the printer used in conjunction with an automated batching and mixing system. Ensure the printed ticket shows the individual weights of the various components of the HMA in a batch, the total weight of each batch, and the sum of all batch weights in the truckload. At the completion of each day's work, provide certification from the weighmaster that the total net weight supplied was correct.

- E. Spreading and Grading. Use a stringline or other linear reference system to ensure proper line and grade when spreading material. Ensure that the system is in place and approved by the Engineer before placing HMA. Ensure that the underlying surface meets line and grade as specified in NJDOT Specification Section 202.03.03.D. Before placing HMA, ensure that the tack coat or prime coat has been placed as specified in NJDOT Specification Sections 401.03.05 and 401.03.06 to the full width of the HMA. Obtain Engineer approval of the underlying surface far enough in advance of spreading HMA to allow 1 day's paving operations.

Ensure that the certified APCT is present during paving operations.

Ensure that a Materials Transfer Vehicle (MTV) independently delivers HMA from the HMA trucks to the HMA paver.

Before beginning, ensure that the temperature of the screed on the HMA paver is heated to at least the laydown temperature of the HMA. Using the MTV's and HMA pavers, construct paving courses in lifts of at least 4 times the nominal maximum aggregate size of the HMA being constructed. Ensure the paver vibratory screed is on when paving and that the paver automation is used as per the paving plan. Ensure the paver and auger speed are coordinated and operated at the proper speed to allow for a uniform head of material across the entire width of the paver. Ensure that the proper paver and auger speed are maintained. Ensure that the grade and profile are maintained.

Use HMA having a nominal maximum aggregate size of 3/8 inch or less in transition (run out) areas. On areas where irregularities or unavoidable obstacles make use of a paver impractical, spread, rake, and lute HMA with hand tools. For these areas, dump, spread, and screed the HMA to obtain the required compacted thickness.

Construct joints as follows:

Longitudinal Joints. Perform paving with the spring-loaded end plats of the paver in the "down" position and ensure that they are firmly seated on the pavement surface. Ensure augers and tunnels are extended to within 12 to 18 inches of the end plates and that a continual supply of hot material flows out to the end plates and the material is not segregating. Ensure the longitudinal joint in 1 lift offsets that in the lift immediately below by approximately 6 inches. Offset the joint in the surface course from the lane lines by 6 inches. When constructing a joint offset the joint by 6 inches.

For surface course only, uniformly apply polymerized joint adhesive to longitudinal cold joint. Apply a 1/8 inch thick coating of polymerized joint adhesive over the entire joint face. Apply slowly to ensure an even coating thickness. Apply polymerized joint adhesive to the vertical faces, curb, and utility structures.

- F. **Compacting.** Compact with the minimum number of rollers as specified in the Table NJDOT Specification Section 401.03.07-2.

Table 401.03.07-2 Compaction Requirements	
Laydown Rate (r), yd ² /day	Minimum Number of Rollers
$r \leq 2,000$	1
$2,000 < r < 4,000$	2
$r \geq 4,000$	3

Orient the drive axles of the roller towards the paver during compaction operation. Operate rollers

at a slow, uniform speed not exceeding 2 ½ miles per hour. If necessary to prevent adhesion of the HMA to the rollers, keep the wheels moistened with water mixed with very small quantities of detergent.

Begin compacting at the sides and progress gradually to the center. On superelevated curves, compact from the lower to the upper edge parallel to the centerline and uniformly overlap each preceding track until the entire surface has been compacted.

Continue rolling until roller marks are eliminated and the air voids conform to the specified requirements.

Along forms, curbs, headers, walls, and other places not accessible to the rollers, compact the HMA by a vibratory drum compactor.

Remove and replace HMA that becomes loose, broken, or otherwise defective or that shows an excess or deficiency of asphalt binder material.

Prevent lateral or vertical displacement of the unconfined edge during the compaction operation. Ensure that the edge of the drums of the rollers extends over the free edge of the mat by at least 6 inches.

When compacting the butt or wedge joint, while paving the adjacent lane, place the roller on the newly placed HMA and overlap the joint by approximately 6 inches.

If a test strip was not required, establish a correlation between the nuclear density gauge and the cores as specified in NJDOT Specification Section 401.03.07.C.6. To adjust correlation with the thin lift nuclear density gauge, take 1 additional core every week during the paving operation. The Engineer may approve additional coring with valid cause presented by the Contractor. On a daily basis, provide results of both the nuclear density and core testing to the Engineer. Provide core and nuclear density results that include the bulk specific gravity, the maximum specific gravity according to AASHTO T 209, and the present air voids. Failure to submit the core and nuclear density test results from the previous week's paving will result in suspended paving operations.

- G. Opening to Traffic. Remove loose material from the traveled way, shoulder, and auxiliary lanes before opening to traffic. Open HMA courses to use only after the surface temperature has cooled to less than 140°F.

When using Warm Mix Asphalt, do not allow use or construction equipment on the HMA course until the surface temperature is less than 120°F.

- H. Air Void Requirements. Mainline lots are defined as the area covered by a day's paving production of the same job mix formula for the traveled way and auxiliary lanes. The Engineer may combine daily production areas less than 1,000 tons with previous or subsequent production areas. If a day's production is greater than 4,000 tons, the Engineer may divide the area of HMA

placed into 2 lots with approximately equal areas.

The Engineer will calculate the percent defective (PD) as the percentage of the lot outside the acceptable range of 2 percent air voids to 8 percent air voids. The acceptable quality limit is 10 percent defective. For lots in which $PD < 10$, the Department will award a positive pay adjustment. For lots in which $PD > 10$, the Department will access a negative pay adjustment.

The Engineer will determine air voids from 5 cores from each lot in random locations. The Engineer will determine air voids of cores from the values for the maximum specific gravity of the mix and the bulk specific gravity of the core. The Engineer will determine the maximum specific gravity of the mix according to NJDOT B-3 and AASHTO T 209, except that minimum sample size may be waived in order to use a 6 inch diameter core sample. The Engineer will determine the bulk specific gravity of the compacted mixture by testing each core according to AASHTO T 166.

The Engineer will calculate pay adjustments based on the following:

1. Sample Mean ($\bar{X}$) and Standard Deviation (S) of the N Test Results ($X_1, X_2, \dots, X_N$).

$$\bar{X} = \frac{(X_1 + X_2 + \dots + X_N)}{N}$$

$$S = \frac{\sqrt{(X_1 - \bar{X})^2 + (X_2 - \bar{X})^2 + \dots + (X_N - \bar{X})^2}}{N - 1}$$

2. Quality Index (Q).

$$Q_L = \frac{(\bar{X} - 2.0)}{S}$$

$$Q_U = \frac{(8.0 - \bar{X})}{S}$$

3. Percent Defective (PD). Using NJDOT ST for the appropriate sample size, the Department will determine PD_L and PD_U associated with Q_L and Q_U , respectively. $PD = PD_L + PD_U$
4. Percent Pay Adjustment (PPA). Calculate the PPA for traveled way and ramp lots as specified in Table 401.03.07-3.

Table 401.03.07-3 PPA for Mainline Lots and Ramp Lots	
Quality	PPA

Surface	PD < 10	PPA = 4 - (0.4 PD)
	10 ≤ PD < 30	PPA = 1 - (0.1 PD)
	PD ≥ 30	PPA = 40 - (1.4 PD)
Intermediate and Base	PD < 30	PPA = 1 - (0.1 PD)
	PD ≥ 30	PPA = 40 - (1.4 PD)

Calculate the PPA for other pavement lots as specified in Table 401.03.07-4.

Table 401.03.07-4 PPA for Other Pavement Lots		
	Quality	PPA
All Courses	PD < 50	PPA = 1 - (0.1 PD)
	PD ≥ 50	PPA = 92 - (1.92 PD)

5. Outlier Detection. If PD < 10, the Engineer will not screen for outliers. If PD ≥ 10, the Engineer will screen acceptance cores for outliers using a statistically valid procedure. The following procedure applies only for a sample size of 5 or 10.

1. The Engineer will arrange the core results in ascending order, in which X_1 represents the smallest value and X_N represents the largest value.
2. If X_N is suspected of being an outlier, the Engineer will calculate:

$$R = \frac{X_N - X_{(N-1)}}{X_N - X_1}$$

3. If X_1 is suspected of being an outlier, the Engineer will calculate:

$$R = \frac{X_2 - X_1}{X_N - X_1}$$

4. For N = 5 if R > 0.642, the value is judged to be statistically significant and the core is excluded. For N = 10 if R > 0.412, the value is judged to be statistically significant and the core is excluded.

If an outlier is detected for N = 5 and no retest is warranted, the Contractor may replace that core by taking an additional core at the same offset and within 5 feet of the original

station. If an outlier is detected and a retest is justified, take a replacement core for the outlier at the same time as the 5 additional retest cores are taken. If the outlier replacement core is not taken within 15 days, the Engineer will use the initial core results to determine PPA.

If an outlier is detected for $N = 10$, the Contractor may replace that core by taking an additional core at the same offset and within 5 feet of the original station. If the outlier replacement core is not taken within 15 days, the Engineer will use the initial core results to determine PPA.

6. Retest. If the initial series of 5 cores produces a percent defective value of $PD \geq 30$ for mainline or ramp lots, or $PD \geq 50$ for other pavement lots, the Contractor may elect to take an additional set of 5 cores at random locations chosen by the ME. Take the additional cores within 15 days of receipt of the initial core results. If the additional cores are not taken within 15 days, the Engineer will use the initial core results to determine the PPA. If the additional cores are taken, the Engineer will recalculate the PPA using the combined results from the 10 cores.
7. Removal and Replacement. If the final lot $PD \geq 75$ (based on the combined set of 10 cores or 5 cores if the Contractor does not take additional cores), remove and replace the lot and all overlying work. The replacement work is subject to the same requirements as the initial work.

For shoulder lots, the Department will assess the calculated PPA instead of removal and replacement. Fog seal the lot as specified in NJDOT Specification Section 422.03.01.

- I. Thickness Requirements. Thickness requirements will apply when full-depth, uniform-thickness HMA pavement construction is shown. The size and the assigned number of thickness lots will match those of the surface course air void lots. The Engineer will not include areas consisting of different HMA mixtures or thicknesses in the same lot.

The Engineer will test for thickness using the full-depth cores taken for surface course air voids, evaluated according to NJDOT B-4. The Engineer will base acceptance on total thickness and thickness of the surface course.

1. Total Thickness. The Engineer will calculate the percent defective (PD) as the percentage of the lot is less than the design thickness. The Engineer will consider 10 percent defective as the acceptable quality limit. For lots where $PD \leq 10$, the Department will award a positive pay adjustment. For lots where $PD \geq 10$, the Department will assess a negative pay adjustment.

The Department will base total thickness acceptance on the percentage of the lot estimated to fall below the specified thickness as follows:

- a. Sample Mean (X) and Standard Deviation (S) of the N Test Results ($X_1, X_2, \dots$,

32 12 16 ASPHALTIC PAVING
FLEXIBLE PAVING

X_N). Calculate as specified in NJDOT Specification Section 401.03.07.H.1.

- b. Quality Index (Q).

$$Q_L = \frac{(X - T_{des})}{S}$$

Where:

T_{des} = design thickness.

- c. Percent Defective (PD). Using NJDOT ST for the appropriate sample size, determine the percentage of material (PD) falling below the design thickness associated with Q_1 (lower limit).
- d. Percent Pay Adjustment (PPA). The Department will determine the pay adjustment based on the quantity of the surface course x PPA.

Table 401.03.07-5 Pay Equations for Thickness	
Quality	PPA
$PD < 30$	$PPA = 1 - (0.1 \times PD)$
$PD \geq 30$	$PPA = 40 - (1.4 \times PD)$

- e. Retest. If the initial series of 5 cores produces a percent defective value of $PD \geq 30$, the Contractor may elect to take an additional set of 5 cores at random locations chosen by the Engineer. Notify the Engineer within 15 days of receipt of the initial core results to take the additional cores. If the Engineer is not notified within the 15 days, the Engineer will use the initial core results to determine the PPA. If the additional cores are taken, the Engineer will recalculate the PPA using the combined results from the 10 cores.
- f. Removal and Replacement. If the final lot $PD \geq 75$ (based on the combined set of 10 cores or 5 cores if the Contractor does not take additional cores), remove and replace, or mill and overlay, the lot. The replacement work is subject to the same requirements as the initial work.
2. Surface Course Thickness. The Engineer will evaluate the surface course solely to determine whether a remove-and-replace or an overlay condition exists, not for pay adjustment. The Engineer will calculate the percent defective (PD) as the percentage of the lot that is less than the allowable thickness for the nominal maximum aggregate used in the surface course. The Engineer will accept pavement lots with $PD \leq 10$ and will reject pavement lots with $PD > 10$.

The Engineer will base surface thickness acceptance on the percentage of the lot estimated to fall below the allowable thickness as follows:

- a. Sample Mean (X) and Standard Deviation (S) of the N Test Results ($X_1, X_2, \dots, X_N$). Calculate using the formula as specified in NJDOT Specification Section 401.03.07.H.1.
- b. Quality Index (Q).

$$Q_L = \frac{(X - T_{all})}{S}$$

Where:

Tall = minimum allowable thickness.

Table 401.03.07-6 Surface Course Thickness
Requirements

HMA Mix Design Size Designation	Minimum Allowable Compacted Lift Thickness (Tall)
9.5 MM	1.00 inch
12.5 MM	1.25 inches
19 MM	2.00 inches

- c. Percent Defective. Using NJDOT ST for the appropriate sample size, determine the percentage of material (PD) falling below the allowable thickness associated with Q_L (lower limit).
- d. Retest. If the initial series of 5 cores produces a percent defective value of PD > 10, the Contractor may take an additional 5 cores at random locations determined by the Engineer. Notify the Engineer within 15 days of receipt of the initial core results to take the additional cores. If the Engineer is not notified within the 15 days, the Engineer will use the initial core results to determine the PPA. When the additional cores are taken, the Engineer will recalculate the PPA using the combined results from the 10 cores to obtain the total PD.
- e. Removal and Replacement. If the surface course fails to meet the acceptance requirement, the Department will require removal and replacement of the lot. The replacement work is subject to the same requirements as the initial work.

