



State of New Jersey

DEPARTMENT OF TREASURY
DIVISION OF PROPERTY MANAGEMENT & CONSTRUCTION
P O BOX 034
TRENTON NJ 08625-0034

PHILIP D. MURPHY
Governor

ELIZABETH MAHER MUOIO
State Treasurer

SHEILA Y. OLIVER
Lt. Governor

CHRISTOPHER CHIANESE
Director

June 5, 2023

Altec Building Systems Corp.
904 Atlantic Avenue
Point Pleasant, NJ 08742

Re: **Notice to Proceed**
Project #A1346-00 (Re-Bid)
Repurpose Mod Lab Generator
Trenton, NJ – Mercer County
Award Amount: **\$1,320,000.**

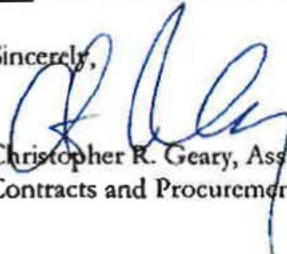
To Whom It May Concern:

We have received and accepted your certificates of insurance and performance and payment bonds. Attached is a fully executed contract for your records.

Contract performance shall be completed within **180** calendar days of the date of this Notice to Proceed.

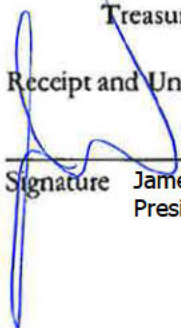
You have been authorized to proceed on **June 6, 2023** with **Non-Permit Activities**.

Sincerely,


Christopher R. Geary, Assistant Deputy Director
Contracts and Procurement

- C J. Polizzi
- V. Campanella
- J. Langsdorf
- E. Cardone
- B. Mahan
- S. Baker
- M. Ryan
- Central File
- Treasury Fiscal

Receipt and Understanding is Hereby Acknowledged.



Signature James E. Lawroski, Jr.
President

Date



6/5/23

CONTRACT

THIS AGREEMENT, made this 1st day of June, 2023

by and between The State of New Jersey, herein called "Owner," acting herein through its
(Corporate Name of Owner)

Division of Property Management and Construction, Deputy Director, and
(Title of Authorized Official)

ALTEC BUILDING SYSTEMS CORP.

(a corporation)

of 904 Atlantic Avenue, City of Point Pleasant, County of Ocean, and State of New Jersey hereinafter called
"Contractor". (FID#22329228900)

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned, to be made and performed by the OWNER, the CONTRACTOR hereby agrees with the OWNER to commence and complete the construction described as follows:

CONTRACT PROJECT NO.: **A1346-00-RE-BID-CC01**
REPURPOSE OF MOD LAB GENERATOR
LABOR & WORKFORCE DEVELOPMENT BUILDING
MERCER COUNTY – TRENTON
NEW JERSEY

LUMP SUM BID\$1,320,000.

- SPECIFICATIONS: Dated 03-15-22 included as part of this contract
- BULLETINS: "A" dated 03-30-23 and "B" dated 05-01-23 have been acknowledged by the bidder and included as part of this contract
- GEN.CONDITIONS: Instructions to Bidders & General Conditions revised December 2015, included as part of this contract
- DRAWINGS: See cover sheet dated 02-25-22, included as part of this contract
- POST BID REVIEW CERTIFICATION: Dated 05-11-23, included as part of this contract

hereinafter called the project, for the sum of **ONE MILLION THREE HUNDRED TWENTY THOUSAND Dollars (\$1,320,000.)** and all extra work in connection therewith, under the terms as stated in the General and Special Conditions, if applicable, of the Contract Specifications, and at his (its or their) own proper cost and expense to furnish all the materials, supplies, machinery, equipment, tools, superintendent, labor, insurance, and other accessories and services necessary to complete the said project in accordance with the conditions and prices stated in the Proposal, the General Conditions, Special Conditions of the Contract Specifications, the plans, which include all maps, plats, blue prints, and other drawings and printed or written explanatory matter thereof, the specifications and contract documents therefore as prepared by **Suburban Consulting Engineers, Inc.,** herein entitled the Architect/Engineer, all of which are made a part hereof and collectively evidence and constitute the contract.

The contractor hereby agrees to commence work under this contract on **(See Notice to Proceed)** and to fully complete the project within **180** consecutive calendar days thereafter. This is of the essence for the completion of this contract. The contractor further agrees to pay, as liquidated damages, the sum of **\$660.00** for each consecutive calendar day thereafter as hereinafter provided in Article 7.5 of the General Conditions.

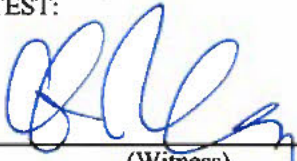
The OWNER agrees to pay the CONTRACTOR in current funds for the performance of the contract, subject to additions and deductions, as provided in the General Conditions of the Contract Specification, and to make payments on account thereof as provided in Article 10 of the General Conditions.

Only domestic materials shall be acquired or used for any public work unless the head of the department, or other public officer charged with the duty by law, shall determine it to be inconsistent with the public interest, or the cost to be unreasonable, or domestic materials of the class or kind to be used are not mined, produced or manufactured, as the case may be, in the United States in commercial quantities and of a satisfactory quality.

The Contractor shall conform to all provisions of "Law Against Discrimination" N.J.S.A. 10:5-31 et seq. and N.J.A.C. 17:27.


IN WITNESS WHEREOF, the parties to these presents have executed this contract in four (4) counterparts, each of which shall be deemed an original, in the year and day first above mentioned.

ATTEST:



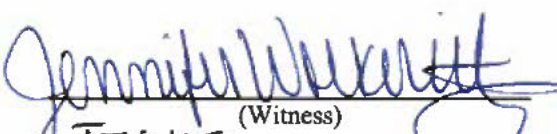
(Witness)

**DIVISION OF PROPERTY MANAGEMENT
AND CONSTRUCTION**

By 

RICHARD S. FLODMAND
DEPUTY DIRECTOR


(Title)



(Witness)
JENNIFER WOLKOWITZ

ALTEC BUILDING SYSTEMS CORP.

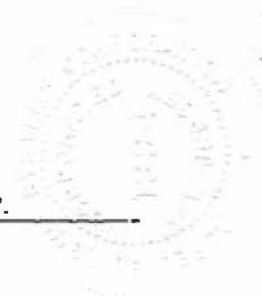
(Contractor)

By 

JAMES E. LAWROSKI, JR.
PRESIDENT

(Title)
904 ATLANTIC AVENUE
POINT PLEASANT, NJ 08742

(Address)



WARRANTY:

It is hereby certified and warranted by the undersigned contractor and by the undersigned principals or officers thereof, for said Contractor and for themselves, personally and individually, that no person has been employed to solicit or secure this Contract in violation of the provisions of Section 10, Chapter 48 of the Laws of 1954, N.J.S.A. 52:34-15, or in violation of any other laws of the State of New Jersey; and it is further warranted that all applicable laws and regulations shall be complied within the performance of this contract.

Please be advised that pursuant to N.J.S.A. 54:49-19 et seq. and notwithstanding any provision of the law to the contrary, whenever any taxpayer, partnership or S corporation under contract to provide goods or services or construction projects to the State of New Jersey or its agencies or instrumentalities, including the legislative and judicial branches of State government, is entitled to payment for those goods or services at the same time the taxpayer, partner or shareholder of that entity is indebted for any State tax, the Director of the Division of Taxation shall seek to set off so much of that payment as shall be necessary to satisfy the indebtedness. The amount set-off shall not allow for the deduction of any expense or other deductions which might be attributable to the taxpayer, partner, or shareholder subject to set-off under this Act.

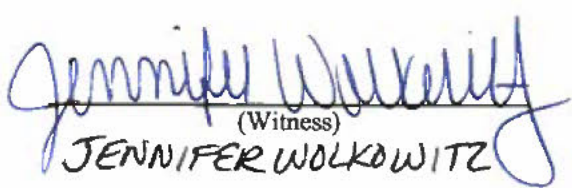
The Director of the Division of Taxation shall give notice of the set-off to the taxpayer, partner or shareholder and provide an opportunity for a hearing within 30 days of such notice under the procedures for protests established under N.J.S.A. 54:49-18. No request for conference, protest, or subsequent appeal to the Tax Court from any protest shall stay the collection of the indebtedness. Interest that may be payable by the State, pursuant to N.J.S.A. 52:32-32 et. seq. to the taxpayer shall be stayed.

By signing this contract, I certify, pursuant to N.J.S.A. 52:34-12.2, that the entity for which I am authorized to bid:


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 McBride principles of nondiscrimination in employment as set forth in N.J.S.A. 52:18A-89.5 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.

I certify that the foregoing statements made by me are true. I am aware that if any of the foregoing statements made by me are willfully false, I am subject to punishment.


(Witness)
JENNIFER WOLKOWITZ

By


ALTEC BUILDING SYSTEMS CORP.
(Contractor)
JAMES E. LAWROSKI, JR.
PRESIDENT
(Title)
904 ATLANTIC AVENUE
POINT PLEASANT, NJ 08742



This contract conforms to the standard form approved by the Attorney General.

MATTHEW J. PLATKIN
ATTORNEY GENERAL OF NEW JERSEY

* Current Wage Rates dated June 1, 2023 and are included as part of this contract.

"THE MINORITY PERCENTAGE GOAL REQUIREMENT FOR THIS CONTRACT IS 30% PER SKILLED CRAFT."

"THE FEMALE PERCENTAGE GOAL REQUIREMENT FOR THIS CONTRACT IS 6.9% PER SKILLED CRAFT."

"(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 upon request."

BID PROPOSAL FORM

STATE OF NEW JERSEY
DEPARTMENT OF TREASURY
DIVISION OF PROPERTY MANAGEMENT & CONSTRUCTION
P.O. BOX 934
TRENTON NEW JERSEY 08625-0034

The bid proposal is to be returned in the pre-addressed envelope and will be accepted no later than 2:00 p.m.,
May 9, 2023 after which time the bid proposals will be publicly opened and read.

FIRM NAME:
(Please Type or Print)
(Business Street Address ONLY - No P.O. Box)

Altec Building Systems Corp.
904 Atlantic Avenue
Point Pleasant, NJ 08742

PROJECT NO: A1346-00 Re-Bid
PROJECT: Repurpose Mod Lab Generator
LOCATION: 1 John Fitch Way and South Warren Street, Trenton, NJ 08608
COUNTY: Mercer

The undersigned Single Prime Contractor proposes to be responsible for all work shown in the contract plans and specifications.

Single Bid \$ 1,320,000.00
lump sum all trades (Numerical Figures Only)

In accordance with N.J.S.A. 52:35-1 et seq., the Contractor will be classified with the Division of Property Management and Construction (DPMC) in one of the following trades: **General Construction (C008) or General Construction/Alterations and Additions (C009)**

The proposal is based upon the bid documents listed below.

1. Instructions to Bidders and General Conditions Revised December, 2015
2. Specifications dated March 15, 2022
3. Drawing(s)#: See Cover Sheet dated February 25, 2022

This project will be fully completed and ready for occupancy within 180 calendar days.