END OF SECTION 321216

DPMC #T0617-00

DIVISION 32

SECTION 321600 - CURBS, GUTTERS, SIDEWALKS, AND DRIVEWAYS
SUBSECTION 32 16 13 - CURBS AND GUTTERS

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for constructing concrete vertical curb.

1.2 RELATED DOCUMENTS

- A. The Standard Specifications of the New Jersey Department of Transportation for Road and Bridge Construction, dated 2019, as amended and augmented by the Supplementary Specifications (NJDOT Specifications) shall govern the material and construction requirements for poles, bases and accessories. Where conflicts arise between the specifications contained herein or the NJDOT specifications, the more stringent requirement shall govern.
- B. The NJDOT West Berlin Maintenance Yard is an NJDEP Site Remediation Program (SRP) site. Coordinate with the NJDOT Division of Environmental Resources/ Environmental Support & Services Unit (DER/ESSU) prior to initiating any ground disturbances.

1.3 RELATED WORK

- A. 312316 – Excavation.

PART 2 - PRODUCTS

2.1 MATERIALS:

Provide materials as specified in NJDOT Specification Section 607.02.01:

Concrete	NJDOT Specification Section 903.03
Mortar	NJDOT Specification Section 903.08.01
Curing Materials	NJDOT Specification Section 903.10
Reinforcement Steel	NJDOT Specification Section 1905.01
Flexible Delineators	NJDOT Specification Section 911.03
Preformed Joint Filler	NJDOT Specification Section 914.01
Joint Sealer, Hot-Poured	NJDOT Specification Section 914.02

For concrete curb at driveways, the Contractor may use Class E concrete, as specified in NJDOT Specification Section 903.04, in order to open the driveway to traffic in 3 days.

2.2 EQUIPMENT:

Provide equipment as specified in NJDOT Specification Section 607.02.01:

Sealer Application System	NJDOT Specification Section 1003.08
Vibrator	NJDOT Specification Section 1005.04
Straightedge	NJDOT Specification Section 1008.02
Concrete Batching Plant	NJDOT Specification Section 1010.01
Concrete Trucks	NJDOT Specification Section 1010.02

PART 3 - EXECUTION

3.1 PREPARATION

- A. Underlayer Preparation. Excavate as specified in NJDOT Specification Section 202.03.03. Shape and compact the underlying material to produce a firm, even surface. Obtain Engineer's approval before finishing excavation. If the Engineer determines that the bottom of the excavation is unstable, undercut, backfill, and compact as directed by the Engineer.
- B. Constructing Forms. Each time before using, ensure that the forms are thoroughly cleaned and treated with a material that will prevent adherence of the concrete to the forms without discoloring the concrete. Construct concrete barrier curb in sections that correspond to the transverse joints in the existing or proposed pavement and at most 20 feet in length. Reduce this length where necessary for closures, but do not construct closure sections that are less than 6 feet. Where changes in the size or shape are necessary for variable height barrier curb, ensure that the transition between the sections is gradual.
- C. Installing Joints. Place 1/2 inch preformed joint filler at the transverse joints and ensure that filler is flush with the top and face of the curb. Install 1/2 inch preformed joint filler between the curb and concrete pavement, and seal the joint with hot-poured joint sealer.
- D. Placing Concrete. Obtain RE approval of forms and joint placement before placing concrete. Place concrete according to the limitations specified in 504.03.02.C. To place concrete between November 1 to March 15, submit to RE for approval a plan detailing the method of protecting the concrete from salt for at least 30 days after placing. Do not begin placing concrete until this plan is approved.

Place concrete across the formed area to minimize rehandling. Continuously place concrete between transverse joints without the use of intermediate bulkheads. To prevent bowing or misalignment of the transverse joints, place concrete simultaneously on both sides of transverse joints without disturbing the joints.

Consolidate the concrete using internal mechanical vibrators. When required, supplement vibrating by hand spading to ensure proper and adequate consolidation. Provide at least an additional standby vibrating unit for individual concrete placements in excess of 10 cubic yards.

Use vibrators to work the concrete around the reinforcement steel and embedded fixtures and into corners and angles of the forms. Ensure proper vibration of the concrete to avoid honeycombing and voids. Do not use vibrators to move or spread concrete into position. Do not over vibrate concrete.

Place reinforcement steel and sleeves for sign posts while placing concrete, and ensure that they remain in position until the concrete is set.

If a section is not completed from transverse joint to transverse joint, remove the incomplete section and replace. Terminate each day's placement at a transverse joint. Protect concrete as specified in NJDOT Specification Section 504.03.02.I.

Fill sleeves for sign or delineator posts installed in barrier curb with sand, and seal the sleeves with hot-poured joint sealer immediately after installation. Reseal the sleeves if and when posts are installed.

- E. Finishing Concrete. Finish the top of the curb with a wood float and round the top edges. Remove the forms as soon as the concrete holds its shape, and immediately finish joint edges using an edging tool with a radius of 1/4 inch. Remove lips of mortar and irregularities caused by form joints. Using mortar from the barrier concrete placement, patch holes, depressions, voids, and honeycombs to produce a smooth, dense, uniform surface of concrete. Finish the surface of the barrier curb with a steel float and texture with a broom.

If a rigid type of construction is to be made against any exposed surface, leave the exposed surface smooth and uniform to allow free movement of the curb.

- F. Protecting and Curing Concrete. Immediately after finishing the concrete, apply curing compound as specified in NJDOT Specification Section 504.03.02.F.1.
- G. Backfilling Curb. Backfill and compact using the directed method, as specified in NJDOT Specification Section 203.03.02.B.3, against the curb.

END OF SECTION 321613

Intentionally Blank Page

DPMC #T0617-00

DIVISION 32

SECTION 321600 - CURBS, GUTTERS, SIDEWALKS, AND DRIVEWAYS
SUBSECTION 32 16 23 - SIDEWALKS

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for constructing concrete sidewalks and detectable warning surfaces.

1.2 RELATED DOCUMENTS

- A. The Standard Specifications of the New Jersey Department of Transportation for Road and Bridge Construction, dated 2019, as amended and augmented by the Supplementary Specifications (NJDOT Specifications) shall govern the material and construction requirements for poles, bases and accessories. Where conflicts arise between the specifications contained herein or the NJDOT specifications, the more stringent requirement shall govern.
- B. The NJDOT West Berlin Maintenance Yard is an NJDEP Site Remediation Program (SRP) site. Coordinate with the NJDOT Division of Environmental Resources/ Environmental Support & Services Unit (DER/ESSU) prior to initiating any ground disturbances.

1.3 RELATED WORK

- A. 312316 – Excavation.

PART 2 - PRODUCTS

2.1 MATERIALS:

Provide materials as specified in NJDOT Specification Section 606.02.01:

Dense-Graded Aggregate	NJDOT Specification Section 901.10
Concrete	NJDOT Specification Section 903.03
Curing Materials	NJDOT Specification Section 903.10
Reinforcement Steel	NJDOT Specification Section 905.01
Welded Wire Reinforcement	NJDOT Specification Section 905.01.03
Preformed Joint Filler	NJDOT Specification Section 914.01
Hot-Poured Joint Sealer, Type 2	NJDOT Specification Section 914.02
Sleeves	NJDOT Specification Section 919.10
Detectable Warning Surface	NJDOT Specification Section 919.14

Detectable Warning Surfaces shall be red vitrified polymer composite (VPC) cast in place. Detectable Warning Surfaces shall be 'Brick Red' replaceable tactiles as manufactured by ADA Solutions, Inc., Detectable Warning Systems, Inc., Engineered Plastics, Inc., Or Approved Equal.

2.2 EQUIPMENT

Provide equipment as specified in NJDOT Specification Section 606.02.02:

Vibratory Drum Compactor	NJDOT Specification Section 1003.06
Bituminous Material Distributor	NJDOT Specification Section 1003.07
Sealer Application System	NJDOT Specification Section 1003.08
Vibrator	NJDOT Specification Section 1005.04
Straightedge	NJDOT Specification Section 1008.02
Pavement Saw	NJDOT Specification Section 1008.04
Hot-Air Lance	NJDOT Specification Section 1008.06
Concrete Batching Plant	NJDOT Specification Section 1010.01
Concrete Trucks	NJDOT Specification Section 1010.02

PART 3 – EXECUTION

3.1 PREPARATION

- A. Underlayer Preparation. Excavate as specified in NJDOT Specification Section 202.03.03. Obtain Engineer's approval before finishing excavation. If the Engineer determines that the bottom of the excavation is unstable, undercut, backfill, and compact as directed by the Engineer.
- B. Forms. Each time before using, ensure that the forms are thoroughly cleaned and treated with a material that will prevent adherence of the concrete to the forms without discoloring the concrete.
- C. Sleeves. When signs or delineators are shown, place sleeves at locations shown on the Plans. Ensure that sleeves are flush with the finished surface. Fill the sleeves with sand. Seal the top 1/2 inch with hot-poured joint sealer immediately after curing concrete. Reseal the sleeves when sign or delineator posts are installed.
- D. Welded Wire Mesh. When reinforcement is shown for sidewalks and driveways, ensure that the welded wire mesh is free of dirt, detrimental scale, paint, oil, or other foreign substances before placing. Ensure that the welded wire mesh is halfway between the top and bottom surfaces of the concrete.
- E. Expansion Joints. Construct 1/2 inch wide expansion joints, placed at intervals of approximately 20 feet, with preformed joint filler. If the sidewalk, driveway, or island is constructed on a concrete surface, install expansion joints directly over the expansion joints in the underlying concrete surface. Construct expansion joints around all appurtenances, such as manholes and utility poles, and between new concrete and any fixed structure, such as a curb, walls, buildings, or bridges. Ensure that the expansion joint material extends for the full depth. Clean the top and

ends of expansion joint material of all excess concrete, and trim the expansion joint material slightly below the surface of the concrete.

- F. Placing Concrete. Obtain Engineer's approval of forms and joint placement before placing concrete. Place concrete according to the limitations specified in NJDOT Specification Section 504.03.02.C. To place concrete between November 1 and March 15, submit, to Engineer for approval, a plan detailing the method of protecting the concrete from salt for at least 30 days after placing. Do not begin placing concrete until this plan is approved. Place concrete across the formed area to minimize rehandling. Ensure that concrete is not discharged into windrows or piles. Continuously place concrete between transverse joints without the use of intermediate bulkheads. To prevent bowing or misalignment of the transverse joints, place concrete simultaneously on both sides of transverse joints without disturbing the joints. Consolidate the concrete by hand spading or using internal mechanical vibrators. If a slab is not completed from transverse joint to transverse joint, remove the incomplete slab and replace. Terminate each day's placement at a transverse joint. If concrete becomes segregated during placement, cease operations and correct handling operations. Protect concrete as specified in NJDOT Specification Section 504.03.02.I.
- G. Finishing Concrete. Strike off the concrete using a transverse template resting upon the side forms to the required cross section. Finish the concrete using floats and straightedges to obtain a smooth surface. When the surface of the concrete is free from water and just before the concrete attains its initial set, texture with a broom. Round edges using an edging tool with a 1/4 inch radius. Divide the surface into blocks using a grooving tool. Ensure that groove lines coincide with expansion joints. Ensure that the grooves are cut to a depth of at least 1/2 inch. Finish the edges of the grooves using an edging tool with a 1/4 inch radius.
- H. Protection and Curing. Cure concrete using curing compound as specified in NJDOT Specification Section 504.03.02.F. Remove forms as specified in NJDOT Specification Section 504.03.02.G. Ensure pedestrians do not use concrete sidewalks, islands, and driveways until 24 hours after finishing. Ensure vehicles and other loads are not placed on sidewalks, islands, and driveways until the concrete has attained compressive strength of 3,000 pounds per square inch, as determined from 2 concrete cylinders field cured according to AASHTO T 23.
- I. Backfilling. After removing the side forms, backfill the spaces along the edges of sidewalks and driveways with suitable material. Place this material in 5 inch lifts, and compact the layers until firm.

3.2 DETECTABLE WARNING - SURFACE PREPARATION TO INSTALLATION

- A. As specified in NJDOT Specification Section 606.03.03.

Clean and dry the designated area where the detectable warning surface will be installed. Install detectable warning surfaces according to the manufacturer's recommendations.

If the detectable warning surface is not integrally colored, apply the detectable warning surface coating according to the manufacturer's recommendation. Evenly broadcast 60 grit over the final wet coat at a rate of 0.07 pounds per square yard for skid resistance.

T0617-00
Material Storage Bin Installation
DOT Maintenance Yard, West Berlin, N.J.

January 25, 2024

END OF SECTION 321623

32 16 23 SIDEWALKS
CURBS, GUTTERS, SIDEWALKS, AND DRIVEWAYS

321623-4

DPMC #T0617-00

DIVISION 32

SECTION 321700 – PAVING SPECIALITIES
SUBSECTION 32 17 13 - PARKING BUMPERS

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for installation of pre-cast parking bumpers.

1.2 RELATED DOCUMENTS

- A. The Standard Specifications of the New Jersey Department of Transportation for Road and Bridge Construction, dated 2019, as amended and augmented by the Supplementary Specifications (NJDOT Specifications) shall govern the material and construction requirements for poles, bases and accessories. Where conflicts arise between the specifications contained herein or the NJDOT specifications, the more stringent requirement shall govern.
- B. The NJDOT West Berlin Maintenance Yard is an NJDEP Site Remediation Program (SRP) site. Coordinate with the NJDOT Division of Environmental Resources/ Environmental Support & Services Unit (DER/ESSU) prior to initiating any ground disturbances.