Liquidated damages will be assessed at 1/20 of one percent (.05%) of the value of this contract (minimum of \$250.00/day).

The above price is good through sixty (60) days after the bid opening date.

Submit only one bid proposal and bid bond form.

A bid bond in the amount of fifty percent (50%) of the TOTAL bid, including alternates if applicable, must accompany this proposal form.

PROJECT NO : A1346-00 Re-Bid

The Contractor must include prices for the base bid and all alternates and unit prices when requested, otherwise the bid may be considered non-responsive.

Having examined the bid documents and the site of the proposed work and being familiar with all of the conditions surrounding the construction of the proposed project including the availability of materials and labor, the Contractor hereby proposes to furnish all labor, materials and supplies, and to construct the project as submitted, within the time set forth therein, and at the price stated. This price is to cover all expenses incurred in performing the work required, of which this proposal is a part.

The Contractor acknowledges and affirms that it has personal knowledge of or has obtained and reviewed a copy of the valid prevailing wage rates for all trades involved in the project for the geographical location of the project as issued by the Commissioner of the Department of Labor, P O Box 389, Trenton, New Jersey, 08625 (609) 292-2259.

The Contractor acknowledges receipt of the following Bulletins:

<u>BULLETIN NUMBER</u>	<u>DATE OF BULLETIN</u>
Bulletin A	March 30, 2023
Bulletin B	May 1, 2023

The names and addresses of each Subcontractor included in this Single Bid proposal are listed below and are classified with DPMC in accordance with N.J.S.A. 52:35-1 et seq. at the time of the bid due date. If the Single Prime contractor intends to perform the work described under any of the listed trades sections of this bid proposal form, that Single Prime Contractor must be classified in that trade and listed in the appropriate Subcontractor section of this bid proposal. The Contractor acknowledges the failure to list classified Subcontractors as part of Single Bid proposals shall constitute a non-waivable material deviation resulting in a rejection of the bid.

STRUCTURAL STEEL & ORNAMENTAL IRON (C029)

NAME: Mastercraft Iron, Inc.

ADDRESS: 1111 10th Avenue, Neptune, NJ 07753

PLUMBING (C030)

NAME: Three G's Plumbing & Heating, Inc.

ADDRESS: 1408 Atlantic Avenue, Manasquan, NJ 08736

ELECTRICAL (C047) (In-House)

NAME: Altec Building Systems Corp.

ADDRESS: 904 Atlantic Avenue, Point Pleasant, NJ 08742

PROJECT NO.: A1346-00 Re-Bid

EXECUTION OF CONTRACT

Upon receipt of written notice of the acceptance of this bid, the Contractor shall execute the formal contract within 10 calendar days and deliver a Performance and Payment Bond as well as other information as required in the bid solicitation.

COMMENCEMENT OF WORK

Contractor acknowledges that the work is to commence upon receipt of the Notice to Proceed with the exception of permit activities.

BID SECURITY

Bid Bond is fifty percent (50%) of the TOTAL bid, including alternates if applicable, and is to become the property of the State in the event the contract and bond are not executed within the time set forth as liquidated damages for the delay and additional expense incurred by the Owner.

PROJECT NO.: A1346-00 Re-Bid
CERTIFICATION

I certify that the below named firm is classified by the Division of Property Management and Construction in the approved amount of \$ 25,000,000.00 for (trade) C047 Electrical, C009 General Construction/Alter.&Additions, C035 Solar Energy Systems until 8/30/23 (expiration date).

I further certify that this firm's bid for this project does not cause the firm to exceed its aggregate rating limit, including consideration of uncompleted construction work (please refer to N.J.A.C. 17:19-2.13, which describes how certain major trade subcontract work is discounted 85% for purposes of calculating whether a contractor is within its rating).

Respectfully submitted,

(Seal-if Bid proposal is by a corporation)

By: Altec Building Systems Corp.
(Name of Firm)

James E. Lawroski, Jr. (Signature)

President
(Title)

904 Atlantic Avenue
(Business Street Address ONLY - No P O Box)

<u>Point Pleasant</u>	<u>NJ</u>	<u>Ocean</u>	<u>08742</u>
(City)	State	County	Zip)

Phone No. 732-903-6264

Fax No. 732-903-6298

Federal Identification No. [REDACTED]

Any change in ownership information since filing your Request for Classification (Form DPMC 27)

Yes

No

If yes, attach explanation.

PROJECT NO: A1346-00 Re-Bid

STATE OF NEW JERSEY
DEPARTMENT OF TREASURY
DIVISION OF PROPERTY MANAGEMENT & CONSTRUCTION

NON-COLLUSION AFFIDAVIT

PROJECT: A1346-00 Re-Bid
Repurpose Mod Lab Generator
Labor and Workforce Development Building

Bid Due Date May 9, 2023 02:00 PM

STATE OF NEW JERSEY |
| SS.
COUNTY OF OCEAN |

I, James E. Lawroski, Jr. of the City of Point Pleasant

in the County of Ocean and the State of New Jersey

of full age, being duly sworn according to law on my oath depose and say that:

I am President

of the firm of Altec Building Systems Corp.

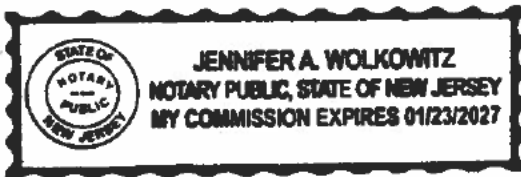
the Contractor making the Bid Proposal for the above named project, and that I execute the said Bid Proposal with full authority so to do; that said Contractor has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free, competitive bidding in connection with the above named project; and that all statements contained in said bid proposal and in this affidavit are true and correct, and made with full knowledge that the State of New Jersey relies upon the truth of the statements contained in said Bid Proposal and in the statements contained in this affidavit in awarding the contract for the said project.