PART 2 - PRODUCTS

2.1 MATERIALS

Parking Bumpers:

1. Provide 6 foot long precast concrete bumpers at 6 inches high and 8 inches wide.
2. Bumpers shall be manufactured of Class 4500 reinforced concrete, as specified NJDOT Standard Specifications, to withstand constant use and rough service. Each bumper shall be reinforced with two No. 4 deformed steel reinforcing bars, minimum.
3. Each bumper to be installed on at-grade asphalt pavement shall be manufactured with two holes to accommodate the installation rebar. Holes shall be positioned 6 inches in from each end.

The proposed Parking Bumper shall be as manufactured by Flemington Precast & Supply, LLC, R&E Mershon Concrete, Gambale Concrete & Asphalt, or Approved Equal. The Parking Bumper as manufactured by Flemington Precast & Supply has been used as the basis of design.

Adhesive: Adhesive for anchoring bumpers or wheel stops to pavement shall be an epoxy adhesive manufactured for this purpose.

32 17 13 PARKING BUMPERS
PAVING SPECIALITIES

Steel Bars for Installation: 1" diameter-30" steel pin, conforming with applicable requirements of CSI Section 03 20 00 - Concrete Reinforcing.

Bollards:

1. Provide 8 foot long steel or ductile iron pipe to be embedded 3 feet into concrete footing. Top to be cut and filled with concrete.
2. Pipe bollard to be painted yellow.
3. Yellow reflective tape to be affixed to bollard, 6 inches from top.
4. Concrete footing to be poured with slope at surface to ensure no ponding of water.

1.3 EQUIPMENT

As needed.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install units without damage to shape or finish. Replace or repair damaged units.
- B. Install units in alignment with parking space painted striping and edge of pavement.
- C. Fasten units in place with two steel pins for each unit bumper.
- D. Core drill concrete pavement 1/8 inch larger than steel pin. Seal annular space around hole with grout or sealant.

END OF SECTION 321713

DPMC #T0617-00

DIVISION 32

SECTION 32 17 00 – PAVING SPECIALTIES

SUBSECTION 32 17 23 PAVEMENT MARKINGS

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. This Section describes the requirements for applying traffic stripes, traffic markings, and Raised Pavement Markers (RPMs) to HMA and concrete surfaces. This Section also describes the requirements for removing traffic stripes, traffic markings, and RPMs, removing and replacing RPM lenses.

1.2 RELATED DOCUMENTS

- A. The Standard Specifications of the New Jersey Department of Transportation for Road and Bridge Construction, dated 2019, as amended and augmented by the Supplementary Specifications (NJDOT Specifications) shall govern the material and construction requirements for poles, bases and accessories. Where conflicts arise between the specifications contained herein or the NJDOT specifications, the more stringent requirement shall govern.
- B. The NJDOT West Berlin Maintenance Yard is an NJDEP Site Remediation Program (SRP) site. Coordinate with the NJDOT Division of Environmental Resources/ Environmental Support & Services Unit (DER/ESSU) prior to initiating any ground disturbances.

PART 2 - PRODUCTS

2.1 MATERIALS:

Provide materials as specified in:

Flexible Delineators	NJDOT Specification Section 911.03
Traffic Stripes.....	NJDOT Specification Section 912.03.01
Traffic Markings.....	NJDOT Specification Section 912.03.02
Raised Pavement Markers (RPM).....	NJDOT Specification Section 912.03.03
Epoxy Resin Adhesive	NJDOT Specification Section 912.03.03.2
Lenses.....	NJDOT Specification Section 912.03.03.3
Lens to Casting Adhesive.....	NJDOT Specification Section 912.03.03.4

2.2 EQUIPMENT:

Provide equipment as specified:

Grinding Machine	NJDOT Specification Section 1006.08

32 17 23 PAVEMENT MARKINGS
PAVING SPECIALTIES

Epoxy Striping Equipment	NJDOT Specification Section 1007.01
Thermoplastic Applicator	NJDOT Specification Section 1007.02
Traffic Stripe and Marking Removal Equipment	NJDOT Specification Section 1007.03
Rumble Strip Cutting Machine	NJDOT Specification Section 1007.04
Pavement Saw	NJDOT Specification Section 1008.04

PART 3 - EXECUTION

3.1 PREPARATION

- A. Marking Plan. At least 20 days before beginning the work, submit to the Engineer for approval a marking plan that includes:
1. Schedule of operations for applying traffic markings.
 2. Number and type of equipment.
 3. Manufacturer's recommendations for use of the materials, including mixing ratios and application temperatures.
 4. Details on the means and methods for surface preparation.
 5. Details on the means and methods for premarking.
- B. Surface Preparation. Immediately before making the pavement surface, clean the surface of dirt, oil, grease, and foreign material, including curing compound on new concrete. Clean the surface 2 inches beyond the perimeter of the marking to be placed.
- C. Applying Traffic Markings. Place performed thermoplastic or hot extruded thermoplastic traffic markings on thoroughly dry surfaces and during dry weather conditions. Apply using equipment and procedures that produce markings of the specified color, width, and thickness with well-defined edges, uniform retroreflectivity, and proper bonding to the pavement. Apply the thermoplastic material as follows:
1. Preformed Thermoplastic. Melt the performed thermoplastic tape to bond the traffic markings permanently in position according to the manufacturer's recommendations.

Meet the minimum initial retroreflectance value, as specified in 610.03.01.D for thermoplastic tape, by applying additional glass beads to the hot-wet material in a uniform pattern as necessary.
 2. Extruded Thermoplastic. Uniformly heat the thermoplastic material. When the ambient and surface temperatures are at least 50°F, apply the melted material at a temperature of between 400 and 425°F. Extrude the thermoplastic traffic markings on the HMA or concrete pavement ensuring a thickness of 90 ± 1 mils.

Immediately after, or in conjunction with the thermoplastic extrusion, uniformly apply glass beads to the wet material at a minimum rate of 10 pounds per 100 square feet of markings. Apply glass beads by mechanical means only.

- D. Performance. Ensure that the traffic markings show no fading, lifting, cracking, chipping for any reason including but not limited to traffic wear, maintenance activities including snow plowing, until Acceptance. Ensure that 60 days after application, traffic markings have a minimum retroreflectance value of:

375 millicandela per square meter per lux for white traffic markings

250 millicandelas per square meter per lux for yellow traffic markings

- E. Defective Work. Replace thermoplastic traffic markings that are determined by the Engineer before Acceptance to be defective or that are damaged during construction. Remove defective markings as specified in NJDOT Specification Section 610.03.08.

Replace the entire area of thermoplastic traffic markings determined to be less than the required thickness, to have incorrect color or width, to have failed to bond to the pavement, or to have chipped or cracked. The minimum replacement area is an individual word or symbol, or for longitudinal lines the entire length from where the deficiency first occurs to where it no longer exists.

The Engineer will determine initial retroreflectance as follows:

Provide the Engineer with a Reflectometer that meets a 30 meter geometry as specified in ASTM E 1710, capable of measuring wet and dry conditions as specified in ASTM E 2176 and ASTM E 2177, and that has been certified by the manufacturer as being calibrated within the last 2 years. The Engineer will test the retroreflectance of traffic markings with the provided reflectometer according to the manufacturer's recommendations. Replace traffic markings that do not meet the retroreflectance values indicated in NJDOT Specification Section 610.03.02.D.

- F. Opening to Traffic. Complete each application of thermoplastic traffic markings and allow to thoroughly dry before opening to traffic. The Engineer will determine when the traveled way can be opened to traffic.

END OF SECTION 321720

Intentionally Blank Page

DPMC #T0617-00

DIVISION 32

SECTION 32 91 00 – PLANTING PREPARATION
SUBSECTION 32 91 19.13 TOPSOIL PLACEMENT AND GRADING

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

This Section describes the requirements for preparing and placing topsoil.

1.2 RELATED DOCUMENTS

- A. The Standard Specifications of the New Jersey Department of Transportation for Road and Bridge Construction, dated 2019, as amended and augmented by the Supplementary Specifications (NJDOT Specifications) shall govern the material and construction requirements for poles, bases and accessories. Where conflicts arise between the specifications contained herein or the NJDOT specifications, the more stringent requirement shall govern.
- B. The NJDOT West Berlin Maintenance Yard is an NJDEP Site Remediation Program (SRP) site. Coordinate with the NJDOT Division of Environmental Resources/ Environmental Support & Services Unit (DER/ESSU) prior to initiating any ground disturbances.

1.3 RELATED WORK

- A. 311413 – Soil Stripping and Stockpiling.
- B. 329219 – Seeding.

PART 2 - PRODUCTS

2.1 MATERIALS:

Provide materials as specified in:

Topsoil.....NJDOT Specification Section 917.01

PART 3 - EXECUTION

3.1 TOPSOIL SPREADING

Store topsoil obtained from stripping in stockpiles as specified in NJDOT Specification Section 202.03.03.B.

Scarify the subsoil to a depth of 5 inches, in the area to be topsoiled, to improve porosity and to improve the bond between slope and topsoil. Remove from the scarified area stones 2

inches or larger in any dimension and other debris such as wires, cables, tree roots, pieces of concrete, clods, and lumps. For slopes of 2H:1V or steeper, and the RE will direct the depth of scarification to create ridges (such as by a dozer track) in the subsoil surface parallel to the bottom of the slope.

After the RE has approved the prepared surface elevations, spread topsoil and smooth to grade to produce the required thickness. For slopes of 2H:1V or steeper, create ridges (such as by a dozer track) in the topsoil surface parallel to the bottom of the slope to hold the seed in place and to retain moisture.

Ensure that ground areas are not damaged by the delivery, handling, or storage of materials, by washouts due to drainage diversion, by workers, or by equipment. Repair such damage by grading, scarifying the subsoil to a depth of 5 inches, fertilizing, seeding, and mulching as specified in NJDOT Specification Section 806.03.01.

3.2 BORROW TOPSOIL

If the quantity of topsoil obtained from stripping operations is insufficient for topsoil spreading, provide borrow topsoil from off-site sources. Store borrow topsoil in stockpiles as specified in NJDOT Specification Section 202.03.03.B.

END OF SECTION 329100

DPMC #T0617-00

DIVISION 32

SECTION 32 92 00 – TURF AND GRASSES
SUBSECTION 32 92 19 SEEDING

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. This Section describes the requirements for providing and placing pulverized limestone, fertilizer, and seed mixtures; and for preparing, seeding, and mulching wildflower seed beds.

1.2 RELATED DOCUMENTS

- A. The Standard Specifications of the New Jersey Department of Transportation for Road and Bridge Construction, dated 2019, as amended and augmented by the Supplementary Specifications (NJDOT Specifications) shall govern the material and construction requirements for poles, bases and accessories. Where conflicts arise between the specifications contained herein or the NJDOT specifications, the more stringent requirement shall govern.
- B. The NJDOT West Berlin Maintenance Yard is an NJDEP Site Remediation Program (SRP) site. Coordinate with the NJDOT Division of Environmental Resources/ Environmental Support & Services Unit (DER/ESSU) prior to initiating any ground disturbances.

1.3 RELATED WORK

- A. 329119.13 – Topsoil Placement and Grading.

PART 2 - PRODUCTS

2.1 MATERIALS:

Provide materials as specified in:

Fertilizer	NJDOT Specification Section 917.02.02
Pulverized Limestone.....	NJDOT Specification Section 917.02.03
Grass Seed Mixture.....	NJDOT Specification Section 917.03.01
Wildflower Seed Mixture.....	NJDOT Specification Section 917.03.02
Mulch	NJDOT Specification Section 917.04
Tackifiers.....	NJDOT Specification Section 917.05
Water	NJDOT Specification Section 919.08

Provide hardwood stakes that are relatively knot free. Provide coarse sand that is clean, dry, and salt-free.

32 92 19 SEEDING
TURF AND GRASSES

PART 3 - EXECUTION

3.1 PREPARATION

- A. Optimal Seeding Seasons. Seed from March 1 to May 15 and from August 15 to October 15. When weather and soil conditions are suitable, the Engineer may allow seeding at other times for soil erosion and sediment control. Notify the Engineer 24 hours before the seeding operation.
- B. Soil Preparation. When the topsoil to be seeded has a pH value of less than 5.8, incorporate sufficient pulverized limestone to increase the soil pH value to 6.5. Test soil for appropriate application of N-P-K in fertilizer in accordance with NJ Fertilizer Law P.L. 2010, Chapter 112. Provide the test results to the Engineer for approval.

Recommend quantities of total oxides (calcium and magnesium) to raise the pH of a 4 inch layer of soil to approximately 6.5 as specified in Table NJDOT Specification Section 806.03.01-1.

Table 806.03.01-1 Recommended Quantities of Total Oxides per Soil Class (Pounds per Acre)				
Soil (pH)	Loamy Sand	Sandy Loam	Loam	Silty Loam
5.7	300	600	900	1200
5.3 to 5.6	600	1035	1500	1800
4.9 to 5.2	900	1500	2100	2400
4.5 to 4.8	1200	1800	2700	3000
4.1 to 4.4	1500	2100	3300	3600

Ensure that the quantity of pulverized limestone required is in proportion to its total oxide content.

Cultivate areas to be seeded to provide a reasonably firm but friable seedbed to a depth of 3 to 4 inches. On slopes steeper than 3H:1V, the Engineer may reduce the depth of cultivation. Remove all vegetation, stones 2 inches or larger in any dimension, and other debris from areas to be seeded.

- C. Seed and Fertilizer Application. Sow grass seed mixtures at the rate of 200 pounds per acre. Use only one type of fertilizer to establish turf throughout the Project Limits. At the time of seeding, apply fertilizer at the per acre rate in accordance with the NJ Fertilizer Law P.L. 2010, Chapter 112. When seeding to establish temporary or permanent turf falls within the period that fertilizer is not allowed to be applied, apply fertilizer in the next allowable period.