James E. Lawroski, Jr. SIGNATURE OF PRINCIPAL

Subscribed and sworn to before me this 9th day
of May 2023

Jennifer A. Wolkowitz
Notary Public

My Commission expires January 23, 2027



NEW JERSEY DEPARTMENT OF THE TREASURY
DIVISION OF PROPERTY MANAGEMENT AND CONSTRUCTION
CERTIFICATION OF NON-DEBARMENT FORM

DPMC Contract No: A1346-00

Contract Name: Rebid Repurpose Mod Lab Generator

Contractor Name: Altec Building Systems Corp.

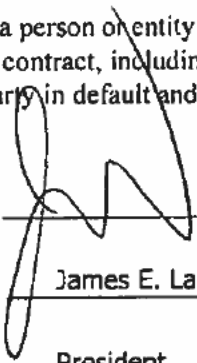
Contractor Address: 904 Atlantic Avenue, Point Pleasant, NJ 08742

CERTIFICATION

Pursuant to N.J.S.A. 52:32-44.1, I, the undersigned, being duly authorized to complete this certification on behalf of the above-named Contractor, do hereby certify and attest, under the pains and penalties of perjury, that:

- The Contractor is not debarred at the federal level from contracting with the federal government;
- None of the parent entities, subsidiaries, related entities or affiliates of the Contractor are debarred at the federal level from contracting with the federal government;
- I am authorized to execute this certification on behalf of the Contractor;
- I acknowledge that the State of New Jersey is relying on the information contained herein;
- I acknowledge that I am under a continuing obligation from the date of this certification through the completion of any contract(s) with DPMC to notify DPMC in writing of any changes to the information contained herein; and
- I acknowledge that it is a criminal offense to make a false statement or misrepresentation in this certification. If I do so, I will be subject to criminal prosecution, and such misrepresentation may be considered fraudulent, and/or a material breach of the Contractor's contract(s) with the State of New Jersey.

If DPMC finds a person or entity to be in violation of the law, it shall take action as may be appropriate and permitted by law, rule or contract, including but not limited to, imposing sanctions, seeking compliance, recovering damages, declaring the party in default and/or seeking debarment or suspension of the party.

Signature:  _____

Print Name: James E. Lawroski, Jr.

Title: President

Date: 5/10/23

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

CERTIFICATION OF NON-DEBARMENT FORM

DPMC Contract No: A1346-00 Re-Bid

Contract Name: Repurpose Mod Lab Generator

Contractor Name: Three G's Plumbing & Heating, Inc.


Contractor Address: 1408 Atlantic Avenue - Manasquan, NJ 08736

CERTIFICATION

Pursuant to N.J.S.A. 52:32-44.1, I, the undersigned, being duly authorized to complete this certification on behalf of the above-named Contractor, do hereby certify and attest, under the pains and penalties of perjury, that:

- The Contractor is not debarred at the federal level from contracting with the federal government;
- None of the parent entities, subsidiaries, related entities or affiliates of the Contractor are debarred at the federal level from contracting with the federal government;
- I am authorized to execute this certification on behalf of the Contractor;
- I acknowledge that the State of New Jersey is relying on the information contained herein;
- I acknowledge that I am under a continuing obligation from the date of this certification through the completion of any contract(s) with DPMC to notify DPMC in writing of any changes to the information contained herein; and
- I acknowledge that it is a criminal offense to make a false statement or misrepresentation in this certification. If I do so, I will be subject to criminal prosecution, and such misrepresentation may be considered fraudulent, and/or a material breach of the Contractor's contract(s) with the State of New Jersey.

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Signature: 

Print Name: William A. Meltsch

Title: Treasurer

Date: 5/12/23

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

CERTIFICATION OF NON-DEBARMENT FORM

DPMC Contract No: A1346-00 Rebid

Contract Name: Repurpose Mod Lab Generator

Contractor Name: Mastercraft Iron, Inc.


Contractor Address: 1111 Tenth Avenue, Neptune, NJ 07753

CERTIFICATION

Pursuant to N.J.S.A. 52:32-44.1, I, the undersigned, being duly authorized to complete this certification on behalf of the above-named Contractor, do hereby certify and attest, under the pains and penalties of perjury, that:

- The Contractor is not debarred at the federal level from contracting with the federal government;
- None of the parent entities, subsidiaries, related entities or affiliates of the Contractor are debarred at the federal level from contracting with the federal government;
- I am authorized to execute this certification on behalf of the Contractor;
- I acknowledge that the State of New Jersey is relying on the information contained herein;
- I acknowledge that I am under a continuing obligation from the date of this certification through the completion of any contract(s) with DPMC to notify DPMC in writing of any changes to the information contained herein; and
- I acknowledge that it is a criminal offense to make a false statement or misrepresentation in this certification. If I do so, I will be subject to criminal prosecution, and such misrepresentation may be considered fraudulent, and/or a material breach of the Contractor's contract(s) with the State of New Jersey.

If DPMC finds a person or entity to be in violation of the law, it shall take action as may be appropriate and permitted by law, rule or contract, including but not limited to, imposing sanctions, seeking compliance, recovering damages, declaring the party in default and/or seeking debarment or suspension of the party.

Signature: 
Bryan Newhook

Print Name: _____
Vice President

Title: _____

Date: May 12, 2023



CONTRACTOR'S POST-BID REVIEW INTERVIEW & CERTIFICATION

DPMC PROJECT NUMBER: A1346-00 Re-Bid

PROJECT NAME: Repurpose Mod Lab Generator

PROJECT ADDRESS: Department of Labor and Workforce Development
1 John Fitch Way
Trenton, NJ 08608

MEETING DATE: Thursday, May 11, 2023

MEETING TIME: 2:00pm

MEETING LOCATION: **MS Teams**

<u>INVITED</u>	<u>REPRESENTING</u>	<u>CONTACT</u>
Joe Polizzi	DPMC, Design Manager	Joseph.Polizzi@treas.nj.gov
Bill Hamilton	DPMC, Asst. Deputy Dir., Const.	William.Hamilton@treas.nj.gov
Vince Campanella	NJBA, Construction Manager	Vincent.Campanella@treas.nj.gov
Michael McAloon	Suburban Consulting Engineers	mmcaloon@suburbanconsulting.com
Jim Lawroski	Altec Building Systems Corp.	jlawroski@altecbuildingsystems.com
Joe Lawroski	Altec Building Systems Corp.	joe@altecbuildingsystems.com
Buddy Canale	Altec Building Systems Corp.	bcanale@altecbuildingsystems.com
Jerry McClure	DPMC, OBMO	Jerry.McClure@treas.nj.gov
David (Ross) Jeneske	DPMC, OBMO	Ross.Jeneske@treas.nj.gov
Michael Debnarik	DPMC, OBMO	Michael.Debnarik@treas.nj.gov
Mark Dae	DPMC, OBMO	Mark.Dae@treas.nj.gov

PURPOSE:

- This Post Bid Review Interview with the apparent low bidder (**Altec Building Systems Corp.**) for project **A1346-00** is to confirm the Contractor's understanding of the project scope, submitted pricing, qualifications and ability to perform the project. Furthermore, the Contractor certifies by his signature(s) below, they understand their contractual responsibility to comply with the Contract Documents.

INTERVIEW:

- 1) Introductions
- 2) Distribution of Handouts
 - a. Bid Tab
 - b. Bulletins

Project #: A1346-00 Re-Bid
Date: 5/11/2023

POST-BID INTERVIEW & CERTIFICATION

PAGE 1 OF 8

3) **Contract Documents**: The Contractor confirms that they have received all contract documents issued by the New Jersey Division of Property Management and Construction for project number **A1346-00** including all drawings, specifications and Bulletins as listed below and that these documents constitute the Contract Documents:

- i. **Bulletin A dated March 30, 2023**
- ii. **Bulletin B dated May 1, 2023**

Response: Yes

Signed: _____

4) **Award**: The Contractor confirms that the following Base Bid was submitted in their bid submission. The Contractor also understands that their Awarded Contract will be based upon the Base Bid.

a) **Base Bid**: The Contractor confirms that the following Lump Sum Base Bid Amount was included in their bid submission:

- i. Single Lump Sum Base Bid

\$1,320,000

Response: Yes

Signed: _____

b. There are No allowances in this project that are included in the Lump Sum Base Bid.

Response: Yes

Signed: _____

5) **Trades**: The Contractor confirms the following trades will be working on the project:

a. **Primary / Named Trades**: The Contractor confirms that the following DPMC classified Contractors were submitted as "Named Subcontractors" in their bid submission. The Contractor further confirms that there will be no substitutions for the Named Subcontractors for the duration of the Project.

C029 - Structural & Ornam. Iron: Mastercraft Iron, Inc.

C030 - Plumbing: Three G's Plumbing & Heating, Inc.

C047 - Electrical: Altec Building Systems Corp.

Response: Yes

Signed: _____

6) Scope of Work and General Conditions Requirements:

a. Intent of the Project: Contractor has reviewed the Contract Documents, and incorporated their contents / information into their bid submission package and is familiar with the intent of the project?

Response: Yes

Signed: _____

b. Existing Conditions: Contractor has visited the project site and familiarized themselves with the existing conditions of the site, including buildings, paving and roadways, utilities and other features, in order to plan and coordinate the proposed work accordingly and that the conditions of the existing site are incorporated into their bid submission?

Response: Yes

Signed: _____

c. Mobilization: Upon execution of the contract and issuance of a Notice to Proceed, the Contractor is prepared to immediately mobilize and begin work?

Response: Yes

Signed: _____

d. Supervision: The contractor will provide one full time superintendent for the duration of the entire project. This superintendent shall be responsible to coordinate all project activities, serve as the official on-site contact person for the Contractor and attend all project meetings including the pre-construction meeting. This superintendent may be a "working" superintendent.

Response: Yes

Signed: _____

e. Substitutions: Contractor affirms that this bid is not based upon substitutions of any products specified in the Contract Documents.

Response: Yes

Signed: _____

7) Schedule: The Contractor is aware of the following schedule requirements:

As per Bulletin A, *Schedule Format*:

- a. **The contractor shall be responsible for preparing, updating and distributing a Gantt chart progress schedule constructed using either Microsoft Project or a Microsoft Project compatible software. The Schedule must be furnished as a Microsoft Project file (.mpp) and in paper format if required.**

Response: Yes

Signed: _____

8) Requirement for Payment: As per Bulletin A, *Schedule Format*:

- a. **Applications for Payment are required to include a Gantt chart progress schedule as an attachment. Applications without this schedule will be considered incomplete and will be rejected.**
- b. **Bi-Weekly Submission**: A **Gantt chart progress schedule as described above**, is required at all biweekly project meetings.
- c. **Contract Time**: Contractor confirms that they have reviewed the project schedule and are prepared to execute the work as outlined and within the stipulated contract time of **180 calendar days** from the State's issuance of a Notice to Proceed.
- d. **Substantial Completion**: the Contractor understands that Substantial Completion must occur within the Contract Time. The Contractor also confirms that in addition to all of the requirements for Substantial Completion listed in the specifications, including a DCA sign off i.e. CofA or CofO, the project will not be considered substantially complete until all required warranties, owner training, owner's manuals and maintenance manuals have been delivered to and accepted by the Consultant and the State.