Place seed and fertilizer by either of the following methods:

1. Hydraulic Method. Mix the seed and fertilizer in water, and then apply under pressure at the specified rates. Retreat all areas inadequately covered.
2. Dry Method. Spread fertilizer in dry form separately from seed at the specified rates based on soil test results. Use mechanical spreaders to achieve even distribution. For areas inaccessible to mechanical spreaders, use hand-operated spreaders. Smooth finished seeded areas to the grades shown on the Plans.

- D. Mulching. Mulch seeded areas as specified in NJDOT Specification Section 809.03.01. Apply straw or fiber mulch at a minimum of 2,500 pounds per acre as a separate operation after areas have been seeded.
- E. Turf Establishment. Protect and maintain seeded areas. Repair damage to seeded areas caused by pedestrian or vehicular traffic or other causes.

Apply a second application of fertilizer approximately 6 months after the initial application in accordance with the NJ Fertilizer Law P.L. 2010, Chapter 112.

Ensure a total grass coverage of 95 percent weed free and containing plants in proportion to the various kinds of seed in the grass seed mixture with no bare areas larger than 25 square feet. If a stand of grass does not meet this criteria, mow unacceptable grass and weeds to a height of 2 inches, remove unacceptable cut vegetation, prepare a viable seed bed, refertilizer, reseed, and remulch until a satisfactory stand of grass is established.

- F. Seeding Seasons. Seed wildflowers from August 15 to October 1 and from April 1 to May 31 inclusive.
- G. Bed Layout. Stake bed outlines at a maximum spacing of 15 feet using 2 x 2 x 36 inch wood stakes driven 1 foot into the ground. Spray paint the upper 2 inches of the stake white. The staking defines the limits for seed protection from mowing, overspray of herbicides, and other potential damage.
- H. Preparation of Seed Mixtures. Provide wildflower seed mixture as specified in NJDOT Specification Section 917.03.02. Provide the wildflower seed mixture and contact information for the seed company as specified in 917.03.02 to the Department for review and approval prior to ordering. In the presence of the Engineer, combine the mixture with a carrier of clean, sand at a volume ratio of 2 parts sand to 1 part wildflower seed mixture.
- I. Seed Application. Evenly spread the prepared blend of seed and sand using a hand-operated, hand-held, broadcast spreader. Lightly drag the seeded area with a piece of chain-link fence to mix the seed into the soil surface.
- J. Mulching. Mulch seeded areas within 7 days of wildflower seeding. Uniformly spread straw mulch in a layer. 1 to 1 ½ inches thick, loose measurement. Bind in place with a tackifier as specified in NJDOT Specification Section 809.03.01.
- K. Wildflower Establishment. Protect and maintain seeded areas. Repair damage to seeded areas caused by pedestrian or vehicular traffic or other causes.

Ensure a total wildflower coverage of 95 percent weed free and containing plants in proportion to the various kinds of seed in the wildflower seed mixture with no bare areas larger than 25 square feet. If a stand of wildflower seeding does not meet this criteria, prepare a viable seed bed, reseed, and remulch until a satisfactory stand of wildflowers is established.

END OF SECTION 329200

Intentionally Blank Page

DPMC #T0617-00

DIVISION 33

SECTION 33 42 00 – STORMWATER CONVEYANCE

SUBSECTION 33 42 23 HEADWALLS AND ENDWALLS FOR STORMWATER
PIPING

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. This Section describes the requirements for constructing, reconstructing, and cleaning inlets and manholes. This Section also describes the requirements for constructing and cleaning concrete culverts and concrete headwalls with a span of less than 5 feet.

1.2 RELATED DOCUMENTS

- A. The Standard Specifications of the New Jersey Department of Transportation for Road and Bridge Construction, dated 2019, as amended and augmented by the Supplementary Specifications (NJDOT Specifications) shall govern the material and construction requirements for poles, bases and accessories. Where conflicts arise between the specifications contained herein or the NJDOT specifications, the more stringent requirement shall govern.
- B. The NJDOT West Berlin Maintenance Yard is an NJDEP Site Remediation Program (SRP) site. Coordinate with the NJDOT Division of Environmental Resources/ Environmental Support & Services Unit (DER/ESSU) prior to initiating any ground disturbances.

PART 2 - PRODUCTS

2.1 MATERIALS:

Provide materials as specified in:

Coarse Aggregate (No. 57).....	NJDOT Specification Section 901.03
Soil Aggregate (I-3)	NJDOT Specification Section 901.11
Concrete.....	NJDOT Specification Section 903.03
Mortar.....	NJDOT Specification Section 903.08.01
Curing Materials.....	NJDOT Specification Section 903.10
Precast Inlet and Manhole.....	NJDOT Specification Section 904.01
Reinforcement Steel.....	NJDOT Specification Section 905.01
Castings	NJDOT Specification Section 909.03
Epoxy Bedding Compound.....	NJDOT Specification Section 909.03.5
Ladder Rung.....	NJDOT Specification Section 909.03.6
Concrete Block.....	NJDOT Specification Section 910.02
Concrete Brick.....	NJDOT Specification Section 910.03
Preformed Joint Filler.....	NJDOT Specification Section 914.01

Inlet Castings shall be by Campbell Foundry, East Jordan Iron Works, J.R. Hoe, Or

33 42 23 HEADWALLS AND ENDWALLS FOR STORMWATER PIPING

Approved Equal.

The proposed Inlet Casting by Campbell Foundry has been used as the basis of design. However, inlet castings by East Jordan Iron Works and J.R. Hoe are approved equals.

2.2 EQUIPMENT:

Provide equipment as specified:

Vibrator	NJDOT Specification Section 1005.04
Concrete Batching Plant	NJDOT Specification Section 1010.01
Concrete Trucks	NJDOT Specification Section 1010.02

PART 3 - EXECUTION

3.1 PREPARATION

A. Headwall

Excavate as specified in NJDOT Standard Specification Section 202.03.03 and Bid Specification Section 312316. Shape and compact the underlying material to produce a firm, even surface.

Headwalls shall be precast and set on a 6 inch bed of compacted coarse aggregate (Dense Graded Aggregate – DGA). Remove handling devices and fill lifting holes with mortar.

END OF SECTION 334241

DPMC #T0617-00

DIVISION 33

SECTION 33 42 00 – STORMWATER CONVEYANCE

SUBSECTION 33 42 41 GRATINGS AND FRAMES FOR STORMWATER
DRAINAGE INLETS

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. This Section describes the requirements for constructing, reconstructing, and cleaning inlets and manholes. This Section also describes the requirements for constructing and cleaning concrete culverts and concrete headwalls with a span of less than 5 feet.

1.2 RELATED DOCUMENTS

- A. The Standard Specifications of the New Jersey Department of Transportation for Road and Bridge Construction, dated 2019, as amended and augmented by the Supplementary Specifications (NJDOT Specifications) shall govern the material and construction requirements for poles, bases and accessories. Where conflicts arise between the specifications contained herein or the NJDOT specifications, the more stringent requirement shall govern.
- B. The NJDOT West Berlin Maintenance Yard is an NJDEP Site Remediation Program (SRP) site. Coordinate with the NJDOT Division of Environmental Resources/ Environmental Support & Services Unit (DER/ESSU) prior to initiating any ground disturbances.

PART 2 - PRODUCTS

2.1 MATERIALS:

Provide materials as specified in:

Coarse Aggregate (No. 57).....	NJDOT Specification Section 901.03
Soil Aggregate (I-3)	NJDOT Specification Section 901.11
Concrete.....	NJDOT Specification Section 903.03
Mortar.....	NJDOT Specification Section 903.08.01
Curing Materials.....	NJDOT Specification Section 903.10
Precast Inlet and Manhole.....	NJDOT Specification Section 904.01
Reinforcement Steel.....	NJDOT Specification Section 905.01
Castings	NJDOT Specification Section 909.03
Epoxy Bedding Compound.....	NJDOT Specification Section 909.03.5
Ladder Rung.....	NJDOT Specification Section 909.03.6
Concrete Block.....	NJDOT Specification Section 910.02
Concrete Brick.....	NJDOT Specification Section 910.03
Preformed Joint Filler.....	NJDOT Specification Section 914.01

33 42 41 GRATING AND FRAMES FOR STORMWATER DRAINAGE INLETS
STORMWATER CONVEYANCE

Inlet Castings shall be by Campbell Foundry, East Jordan Iron Works, J.R. Hoe, Or
Approved Equal.

The proposed Inlet Casting by Campbell Foundry has been used as the basis of design.
However, inlet castings by East Jordan Iron Works and J.R. Hoe are approved equals.

2.2 EQUIPMENT:

Provide equipment as specified:

Vibrator	NJDOT Specification Section 1005.04
Concrete Batching Plant	NJDOT Specification Section 1010.01
Concrete Trucks	NJDOT Specification Section 1010.02

PART 3 - EXECUTION

3.1 PREPARATION

A. Inlet and Manhole

Excavate as specified in NJDOT Standard Specification Section 202.03.03 and Bid Specification Section 312316. Obtain Engineer approval before finishing excavating. If the Engineer determines that the bottom of the excavation is unstable, undercut, backfill, and compact as directed by the Engineer.

When surrounding grade is below proposed grade, provide temporary drainage into the drainage structure as directed by the RE. Repair temporary openings as necessary. Construct inlet and manhole structures as follows:

1. Precast. The Contractor may use precast concrete inlets and manholes. If modifications to precast concrete inlets and manholes are required, obtain RE approval before installation. After installation, fill the lifting holes with mortar.
2. Block and Brick Construction. Lay concrete block and brick with staggered joints. Fill with mortar horizontal joints, brick vertical joints, and concrete block key ways. Ensure that horizontal joints and vertical joints in brick are not more than 3/8 inch wide. Coat the outside wall with at least a 1/2 inch thick layer of mortar and trowel smooth. When the ambient temperature is below 40 °F, ensure that the mortar temperature is between 50 and 100 °F. Cover the masonry and maintain its temperature above 32 °F for 24 hours. Ensure that the connection between drainage structures and pipe is leak-free.

Set castings in mortar beds or anchor castings to the masonry as shown before finishing adjoining Items of work with the same final elevation. Ensure that mortar attains a strength of 2,500 pounds per square inch before opening to traffic.

Backfill and compact using the directed method as specified in NJDOT Specification Section 203.03.02.B.3.

Construct inverts with a smooth and uniform finish that minimizes resistance to flow. Ensure that the shape of the inverts conforms uniformly with the inlet and outlet pipe.

33 42 41 GRATING AND FRAMES FOR STORMWATER DRAINAGE INLETS
STORMWATER CONVEYANCE

Set the manhole cover or inlet grate on the casting. If the manhole cover or inlet grate is loose or wobbles, grind to obtain a tight fit.

B. Set Casting, Reset Casting, and Reconstructed Inlet and Manhole

When modifying less than 1 foot of an inlet or manhole, set or reset the casting. When modifying 1 foot or more of an inlet or manhole, reconstruct the inlet or manhole.

Remove castings, damaged wall portions, and ladder rungs as directed by the Engineer. Reuse concrete as specified in NJDOT Specification Section 202.03.03.C.1. Dispose of other material as specified in NJDOT Specification Section 202.03.03.C.2.

Reconstruct the walls to the elevation shown, and, if necessary, install new ladder rungs. Set castings in mortar beds or anchor castings to the masonry as shown before finishing adjoining Items of work with the same final elevation. If excavation is required to reconstruct, backfill and compact using the directed method as specified in NJDOT Specification Section 203.03.02.B.3.

Set the manhole cover or bicycle grate on the casting. If the manhole cover or bicycle safe grate is loose or wobbles, grind to obtain a tight fit. Do not open to use until 3 days after the grout was set.

C. Extension Frame and Extension Ring

If structures contain existing frames or rings, remove extension frames or rings. Use the minimum number of frames or rings necessary to achieve the proposed grades. Place the extension frame or ring in the casting and check for it.

Before applying epoxy bedding compound, clean the surfaces that will receive the epoxy bedding compound, the lower bearing surfaces, and sides of the extension frames or rings. Clean by sand blasting or brushing with a mechanically-driven wire wheel to ensure that the epoxy bedding compound adheres to the surfaces. Wipe the prepared surfaces with a rapid-evaporating degreasing agent.

Apply extra epoxy bedding compound where there are gaps in the fit. Apply the epoxy bedding compound according to the manufacturer's recommendations, and immediately set the extension frame or ring into the epoxy bedding compound. Ensure that the frame or ring is in full contact with the casting and that the epoxy bedding compound fills the gaps.

Set the bicycle safe grate or manhole cover on the extension frame or ring. If the bicycle safe grate or manhole cover is loose or wobbles after being set in the extension frames or rings, grind to obtain a tight fit or replace as directed.

Repair damage to galvanized coatings according to ASTM A 780. Dispose of materials removed from the existing structure as specified in NJDOT Specification Section 201.03.01.H.

D. Curb Piece

Remove curb pieces of existing inlets and install new curb pieces. Dispose of materials removed

from existing structure as specified in NJDOT Specification Section 201.03.01.H.

Bolt the curb piece to the frame before setting the frame in concrete or mortar. Ensure that all castings are set firm and snug.

E. Cleaning Drainage Structure

At least 5 days before beginning the work, submit a plan to the RE detailing the proposed method and equipment to be used. Remove and collect silt, debris, and material. Ensure that the material is not discharged into the drainage system. Dispose of materials removed from the existing structure as specified in NJDOT Specification Section 202.03.09.

END OF SECTION 334241

DPMC #T0617-00

DIVISION 34

SECTION 34 71 00 – ROADWAY CONSTRUCTION
SUBSECTION 34 71 13.26 VEHICLE GUIDE RAILS

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. This Section describes the requirements for installing beam guide rail.