Response: Yes

Signed: _____

9) Project Specific Issues: The Contractor confirms that they are aware of the following project specific issues:

- a. The facility serves a critical function, particularly the 2nd floor data center which contains important servers necessary for several operating systems by State employees and the public. Interruptions to the electrical service for this equipment is to be limited and restricted to nighttime working hours on Saturday nights as server traffic is reduced; any work not interrupting the electrical service can commence during the normal working hours identified. The scheduling and coordination of this shutdown is to be performed well in advance.

- b. The Cummins 600KW diesel generator and 3,000 gallon day tank shall be furnished by the owner. The generator and day tank are currently stored offsite at the Trenton Print Shop at 101 Carrol Street, Trenton, NJ 08609 and shall be relocated to the proposed location at DLWD Building at 1 John Fitch Way, Trenton, NJ 08611
- c. The Contractor shall rig the generator and day tank from the existing storage location to the new proposed location as shown on the design drawings. The contractor shall arrange all necessary permits, permit fees, scheduling with the local Police Department for necessary road closure, and cost of Police Officer(s).
- d. The Contractor shall provide, install, and perform an acceptance test of the complete owner furnished generator and day tank.
- e. All personnel working on-site must pass a background check.

Response: Yes

Signed: _____

10) Execution of the Work: The Contractor understands the following concerning the execution of the work:

- a. The site will remain fully operational throughout the duration of the project.
- b. The building and worksite is closed on weekends and State holidays.
- c. Contractor is not permitted onsite when the facility is closed.
- d. 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.
- e. Utility shutdowns, interruptions to service, deliveries, etc. must be approved by and coordinated with the DPMC and the Client.
- f. The Contractor will be required to use all appropriate DPMC forms during the construction process. These forms are available on the DPMC website and can be downloaded for the Contractor's use. Instructions concerning how to access this website will be provided to the Contractor during the award process.

Response: Yes

Signed: _____

11) Bonds: The Contractor is aware that if he is the successful low bidder, he will be responsible to furnish the following bonds within the timeframe

specified in the Intent-to-Award Letter. (Note: this is typically, but not always, 10 days from the date of the Intent-to-Award Letter.)

Performance and Payment Bond

Response: Yes

Signed:  _____

12) UCC Permit Status: The Contractor understands the following concerning the UCC Building Permit for this project:

- a. The required UCC Permit Tech Sheets have been prepared by the Consultant and will be forwarded by the State to the Contractor along with a Letter of Intent to Award the Contract.
- b. The Contractor shall return the Tech Sheets to the State with the appropriate signatures and seals either at the Contract Award Meeting, or within a maximum of 10 days after the Award Meeting.
- c. DPMC will submit the fully executed Tech Sheets to the DCA for their issuance of a UCC Building Permit(s). When issued, DPMC will deliver the Building Permit to the Contractor.
- d. The Notice to Proceed will be issued when the contract is fully executed. The Contract Time will begin when the Notice to Proceed is issued. Note: The Contractor is not authorized to perform Work governed by the UCC Permit until it is issued by DCA and received by the Contractor.

Response: Yes

Signed:  _____

13) Pre-Construction Meeting: The Contractor and the named sub-contractors understand that they will attend a Pre-Construction meeting at a date to be determined by the DPMC construction manager. Unless otherwise specified, this meeting will occur within a few days of the Award Meeting and will be considered the first project meeting:

Response: Yes

Signed:  _____

14) The Submittal Process: The Contractor understands the following concerning the Submittal Process:

- a. Contractor shall furnish submittals in accordance with the Submittal Schedule as prepared by the Consultant.
- b. All submittals shall be made within **14 days** of the Notice to Proceed.
- c. All products intended to be used on the project must be submitted to the Consultant for review and approval.
- d. The Contractor is expected to utilize electronic submittals wherever possible. Details of this process will be discussed at the pre-construction meeting.
- e. The Consultant will not review submittals that supersede previously approved submissions unless there is justification.

Response: Yes

Signed: [Signature]

- 15) Review of Drawing Set / Specifications: The Contractor confirms that their bid submission includes all work necessary to deliver a complete project based upon the intent of the Contract Documents.

Response: Yes

Signed: [Signature]

- 16) Comparison of the Bid Submission with the Consultant's Estimate by CSI Division: The Contractor confirms that their bid submission accurately reflect the Scope of the Work as defined by the Contract Documents:

- i. Review of the Base Bid

Response: Yes

Signed: [Signature]

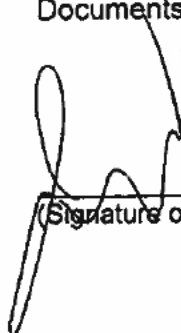
CERTIFICATION

I James E. Lawroski as authorized
(Name and Title of Bidder's Representative - print)

signatory for Altec Building Systems Corp. hereby confirm
(Company Name - print)

that the bid submitted by this Company is complete; that said Company is not requesting to modify or withdraw their submitted bid; and that the statements made during this Post Bid Interview are true and accurate.

Furthermore, by my signature below, I attest that said Company is prepared to enter into a contract for this project and execute the Work in conformance with the Contract Documents, administrative contract requirements, governing codes and regulations.