1.2 RELATED DOCUMENTS

- A. The Standard Specifications of the New Jersey Department of Transportation for Road and Bridge Construction, dated 2019, as amended and augmented by the Supplementary Specifications (NJDOT Specifications) shall govern the material and construction requirements for poles, bases and accessories. Where conflicts arise between the specifications contained herein or the NJDOT specifications, the more stringent requirement shall govern.
- B. The NJDOT West Berlin Maintenance Yard is an NJDEP Site Remediation Program (SRP) site. Coordinate with the NJDOT Division of Environmental Resources/ Environmental Support & Services Unit (DER/ESSU) prior to initiating any ground disturbances.

1.3 RELATED WORK

- A. 312316 – Excavation
- B. 312514 – Stabilization Measures for Erosion and Sedimentation Control

PART 2 - PRODUCTS

2.1 MATERIALS:

Provide materials as specified in:

Concrete.....	NJDOT Specification Section 903.03
Reinforcement Steel.....	NJDOT Specification Section 905.01
Adhesive Anchor System.....	NJDOT Specification Section 908.01.04
Flexible Delineators	NJDOT Specification Section 911.03
Rail Element.....	NJDOT Specification Section 913.01.01
End Treatment.....	NJDOT Specification Section 913.01.02
Posts	NJDOT Specification Section 913.01.03
Blockouts.....	NJDOT Specification Section 913.01.03
Rub Rail.....	NJDOT Specification Section 913.01.04
Miscellaneous Hardware	NJDOT Specification Section 913.01.05

PART 3 - EXECUTION

34 71 13.26 VEHICLE GUIDE RAIL

3.1 BEAM GUIDE RAIL

Install beam guide rail, single or dual faced, so that no unprotected end is exposed to approaching traffic. Within the same working day, replace all existing beam guide rail or cable guide rail that is removed. Where possible, install new beam guide rail exposed to approaching traffic before the removal of the existing system.

Before driving or mounting the posts, determine the location of utilities that may conflict with the posts. The Contractor may adjust post spacing by 6 inches, as approved, to eliminate such conflicts. After completing the wiring for each electrical system and before making connections, perform the following tests on each circuit using suitable equipment in the presence of the RE:

1. Tests for continuity.
2. Tests for ground.
3. Tests for insulation resistance between circuit wires and from circuit wires to ground. Verify that the insulation resistance is at least 150 megaohms between conductors, or between conductor and ground for circuits with a total single conductor length of 1,500 feet or more, and at least 175 megaohms for circuits with a total single conductor length of less than 1,500 feet.

The RE may require additional tests if it is suspected that conduit have been damaged. Locate and repair damage to the electrical conduit due to construction operations.

Drive beam guide rail posts to the required position. Ensure that posts are driven plumb, properly spaced, and to the line and grade shown.

Attach the beam guide rail element to the blockout at every post. Align the top edge of the beam guide rail element in a straight line or smooth curve, parallel to, or concentric with, the traveled way. Where a vertical transition is required, ensure that the top edge of the beam guide rail element forms the chords of a smooth vertical curve. If adjustments to the rail element are necessary, obtain RE approval before punching, drilling, or reaming of the rail element. Do not cut or weld the rail element.

Install flexible delineators with white retroreflective sheeting on the right side of the direction of traffic. Install flexible delineators with yellow retroreflective sheeting on the left side of the direction of traffic.

Mount flexible delineators on the blockout of beam guide rail using either a "U" channel base on the I-beam blockout or a flat base attached to a wood timber or synthetic routed blockout. Attach the base to the I-beam, wood timber blockout, or synthetic routed blockout using an adhesive recommended by the manufacturer of the base and panel. In addition to adhesive, mount flat base to a wood timber or synthetic routed blockout with two #10 x 3/4 inch long sheet metal screws. Mount the first delineator on the beam guide rail end treatment so that the plane face of the center of the reflective area is at an angle of 0 degrees with a line that is perpendicular to the direction of traffic. Mount subsequent delineators every 81 1/4 feet (13 sections of guide rail) along tangent mainline roadway, or every 43 3/4 feet (7 sections of guide rail) along curved mainline roadway with a radius of less than 1,910 feet. If a parabolic flare in the beam guide rail exists, place the second delineator at the end of the flared section

with subsequent delineators spaced as stated above. If the distance between the last delineator and the end of the beam guide rail is greater than 40 feet on tangent mainline roadways, or 20 feet on curved mainline roadways, mount a delineator on the last post or end treatment.

Repair damage to the galvanized coating according to ASTM A 780.

Remove trees and shrubs as specified in 801.03 and 802.03 from the entire guide rail element extending 4 feet behind the guide rail post.

3.2 RUB RAIL

When rub rail is required, bolt rub rail consisting of a steel channel or a bent plate to the beam guide rail posts.

3.3 TERMINALS AND ANCHORAGES

At least 10 days before beginning the work, submit the manufacturer's recommendations the RE. Install terminals and anchorages according to the manufacturer's recommendations.

Excavate for post holes as specified in NJDOT Specification Section 202.03.03. Backfill and compact using the directed method as specified in NJDOT Specification Section 203.03.02.B.3.

Excavate cut slope as specified in NJDOT Specification Section 202.03.03 within the limits of the buried guide rail terminal. Drive beam guide rail posts for buried guide rail terminal to the required position. Ensure that posts are driven plumb, properly spaced, and to the line and grade shown. Attach the beam guide rail element to the spacer at every post. Attach the beam guide rail element and plate to the terminal posts. Align the top edge of the beam guide rail element in a straight line. Where a vertical transition is required, ensure that the top edge of the beam guide rail element forms the chords of a smooth vertical curve. Backfill with excavated material as specified in NJDOT Specification Section 203.03.02.B.3.

3.4 BEAM GUIDE RAIL BLOCKOUTS

Where required, attach blockout on existing beam guide rail between the steel posts and rail elements. Where beam guide rail is attached to a structure, attach the blockout to the structure. Reset beam guide rail, as specified in NJDOT Specification Section 609.03.05, to provide a smooth transition to the existing structure.

END OF SECTION 34 71 13.26

Intentionally Blank Page

DPMC #T0617-00

DIVISION 35

SECTION 35 01 00 – OPERATION AND MAINTENANCE OF WATERWAY AND
MARINE CONSTRUCTION
SUBSECTION 35 01 50.71 CHANNEL EXCAVATION, CLEANING AND DEEPING

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. This Section describes the requirements for constructing slope and channel protection along a waterway.

1.2 RELATED DOCUMENTS

- A. The Standard Specifications of the New Jersey Department of Transportation for Road and Bridge Construction, dated 2019, as amended and augmented by the Supplementary Specifications (NJDOT Specifications) shall govern the material and construction requirements for poles, bases and accessories. Where conflicts arise between the specifications contained herein or the NJDOT specifications, the more stringent requirement shall govern.
- B. The NJDOT West Berlin Maintenance Yard is an NJDEP Site Remediation Program (SRP) site. Coordinate with the NJDOT Division of Environmental Resources/ Environmental Support & Services Unit (DER/ESSU) prior to initiating any ground disturbances.

1.3 RELATED WORK

- A. 311200 – Selective Clearing
- B. 311413 – Soil Stripping and Stockpiling
- C. 312316 – Excavation
- D. 312514 – Stabilization Measures for Erosion and Sedimentation Control

PART 2 - PRODUCTS

2.1 MATERIALS:

Provide materials as specified in:

Coarse Aggregate (No. 57).....	NJDOT Specification Section 901.03
Fine Aggregate	NJDOT Specification Section 901.06.02
Riprap Stones.....	NJDOT Specification Section 901.08
Concrete.....	NJDOT Specification Section 903.03
Mortar.....	NJDOT Specification Section 903.08.01
Curing Materials.....	NJDOT Specification Section 903.10
Stabilization Geotextiles	NJDOT Specification Section 919.01

35 01 50.71 CHANNEL EXCAVATION, CLEANING AND DEEPENING

2.2 EQUIPMENT:

Provide equipment as specified:

Vibrator	NJDOT Specification Section 1005.04
Concrete Batching Plant	NJDOT Specification Section 1010.01
Concrete Trucks	NJDOT Specification Section 1010.02

PART 3 - EXECUTION

3.1 PREPARATION

A. Riprap Stone Slope Protection

Excavate as specified in NJDOT Specification Section 202.03.03. Shape and compact the underlying material to produce a firm, even surface.

Place geotextile over the entire area where riprap is to be placed and extend it at least 12 inches on each side. Bury the geotextile that is extended outside of the riprap area a minimum of 6 inches into the soil. When joining sections of geotextile, overlap the geotextile by a minimum of 18 inches in the direction of flow.

Place a 6 inch layer of coarse aggregate without damaging or dislodging the geotextile.

Firmly bed the riprap stones into the coarse aggregate without damaging or displacing the geotextile. Use larger riprap stones in the lower courses. Fill spaces between the riprap stones with smaller stones of the same type and quality. Firmly ram the smaller stones into place. Provide an even, finished surface for the slope or channel protection.

B. Rock Backfill

Excavate as specified in NJDOT Specification Section 202.03.03. Shape and compact the underlying material to produce a firm, even surface.

Place geotextile over the entire area where riprap is to be placed and extend it at least 12 inches on each side. Bury the geotextile that is extended outside of the riprap area a minimum of 6 inches into the soil. When joining sections of geotextile, overlap the geotextile by a minimum of 18 inches in the direction of flow.

Firmly bed the riprap stones without damaging or displacing the geotextile.

END OF SECTION 350150.71



GEOTECHNICAL ENGINEERING REPORT

T0617-00 Material Storage Bin Installation

West Berlin, Camden County, New Jersey

December 2021

Prepared For:

Whitman Environmental Consulting and Engineering
7 Pleasant Hill Road
Cranbury, New Jersey 08512

Attn: Karlie Baran

Prepared By:

GEO-TECHNOLOGY ASSOCIATES, INC.
Geotechnical and Environmental Consultants
14 Worlds Fair Drive, Suite A
Somerset, New Jersey 08873

GTA Job No: 31211885

THIS PAGE IS INTENTIONALLY BLANK

GEO-TECHNOLOGY ASSOCIATES, INC.

GEOTECHNICAL AND
ENVIRONMENTAL CONSULTANTS

A Practicing Geoprofessional Business Association Member Firm



December 20, 2021

Whitman Environmental Consulting and Engineering
7 Pleasant Hill Road
Cranbury, New Jersey 08512

Attn: Karlie Baran
Project Engineer

Re: Geotechnical Engineering Report
T0617-00 Material Storage Bin Installation
West Berlin, Camden County, New Jersey

Dear Karlie:

In accordance with our agreement dated September 23, 2021 and executed on October 4, 2021, Geo-Technology Associates, Inc. (GTA) has performed a geotechnical exploration for the planning and design of a proposed material storage building to be constructed in West Berlin, Camden County, New Jersey. The exploration consisted of drilling 2 test borings, visually classifying the encountered soils, and performing limited laboratory testing. The results of the field and laboratory testing, and GTA's recommendations regarding the planning and design of proposed salt storage building are included in this report.

GTA appreciates the opportunity to have been of assistance to you on this project. Please contact our office at (732) 271-9301 if you have questions or require additional information.

Very truly yours,
GEO-TECHNOLOGY ASSOCIATES, INC.

Allison Tether

Allison Tether, P.G.
Senior Project Manager

Dennis C. Loh

Dennis C. Loh, P.E.
Vice President



AFS/AMT/DCL
Job No. 31211885
Attachments

14 Worlds Fair Drive, Suite A, Somerset, NJ 08873 (732) 271-9301

✦ Abingdon, MD ✦ Baltimore, MD ✦ Laurel, MD ✦ Frederick, MD ✦ Waldorf, MD ✦ New Castle, DE ✦ Georgetown, DE ✦ Somerset, NJ
✦ NYC Metro ✦ York, PA ✦ Quakertown, PA ✦ Beaver Falls, PA ✦ Malvern, OH ✦ Sterling, VA ✦ Nashville, TN ✦ Charlotte, NC ✦ Raleigh, NC

Visit us on the web at www.gtaeng.com

TABLE OF CONTENTS

SUBJECT	PAGE
INTRODUCTION	1
SITE CONDITIONS.....	1
PROPOSED CONSTRUCTION	2
SITE GEOLOGY	2
SUBSURFACE EXPLORATION.....	3
LABORATORY TESTING.....	4
SUBSURFACE CONDITIONS	4
CONCLUSIONS AND RECOMMENDATIONS	5
Site Preparation.....	5
Earthwork.....	6
Foundations.....	7
Seismic Information.....	8
Floor Design	8
LIMITATIONS.....	8
GBA—Important Information About Your Geotechnical Engineering Report	
APPENDICES	
Appendix A – Figures (2 pages)	
Figure 1 – Site Location Map	
Figure 2 – Boring Location Plan (11x17)	
Appendix B –Exploration Logs (3 pages)	
Notes for Exploration Logs	
Logs of Borings (2 pages)	
Appendix C – Laboratory Data	
Particle Size Distribution Reports (3 pages)	

14 Worlds Fair Drive, Suite A, Somerset, NJ 08873 (732) 271-9301

◆ Abingdon, MD ◆ Baltimore, MD ◆ Laurel, MD ◆ Frederick, MD ◆ Waldorf, MD ◆ New Castle, DE ◆ Georgetown, DE ◆ Somerset, NJ
◆ NYC Metro ◆ York, PA ◆ Quakertown, PA ◆ Beaver Falls, PA ◆ Malvern, OH ◆ Sterling, VA ◆ Nashville, TN ◆ Charlotte, NC ◆ Raleigh, NC

Visit us on the web at www.gtaeng.com

GEOTECHNICAL ENGINEERING REPORT
MATERIAL STORAGE BIN INSTALLATION
WEST BERLIN
CAMDEN COUNTY, NEW JERSEY
DECEMBER 2021

INTRODUCTION

This report presents the results of a geotechnical exploration performed by Geo-Technology Associates, Inc. (GTA) for the planning and design of a proposed material storage building to be constructed at the existing NJDOT West Berlin Maintenance Yard in West Berlin, Camden County, New Jersey. The site is located on Walker Avenue north of its intersection with Zulker Avenue and is identified as Lot 1 in Block 112 on the Berlin Township tax map. The site location is shown on the Site Location Map, which is included as Figure 1 in Appendix A of this report.

GTA was provided with a plan prepared by Ruggieri and Partners titled “Plan of Existing Conditions & Wetlands Delineation” dated April 28, 1995. The plan indicates the site boundaries and existing site features. Following the completion of our field work, we were provided with an untitled and undated plan prepared by Stone Water Architecture, LLC that indicates the existing site features and topography, and the layout and dimensions of the proposed material storage building and site improvements.

The scope of this study included a field exploration, laboratory testing, and geotechnical engineering analyses. The field exploration consisted of drilling 2 Standard Penetration Test (SPT) borings that extended to depths of 27 feet below the existing ground surface. Limited laboratory testing was performed on soil samples obtained from the explorations to assist in characterizing the general subsurface conditions. The conclusions and recommendations presented in this report were derived from engineering analyses of the field and laboratory data, and the information shown on the plans as detailed herein.

SITE CONDITIONS

The site is bounded by Walker Avenue to the west, wooded areas and wetlands to the north, Zulker Avenue to the south, and New Jersey State Route 73 to the east. At the time of our study, the site was occupied by 1-story office and maintenance buildings along Walker Avenue with associated

parking lot areas located adjacently north and east of the buildings. An existing 1-story salt storage building was present in the south-central portion of the site and an existing 1-story materials storage building was located adjacently north. The northern portion of the site also contained soil stockpiles, and trees were present to the east and along the northern property boundary.

Based on our visual observations at the site and review of the ground surface topography indicated on the plans provided to us, the ground surface generally slopes gently from about Elevation (EL) 156 feet in the western portion of the site to about EL 153 feet in the northeastern portion of the site.

PROPOSED CONSTRUCTION

GTA understands that the existing materials storage building will be demolished, and a new material storage building will be constructed in the eastern portion of the site. Based on the most recent plan provided to us, we understand the proposed material storage building will have footprint dimensions of approximately 87 feet by 21 feet. We anticipate that the proposed structure will have a slab-on-grade established at roughly the existing surface grades. The plan also indicates that new pavement will be installed adjacently west of the proposed material storage building.

SITE GEOLOGY

The subject site is situated within the Coastal Plain physiographic province characterized by unconsolidated deposits gently dipping to the southeast. According to the *Bedrock Geologic Map of Central and Southern New Jersey (I-2540, 1998)* published by the New Jersey Geological Survey, the site is underlain by the middle Miocene age Cohansey Formation. This formation is characterized as white to yellow, medium-grained, quartz sand with local gravel and clay. The sand can be locally stained red or orange brown by iron oxides and contained large blocks of ironstone. The unweathered clay is typically dark gray, but commonly weathers white where interbedded with ironstone.

According to the *Surficial Geology of New Jersey (DGS07-2, 2013)* published as part of the Digital Geodata Series by the New Jersey Geological and Water Society, generated using data from the United States Geological Survey, the surficial geology of the site is mapped as Weathered Coastal Plain Formations, consisting of exposed sand and clay of Coastal Plain bedrock formations.

The unit includes thin, patchy alluvium and colluvium, and pebbles left from erosion of surficial deposits.

Please refer to the referenced publication for more detailed descriptions of the geologic members.

SUBSURFACE EXPLORATION

The subsurface exploration program consisted of drilling 2 SPT borings within the proposed building area. The borings were performed by Environmental Technical Drilling, Inc. using a CME 55 drill rig on October 18, 2021 and extended to depths of approximately 27 feet below the existing surface grades. The exploration locations were selected by GTA and located in the field using the existing site features as reference.

The approximate locations of the explorations performed for this study are shown on the Boring Location Plan, which is included as Figure 2 in Appendix A. Detailed descriptions of the encountered subsurface conditions are indicated on the Logs of Borings, which are presented in Appendix B. The ground surface elevations indicated on the exploration logs were obtained by interpolating between contours shown on the plan provided to us and should be considered approximate.

Standard Penetration Testing (SPT) was performed in the borings in accordance with procedures of ASTM D1586. Soil samples were obtained at two- to five-foot intervals within the boreholes. The SPT involves driving a 2-inch O.D., 1⅜-inch I.D. split-spoon sampler with a 140-pound hammer free-falling from a height of 30 inches. The number of blows required to drive the sampler was recorded in six-inch intervals. The SPT N-value, given as blows per foot, is defined as the total number of blows required to drive the sampler from the 6- to 18-inch interval.

Soil samples obtained from the explorations were brought to GTA's soils laboratory for visual classification by a geotechnical engineer and limited laboratory testing. The soil descriptions shown on the logs are therefore based on visual observation of the samples, supplemented by the laboratory results.

LABORATORY TESTING

Laboratory testing performed for this study included grain size distribution tests for classification of the soils in accordance with the Unified Soil Classification System (USCS), and natural moisture content determinations. Classification of soils in accordance with the USCS provides information regarding the engineering properties of the on-site soils that will likely support the proposed foundations, and be used as controlled compacted fill and backfill. Detailed results of the laboratory testing performed for this study are included in Appendix C. The results of the laboratory tests are summarized in the following table:

SUMMARY OF LABORATORY TESTING

Boring	Depth (Ft)	USCS Classification	Fines (%)	NMC (%)
B-1	6-8	Silty SAND (SM)	16.6	12.7
B-2	4-6	Silty SAND with gravel (SM)	20.3	10.3
B-2	15-17	Silty SAND (SM)	12.8	18.5

*Note: NMC = Natural Moisture Content, Fines=Materials passing #200 sieve

SUBSURFACE CONDITIONS

Existing fill materials were encountered at the ground surface in the borings performed for this study, and extended to depths of about 3 to 4 feet below the ground surface. The fill predominantly consisted of loose to medium dense silty sands with varying amounts of gravel and contained concrete fragments and wood pieces. No compressible or otherwise deleterious materials were observed in the recovered samples or drill cuttings.

The natural soils encountered below the fill appear consistent with the geologic mapping. The subsurface profile generally consisted of loose to medium dense silty sands (SM) with varying amounts of gravel to depths of about 8 feet below the ground surface, underlain by medium dense to very dense poorly-graded sand with silts (SP-SM) to depths of 15 feet below the ground surface. A deeper layer of silty sand was encountered below the poorly-graded sand with silts, which extended to the completion depths. The deeper silty sands were generally medium dense to very dense, with exception to the samples taken at 20 feet below the ground surface that were very loose to loose.

Groundwater was encountered in the borings at depths ranging from about 4 to 5 feet below the existing surface grades. Long-term groundwater readings were not obtained because the explorations were backfilled upon completion for safety considerations. Fluctuations in the groundwater level typically occur due to several factors, including variations in precipitation, seasonal changes, and site development activities.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of this study, it is GTA's opinion that construction of the proposed material storage building is feasible, given that the geotechnical recommendations are followed, and that the standard level of care is maintained during construction. It is our opinion that the proposed structure may be supported by conventional spread footings, and the floor slab may be established on-grade. Geotechnical issues that may impact site development include the presence of existing fill materials and groundwater at relatively shallow depths.

Site Preparation

Site preparation should begin by clearing and grubbing any surface vegetation, and stripping the topsoil and/or surface materials from within and at least five feet beyond the proposed building and pavement areas. Any existing utilities located within and at least five feet beyond the area of the proposed material storage building should be rerouted. The resultant excavations should be backfilled with controlled compacted fill.

Existing fill materials were exposed at the ground surface and extended to depths ranging from about 3 to 4 feet below the existing surface grades at the boring locations. The fill materials generally consisted of loose to medium dense silty sands with gravel and minimal concrete debris and wood fragments. Considering the proposed building will be used to store materials, we believe the existing fill materials can remain in place below the proposed floor slab provided the Owner understands and accepts that greater than normal slab settlements will likely occur. That being the case, the excavations for the proposed building foundations will need to extend through the existing fill to the natural soils as detailed in the *Foundations* section of this report.

If the risk of relatively minor slab settlements cannot be accepted, then the existing fill materials should be completely removed from within and at least a few feet beyond the proposed

building area and the resultant excavation be backfilled to the planned building subgrade level using controlled compacted fill.

Earthwork

We recommend that the earthwork phase of the project be performed during the warmer, drier months of the year. Bid documents should clearly state that the geotechnical engineer will evaluate the suitability of the soils for various purposes at the time of construction, and that high moisture content will not be considered as a basis for rejection of soils as unsuitable. The potential for moisture conditioning (drying) of the soils should be anticipated and included in the earthwork contract.

We recommend that the exposed subgrade be compacted by several passes of a large smooth drum vibratory roller. Soils that are observed to be soft or unstable should be selectively excavated, and the resultant excavations should be backfilled with controlled compacted fill or AASHTO Size No. 57 aggregate.

All construction excavations should be sloped and shored in accordance with OSHA excavation regulations or stricter local governing safety codes. It is our opinion that the undisturbed natural soils or controlled compacted fill composed of similarly graded materials would generally be classified as “Type C” soils under the OSHA excavation regulations. Significantly flatter excavation side-slopes will be required where groundwater seepage occurs.

The excavated predominately coarse-grained existing fill and natural site soils (SM, SP-SM) are considered suitable for reuse as backfill, with some limitations. Moisture conditioning of the on-site soils may be required to attain the recommended degree of compaction, depending on the prevailing weather conditions at the time the earthwork is performed. All backfill placed below proposed buildings and pavements be installed under the observation of a representative of GTA. Backfill should be spread in layers on the order of 8 to 10 inches in loose thickness and be compacted to 95 percent of the maximum dry density as defined by ASTM D1557.

Groundwater was encountered in the borings at depths ranging from about 4 to 5 feet below the existing surface grades. Assuming the foundation excavations will not extend more than a foot or

two below these depths, we anticipate that groundwater seepage will be able to be controlled by pumping from sumps located in the excavations. Positive drainage should be maintained during construction to prevent inundation of subgrade soils by surface water runoff. Excavations to remove wet, soft soils should be backfilled with controlled compacted fill or AASHTO No. 57 stone aggregate.

Foundations

The proposed material storage building may be supported on conventional shallow spread foundations designed to impose an allowable net bearing pressure of up to 3,000 pounds per square foot. Minimum widths for wall footings of 24 inches and column footings of 30 inches are recommended to prevent a punching-type shear failure if the design, based on the above bearing pressure, results in a narrower footing.

Assuming the Owner decides to accept the risk of minor slab settlements and allow the existing fill to remain in place below the floor, it will be necessary to excavate through the existing fill to expose the surface of natural soils at the proposed footing locations, and backfill the overexcavations using AASHTO No. 57 stone aggregate to achieve the planned footing subgrade level. We recommend that a filter fabric (Mirafi 140N, or equiv.) be installed between the natural soil and stone to prevent soil migration into the void spaces within the stone aggregate below the footings. If seepage of water is encountered during foundation construction, the excavation should be dewatered using sumps and removing the water by pumping away from the building site.

Based on the assumed loads, settlements on the order of 1-inch total and ½-inch differential can be anticipated. Exterior footings should be founded a minimum of 30 inches below the final exterior grades to provide protection from frost action, or deeper if required by local building code. Interior foundations in permanently heated portions of the structure may be established at convenient depths below the floor slab.

Detailed foundation subgrade evaluations should be performed by a representative of GTA in each footing excavation, prior to the placement of reinforcing steel or concrete, to confirm that the recommended allowable soil bearing capacity is available. The foundation bearing surface

evaluations should be performed using a combination of visual observation, hand-rod probing, Dynamic Cone Penetrometer (DCP) testing, and comparisons with the explorations.

Seismic Information

Based on the results of this study, it is GTA's opinion that the subsurface conditions at the site may be categorized as Site Class D as defined in the 2018 IBC. This categorization is based on the subsurface conditions encountered in the explorations performed for this study, general geologic information for the region, and the information contained in the Code.

Floor Design

Following the earthwork procedures recommended in this report, it is our opinion that the floor slab can be designed as a concrete slab-on-grade using a design modulus of subgrade reaction (k) of 125 pounds per cubic inch (pci). GTA recommends that the concrete floor slab be founded on a minimum 4-inch-thick coarse granular layer. Washed gravel or crushed stone meeting the gradation of AASHTO Size No. 57 aggregate can be used for the granular layer unless otherwise required by local code. The slab may bear on wall projections; however, it should be jointed so that the foundation walls can settle slightly without affecting the slab.

Construction activities and exposure to the environment often cause deterioration of slab subgrades. Therefore, we recommend that the slab subgrade soils be evaluated by a representative of the geotechnical engineer immediately prior to stone and concrete placement. This evaluation may include a combination of visual observations, proofrolling, hand-probing, and field density tests to verify that the subgrade soils have been prepared properly. Contractors should anticipate that remedial work could be required to achieve a stable subgrade prior to stone placement, even if the subgrade soils had previously been compacted to the required densities. All interior utility trenches should be backfilled and compacted in accordance with our *Earthwork* recommendations.

LIMITATIONS

This report, including all supporting exploration logs, field data, field notes, laboratory test data, calculations, estimates and other documents prepared by GTA in connection with this project have been prepared for the exclusive use of Whitman Environmental Consulting and Engineering (Client) pursuant to the Agreement between GTA and Client dated September 23, 2021 and executed

on October 4, 2021, and in accordance with generally accepted engineering practice. All terms and conditions set forth in the Agreement and the General Provisions attached thereto are incorporated herein by reference. No warranty, express or implied, is made herein. Use and reproduction of this report by any other person without the expressed written permission of GTA and Client is unauthorized and such use is at the sole risk of the user.