(Signature of Bidder's Representative)

5/11/23
Date

Witnessed by:

Joseph Polizzi
DPMC Representative (print)

 05/11/2023
Signature / Date

Project #: A1346-00 Re-Bid
Date: 5/11/2023

POST-BID INTERVIEW & CERTIFICATION

PAGE 8 OF 8

EXHIBIT B

MANDATORY EQUAL EMPLOYMENT OPPORTUNITY LANGUAGE

N.J.S.A. 10:5-31 et. seq. (P.L. 1975, C. 127)

N.J.A.C. 17:27-7.2

CONSTRUCTION CONTRACTS

During the performance of this contract, the contractor agrees as follows:

- a. The contractor or subcontractor, where applicable will not discriminate against any employee or applicant for employment because of age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Except with respect to affectional or sexual orientation and gender identity or expression, the contractor will ensure that equal employment opportunity is afforded to such applicants in recruitment and employment, and that employees are treated during employment, without regard to their age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Such equal employment opportunity shall include, but not be limited to the following; employment, up-grading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Public Agency Compliance Officer setting forth provisions of this nondiscrimination clause.
- b. The contractor or subcontractor, where applicable will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex.
- c. The contractor or subcontractor will send to each labor union, with which he has a collective bargaining agreement a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of the contractor's commitments under this act and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- d. The contractor or subcontractor, where applicable, agrees to comply with any regulations promulgated by the Treasurer pursuant to N.J.S.A. 10:5-31 et. seq., as amended and supplemented from time to time and the Americans with Disabilities Act.
- e. When hiring or scheduling workers in each construction trade, the contractor or subcontractor agrees to make good faith efforts to employ minority and women workers in each construction trade consistent with the targeted employment goal prescribed by N.J.A.C. 17:27-7.2, provided however, that the Dept. of LWD, Construction EEO Monitoring Program may, in its discretion, exempt a contractor or subcontractor from compliance with the good faith procedures prescribed by the following provisions, A, B, and C, as long as the Dept. of LWD, Construction EEO Monitoring Program is satisfied that the contractor or subcontractor is employing workers provided by a union which provides evidence, in accordance with standards prescribed by the Dept. of LWD, Construction EEO Monitoring Program, that its percentage of active "card carrying" members who are minority and women workers is equal to or greater than the applicable employment goal established in accordance with N.J.A.C. 17:27-7.2. The contractor or subcontractor agrees that a good faith effort shall include compliance with the following procedures:
 - (A) If the contractor or subcontractor has a referral agreement or arrangement with a union for a construction trade, the contractor or subcontractor shall, within three business days of the contract award, seek assurances from the union that it will cooperate with the contractor or subcontractor as it fulfills its affirmative action obligations under this contract and in accordance with the rules promulgated by the Treasurer pursuant to N.J.S.A. 10:5-31 et seq., as supplemented and amended from time to time and the Americans with Disabilities Act. If the contractor or subcontractor is unable to obtain said assurances from the construction trade union at least five business days prior to the commencement of construction work, the contractor or subcontractor agrees to afford equal employment opportunities minority and women workers directly, consistent with this chapter. If the contractor's or subcontractor's prior experience with a construction trade union, regardless of whether the union has provided said assurances indicates a significant possibility that the trade union will not refer sufficient minority and women workers consistent with affording equal employment opportunities as specified in this chapter, the contractor or subcontractor agrees to be prepared to provide such opportunities to minority and women workers directly consistent with this chapter,

by complying with the hiring or scheduling procedures prescribed under (B) below; and the contractor or subcontractor further agrees to take said action immediately if it determines that the union is not referring minority and women workers consistent with the equal employment opportunity goals set forth in this chapter.

- (B) If good faith efforts to meet targeted employment goals have not or cannot be met for each construction trade by adhering to the procedures of (A) above, or if the contractor does not have a referral agreement or arrangement with a union for construction trade, the contractor or subcontractor agrees to take the following actions:
- (1) To notify the public agency compliance officer, the Dept. of LWD, Construction EEO Monitoring Program, and minority and women referral organizations listed by the Division pursuant to N.J.A.C. 17:27-5.3, of its workforce needs, and request referral of minority and women workers;
 - (2) To notify any minority and women workers who have been listed with it as awaiting available vacancies;
 - (3) Prior to commencement of work, to request the local construction trade union refer minority and women workers to fill job openings, provided the contractor or subcontractor has a referral agreement, or arrangement with a union for the construction trade;
 - (4) To leave standing requests for additional referral of minority and women workers with the local construction trade union, provided the contractor or subcontractor has a referral agreement or arrangement with a union for the construction trade. The State Training and Employment Service and other approved referral sources in the area;
 - (5) If it is necessary to layoff some of the workers in a given trade on the construction site, layoffs shall be conducted in compliance with the equal employment opportunity and non-discrimination standards set forth in this regulation, as well as with applicable Federal and State court decisions;
 - (6) To adhere to the following procedure when minority and women workers apply or are referred to the contractor or subcontractor:
 - (i) The contractor or subcontractor shall interview the referred minority or women worker.
 - (ii) If said individuals have never previously received any document or certification signifying a level of qualification lower than that required in order to perform the work of the construction trade, the contractor or subcontractor shall in good faith determine the qualifications of such individuals. The contractor or subcontractor shall hire or schedule those individuals who satisfy appropriate qualification standards, in conformity with the equal employment opportunity and non-discrimination principles set forth in this chapter. However, a contractor or subcontractor shall determine that the individual at least possesses the requisite skills, and experience recognized by a union, apprentice program or a referral agency, provided the referral agency is acceptable to the Dept. of LWD, Construction EEO Monitoring Program. If necessary, the contractor or subcontractor shall hire minority and women workers who qualify as trainees pursuant to these rules. All of the requirements, however, are limited by the provisions of (C) below.
 - (iii) The name of any interested women or minority individual shall be maintained on a waiting list, and shall be considered for employment as described in (i) above, whenever vacancies occur. At the request of the Dept. of LWD, Construction EEO Monitoring Program, the contractor or subcontractors shall provide evidence of its good faith efforts to employ women and minorities from the list to fill vacancies.
 - (iv) If, for any reason, said contractor or subcontractor determines that a minority individual or a women is not qualified or if the individual qualifies as an advanced trainee or apprentice, the contractor or subcontractor shall inform the individual in writing with the reasons for the determination and maintain a copy of the determination in its files, and send a copy to the public agency compliance officer and to the Dept. of LWD, Construction EEO Monitoring Program.
 - (7) To keep a complete and accurate record of all requests made for the referral of workers in any trade covered by the contract, and on forms made available by the Dept. of LWD, Construction EEO Monitoring Program upon request.