The analysis and recommendations contained in this report are based on the data obtained from limited observation and testing of the encountered materials. Borings indicate soil conditions only at specific locations and times, and only at the depths penetrated. They do not necessarily reflect strata or variations that may exist between exploration locations. Consequently, the analysis and recommendations must be considered preliminary until the subsurface conditions can be verified by direct observation at the time of construction. If variations of subsurface conditions from those described in this report are noted during construction, recommendations in this report may need to be re-evaluated.

In the event that any changes in the nature, design, or location of the facilities are planned, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and conclusions of this report are verified in writing. GTA is not responsible for any claims, damages, or liability associated with interpretation of subsurface data or reuse of the subsurface data or engineering analysis without the expressed written authorization of GTA.

The scope of our services for this geotechnical exploration did not include any environmental assessment or investigation for the presence or absence of wetlands, or hazardous or toxic materials in the soil, surface water, groundwater or air, on or below or around this site. Any statements in this report or on the logs regarding odors or unusual or suspicious items or conditions observed are strictly for the information of our Client.

This report and the attached logs are instruments of service. The subject matter of this report is limited to the facts and matters stated herein. Absence of a reference to any other conditions or subject matter shall not be construed by the reader to imply approval by the writer.

Important Information about This Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer

will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the “Findings” Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site’s subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual site-wide subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report’s Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals’ misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals’ plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note*

conspicuously that you’ve included the material for information purposes only. To avoid misunderstanding, you may also want to note that “informational purposes” means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled “limitations,” many of these provisions indicate where geotechnical engineers’ responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a “phase-one” or “phase-two” environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer’s services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, *proper implementation of the geotechnical engineer’s recommendations will not of itself be sufficient to prevent moisture infiltration.* Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. *Geotechnical engineers are not building-envelope or mold specialists.*



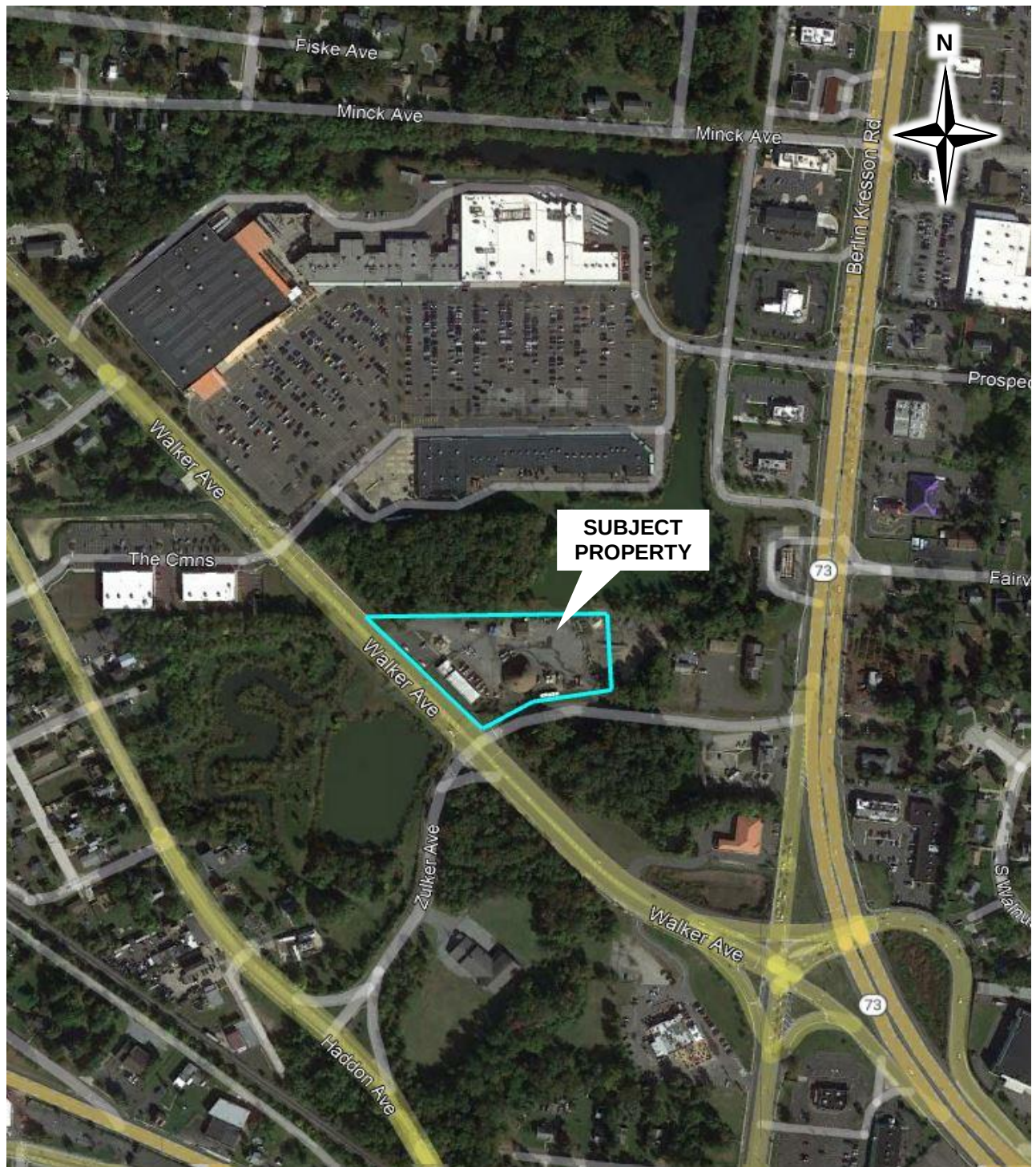
**GEOPROFESSIONAL
BUSINESS
ASSOCIATION**

Telephone: 301/565-2733

e-mail: info@geoprofessional.org www.geoprofessional.org

APPENDIX A

Figures



Note: Site boundary is approximate.

SITE LOCATION MAP



14 Worlds Fair Drive, Suite A
Somerset, New Jersey 08873
(732) 271-9301
fax (732) 271-9306

GEO-TECHNOLOGY ASSOCIATES, INC.

T0617-00 MATERIAL STORAGE BIN INSTALLATION

West Berlin, Camden County, New Jersey

Prepared For: Whitman Environmental Consulting
and Engineering

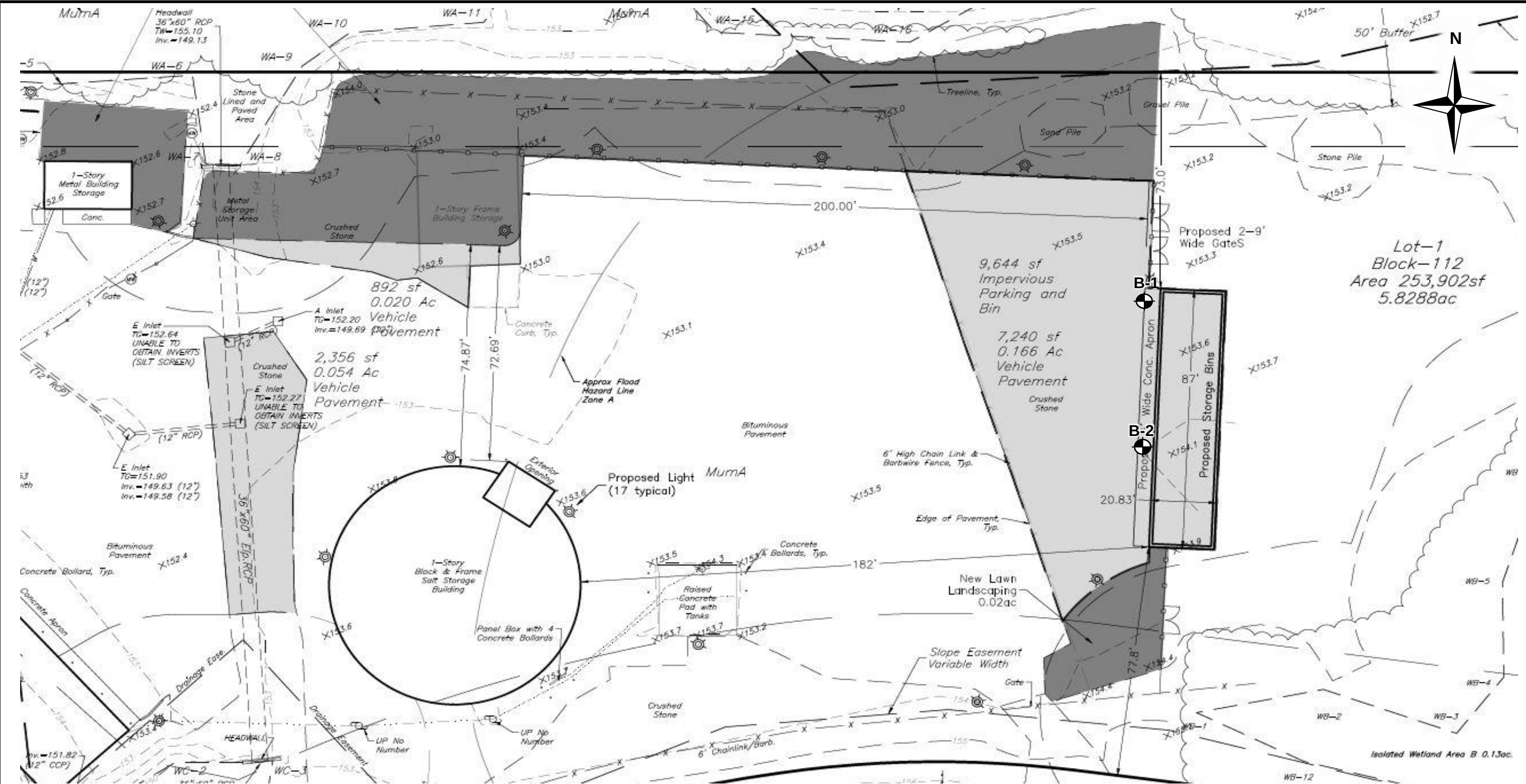
SOURCE: Google Maps

SCALE: NTS

DATE: DEC. 2021

PROJECT #: 31211885

Figure 1



*Undated and untitled baseplan prepared by Stone Water Architecture, LLC.

LEGEND:

B-X  Indicates the numbers and approximate locations of borings performed for this study.

BORING LOCATION PLAN



14 Worlds Fair Drive, Suite A
Somerset, New Jersey 08873
(732) 271-9301
fax (732) 271-9306

GEO-TECHNOLOGY ASSOCIATES, INC.

**T0617-00 MATERIAL STORAGE
BIN INSTALLATION**

West Berlin, Camden County, New Jersey

Prepared For: Whitman Environmental
Consulting and Engineering

DESIGN BY: *	DRAWN BY: AFS	REVIEWED BY: AMT
SCALE: NTS	DATE: DEC. 2021	PROJECT #: 31211885

Figure 2

APPENDIX B

Exploration Logs

NOTES FOR EXPLORATION LOGS

KEY TO USCS TERMINOLOGY AND GRAPHIC SYMBOLS

MAJOR DIVISIONS (BASED UPON ASTM D 2488)			SYMBOLS	
			GRAPHIC	LETTER
COARSE- GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LESS THAN 15% PASSING THE NO. 200 SIEVE)		GW
		GRAVELS WITH FINES (MORE THAN 15% PASSING THE NO. 200 SIEVE)		GP
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LESS THAN 15% PASSING THE NO. 200 SIEVE)		SW
		SANDS WITH FINES (MORE THAN 15% PASSING THE NO. 200 SIEVE)		SP
		SANDS WITH FINES (MORE THAN 15% PASSING THE NO. 200 SIEVE)		SM
				SC
FINE- GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILT OR CLAY ($<15\%$ RETAINED ON THE NO. 200 SIEVE) SILT OR CLAY WITH SAND OR GRAVEL (15% TO 30% RETAINED ON THE NO. 200 SIEVE) SANDY OR GRAVELLY SILT OR CLAY ($>30\%$ RETAINED ON THE NO. 200 SIEVE)			ML
				CL
				OL
	ELASTIC SILTS AND FAT CLAYS LIQUID LIMIT GREATER THAN 50			MH
				CH
				OH
HIGHLY ORGANIC SOILS				PT

NOTE: DUAL SYMBOLS ARE USED TO INDICATE COARSE-GRAINED SOILS WHICH CONTAIN AN ESTIMATED 5 TO 15% FINES BASED ON VISUAL CLASSIFICATION OR BETWEEN 5 AND 12% FINES BASED ON LABORATORY TESTING; AND FINE-GRAINED SOILS WHEN THE PLOT OF LIQUID LIMIT & PLASTICITY INDEX VALUES FALLS IN THE PLASTICITY CHART'S CROSS-HATCHED AREA. FINE-GRAINED SOILS ARE CLASSIFIED AS ORGANIC (OL OR OH) WHEN ENOUGH ORGANIC PARTICLES ARE PRESENT TO INFLUENCE ITS PROPERTIES. LABORATORY TEST RESULTS ARE USED TO SUPPLEMENT SOIL CLASSIFICATION BY THE VISUAL-MANUAL PROCEDURES OF ASTM D 2488.

ADDITIONAL TERMINOLOGY AND GRAPHIC SYMBOLS

ADDITIONAL DESIGNATIONS	DESCRIPTION		GRAPHIC SYMBOLS
	TOPSOIL		
	MAN MADE FILL		
	GLACIAL TILL		
	COBBLES AND BOULDERS		
RESIDUAL SOIL DESIGNATIONS	DESCRIPTION	"N" VALUE	
	HIGHLY WEATHERED ROCK	50 TO 50/1"	
	PARTIALLY WEATHERED ROCK	MORE THAN 50 BLOWS FOR 1" OF PENETRATION OR LESS, AUGER PENETRABLE	

COARSE-GRAINED SOILS (GRAVEL AND SAND)

DESIGNATION	BLOWS PER FOOT (BPF) "N"
VERY LOOSE	0 - 4
LOOSE	5 - 10
MEDIUM DENSE	11 - 30
DENSE	31 - 50
VERY DENSE	>50

NOTE: "N" VALUE DETERMINED AS PER ASTM D 1586

FINE-GRAINED SOILS (SILT AND CLAY)

CONSISTENCY	BPF "N"
VERY SOFT	<2
SOFT	2 - 4
MEDIUM STIFF	5 - 8
STIFF	9 - 15
VERY STIFF	16 - 30
HARD	>30

NOTE: ADDITIONAL DESIGNATIONS TO ADVANCE SAMPLER INDICATED IN BLOW COUNT COLUMN:
WOH = WEIGHT OF HAMMER
WOR = WEIGHT OF ROD(S)

SAMPLE TYPE

DESIGNATION	SYMBOL
SOIL SAMPLE	S-
SHELBY TUBE	U-
ROCK CORE	R-

WATER DESIGNATION

DESCRIPTION	SYMBOL
ENCOUNTERED DURING DRILLING	
UPON COMPLETION OF DRILLING	
24 HOURS AFTER COMPLETION	

NOTE: WATER OBSERVATIONS WERE MADE AT THE TIME INDICATED. POROSITY OF SOIL STRATA, WEATHER CONDITIONS, SITE TOPOGRAPHY, ETC. MAY CAUSE WATER LEVEL CHANGES.

LOG OF BORING NO. B-1

Sheet 1 of 1

PROJECT: **T0617-00 Material Storage Bin Installation**
 PROJECT NO.: **31211885**
 PROJECT LOCATION: **West Berlin, Camden County, New Jersey**

WATER LEVEL (ft): **4 Ft.** **5 Ft.** **N/A**
 DATE: **10/18/2021** **10/18/2021** **-**
 CAVED (ft): **In auger** **10 Ft.** **BOC**

DATE STARTED: **10/18/2021**
 DATE COMPLETED: **10/18/2021**
 DRILLING CONTRACTOR: **Environmental Technical Drilling, Inc.**
 DRILLER: **Mike Kane**
 DRILLING METHOD: **Hollow Stem Auger**
 SAMPLING METHOD: **Split-Spoon**

GROUND SURFACE ELEVATION: **153 Ft.**
 DATUM: **Topo**
 EQUIPMENT: **CME 55**
 HAMMER TYPE: **Automatic**
 LOGGED BY: **AFS**
 CHECKED BY: **AMT**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL		
									DESCRIPTION	REMARKS
1	0.0	11	7-8-7-5	15	153.0	0			FILL - Dark gray, moist, loose to medium dense, silty sand, with concrete fragments and wood pieces	
2	2.0	10	3-4-5-5	9	150.0		SM		Gray, moist, loose, Silty SAND with gravel - wet at 4 Ft.	  - NMC = 12.7%
3	4.0	14	1-1-8-12	9		5			- medium dense at 6 Ft.	
4	6.0	18	8-10-11-14	21						
5	8.0	17	7-9-10-11	19	145.0		SP-SM		Brown, wet, medium dense, Poorly-graded SAND with silt and gravel - very dense at 10 Ft.	
6	10.0	12	20-20-34-44	54		10				
7	15.0	14	15-17-24-29	41	138.0	15	SM		Dark brown, wet, dense, Silty SAND - Brown at 16 Ft. - Gray at 17 Ft.	
8	20.0	11	1-7-3-2	10		20			- Yellow-brown, loose at 21 Ft.	
9	25.0	23	7-12-16-23	28		25			- Dark yellow-brown, medium dense at 25 Ft.	
					126.0				Boring complete at 27 Ft.	
						30				

NOTES: **Locations and elevations are approximate.**
BOC: Backfilled on completion.



GEO-TECHNOLOGY ASSOCIATES, INC.

14 Worlds Fair Drive, Suite A
 Somerset, NJ 08873

LOG OF BORING NO. B-1

Sheet 1 of 1

LOG OF BORING NO. B-2

Sheet 1 of 1

PROJECT: **T0617-00 Material Storage Bin Installation**
 PROJECT NO.: **31211885**
 PROJECT LOCATION: **West Berlin, Camden County, New Jersey**

WATER LEVEL (ft): **4 Ft.** **5 Ft.** **N/A**
 DATE: **10/18/2021** **10/18/2021** **-**
 CAVED (ft): **In auger** **9 Ft.** **BOC**

DATE STARTED: **10/18/2021**
 DATE COMPLETED: **10/18/2021**
 DRILLING CONTRACTOR: **Environmental Technical Drilling, Inc.**
 DRILLER: **Mike Kane**
 DRILLING METHOD: **Hollow Stem Auger**
 SAMPLING METHOD: **Split-Spoon**

GROUND SURFACE ELEVATION: **154 Ft.**
 DATUM: **Topo**
 EQUIPMENT: **CME 55**
 HAMMER TYPE: **Automatic**
 LOGGED BY: **AFS**
 CHECKED BY: **AMT**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL		
									DESCRIPTION	REMARKS
1	0.0	13	4-9-9-7	18	154.0	0			FILL - Dark gray, moist, loose to medium dense, silty sand with gravel and concrete fragments	
2	2.0	13	8-5-5-6	10					- with wood pieces at 3 Ft.	
3	4.0	11	1-3-8-9	11	150.0	5	SM		Gray, wet, loose to medium dense, Silty SAND	NMC = 10.3%
4	6.0	20	5-8-9-14	17						
5	8.0	20	8-12-11-9	23	146.0	10	SP-SM		Brown, wet, medium dense, Poorly-graded SAND with silt and gravel	
6	10.0	23	15-25-23-24	48					- dense at 10 Ft.	
7	15.0	17	13-24-25-29	49	139.0	15	SM		Dark yellow-brown, wet, dense, Silty SAND	- NMC = 18.5%
8	20.0	9	3-2-1-5	3		20			- Yellow-brown, very loose, with clay clods at 20 Ft.	
9	25.0	0	20-25-30-41	55		25			- very dense at 25 Ft.	
					127.0				Boring complete at 27 Ft.	
						30				

NOTES: **Locations and elevations are approximate.**
BOC: Backfilled on completion.



GEO-TECHNOLOGY ASSOCIATES, INC.

14 Worlds Fair Drive, Suite A
 Somerset, NJ 08873

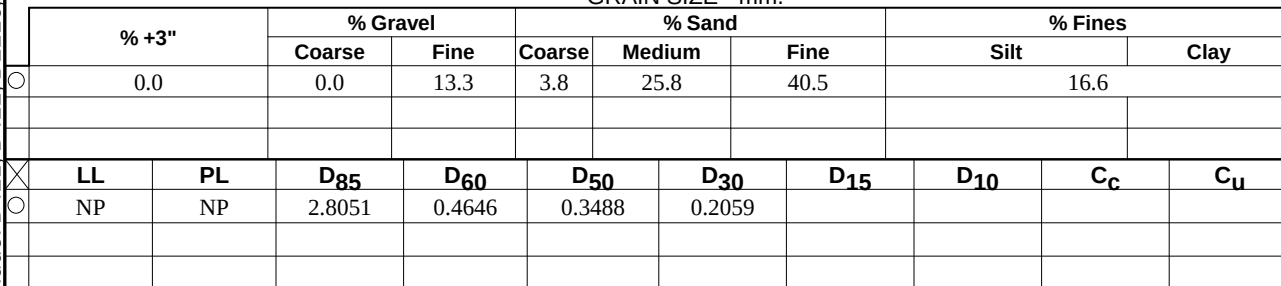
LOG OF BORING NO. B-2

Sheet 1 of 1

APPENDIX C

Laboratory Data

ASTM Specifications performed my include: D421, D422, D2216, D2217, and D4318.



Material Description	USCS	AASHTO
○ Silty SAND	SM	A-2-4(0)

Remarks:
ONMC = 12.7%

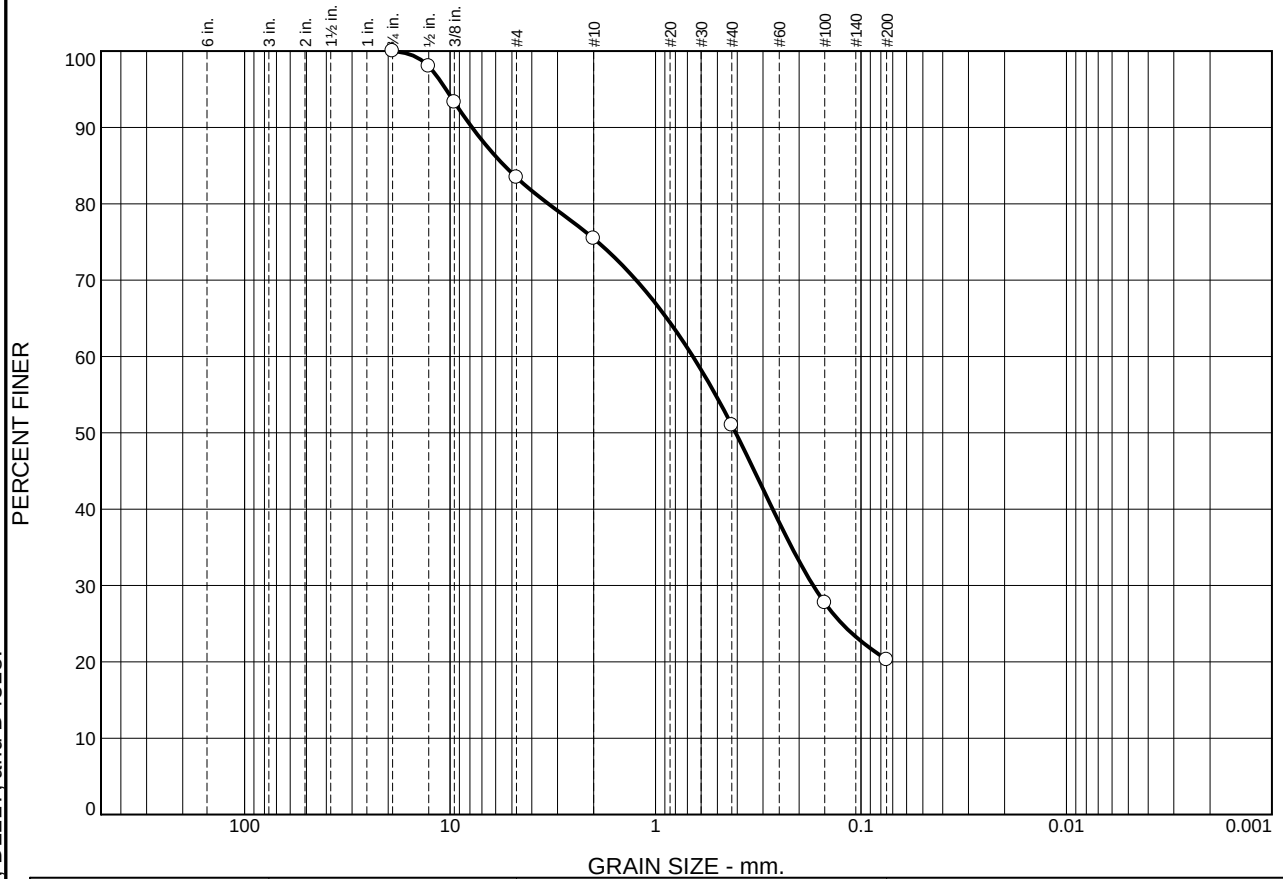
○ **Source of Sample:** B-1 **Depth:** 6 **Sample Number:** 4



Figure

Tested By: RK **Checked By:** DSP

Particle Size Distribution Report



	% +3"		% Gravel		% Sand			% Fines		
			Coarse	Fine	Coarse	Medium	Fine	Silt		Clay
○	0.0		0.0	16.6	7.9	24.5	30.7	20.3		
⊗	LL	PL	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
○	NP	NP	5.4407	0.6578	0.4069	0.1708				

Material Description	USCS	AASHTO
Silty SAND with gravel	SM	A-2-4(0)

Project No. 31211885 Client: Whitman Environmental Consulting and Engineering Project: T0617-00 Material Storage Bin Installation Source of Sample: B-2 Depth: 4 Sample Number: 3	Remarks: ONMC = 10.3%
 GEO-TECHNOLOGY ASSOCIATES, INC. 14 Worlds Fair Drive, Suite A Somerset, NJ 08873	Figure

Tested By: RK Checked By: DSP

ASTM Specifications performed my include: D421, D422, D2216, D2217, and D4318.

Particle Size Distribution Report



	% +3"		% Gravel		% Sand			% Fines		
			Coarse	Fine	Coarse	Medium	Fine	Silt		Clay
○	0.0		0.0	0.0	0.0	15.4	71.8	12.8		
×	LL	PL	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
○	NP	NP	0.4421	0.2959	0.2591	0.1948	0.1097			
Material Description								USCS	AASHTO	
○ Silty SAND								SM	A-2-4(0)	

Project No. 31211885 **Client:** Whitman Environmental Consulting and Engineering
Project: T0617-00 Material Storage Bin Installation

Source of Sample: B-2 **Depth:** 15 **Sample Number:** 7



GEO-TECHNOLOGY
ASSOCIATES, INC.
14 Worlds Fair Drive, Suite A
Somerset, NJ 08873

Remarks:

ONMC = 18.5%

Figure

Tested By: RK

Checked By: DSP

ASTM Specifications performed my include: D421, D422, D2216, D2217, and D4318.