- (C) The contractor or subcontractor agrees that nothing contained in (B) above shall preclude the contractor or subcontractor from complying with the union hiring hall or apprenticeship policies in any applicable collective bargaining agreement or union hiring hall arrangement, and, where required by custom or agreement, it shall send journeymen and trainees to the union for referral, or to the apprenticeship program for admission, pursuant to such agreement or arrangement. However, where the practices of a union or apprenticeship program will result in the exclusion of minorities and women or the failure to refer minorities and women consistent with the targeted county employment goal, the contractor or subcontractor shall consider for employment persons referred pursuant to (B) above without regard to such agreement or arrangement; provided further, however, that the contractor or subcontractor shall not be required to employ minority and women advanced trainees and trainees in numbers which result in the employment of advanced trainees as a percentage of the total workforce for the construction trade, which percentage significantly exceeds the apprentice to journey worker ratio specified in the applicable collective bargaining agreement, or in the absence of a collective bargaining agreement, exceeds the ratio established by practice in the area for said construction trade. Also the contractor or subcontractor agrees that, in implementing the procedures of (B) above, it shall, where applicable, employ minority and women workers residing within the geographical jurisdiction of the union.

After notification of award, but prior to signing a construction contract, the contractor shall submit to the public agency compliance officer and the Dept. of LWD, Construction EEO Monitoring Program an initial project workforce report (Form AA-201) electronically provided to the public agency by the Dept. of LWD, Construction EEO Monitoring Program, through its website, for distribution to and completion by the contractor, in accordance with N.J.A.C. 17:27-7. The contractor also agrees to submit a copy of the Monthly Project Workforce Report once a month thereafter for the duration of this contract to the Division and to the public agency compliance officer.

The contractor agrees to cooperate with the public agency in the payment of budgeted funds, as is necessary, for on-the-job and/or off-the-job programs for outreach and training of minorities and women.

- (D) The contractor and its subcontractors shall furnish such reports or other documents to the Dept. of LWD, Construction EEO Monitoring Program as may be requested by the Dept. of LWD, Construction EEO Monitoring Program from time to time in order to carry out the purposes of these regulations, and public agencies shall furnish such information as may be requested by the Dept. of LWD, Construction EEO Monitoring Program for conducting a compliance investigation pursuant to N.J.A.C. 17:27-1.1 et seq.

ANTIDISCRIMINATION PROVISIONS

Mandatory Language

N.J.S.A. 10:2-1

The contractor agrees that:

Antidiscrimination provisions. Every contract for or on behalf of the State or any country or municipality or other political subdivision of the State, or any agency of or authority created by any of the foregoing, for the construction, alteration or repair of any public building or public work or for the acquisition of materials, equipment, supplies or services shall contain provisions by which the contractor agrees that:

- a. In the hiring of persons for the performance of work under this contract or any subcontract hereunder, or for the procurement, manufacture, assembling or furnishing of any such materials, equipment, supplies, or services to be acquired under this contract, no contractor, nor any person acting on behalf of such contractor or subcontractor, shall, by reason of race, creed, color, national origin, ancestry, marital status, gender identity or expression, affectional or sexual orientation or sex, discriminate against any person who is qualified and available to perform the work to which the employment relates;
- b. No contractor, subcontractor, nor any person on his behalf shall, in any manner, discriminate against or intimidate any employee engaged in the performance of work under this contract or any subcontract hereunder, or engaged in the procurement, manufacture, assembling or furnishing of any such materials, equipment, supplies or services to be acquired under such contract, on account of race, creed, color, national origin, ancestry, marital status, gender identity or expression, affectional or sexual orientation or sex;
- c. There may be deducted from the amount payable to the contractor by the contracting public agency, under this contract, a penalty of \$50.00 for each person for each calendar day during which such person is discriminated against or intimidated in violation of the provisions of the contract; and
- d. This contract may be canceled or terminated by the contracting public agency, and all money due or to become due hereunder may be forfeited, for any violation of this section of the contract occurring after notice to the contractor from the contracting public agency of any prior violation of this section of the contract.

ADDITIONAL MANDATORY CONSTRUCTION CONTRACT LANGUAGE

It is the policy of the State of NJ Department of the Treasury, Division of Property Management & Construction (DPMC), that its contracts should create a workforce that reflects the diversity of the State of New Jersey. Therefore, contractors engaged by the DPMC, to perform under a construction contract shall put forth a good faith effort to engage in recruitment and employment practices that further the goal of fostering equal opportunities to minorities and women.

The contractor must demonstrate to the DPMC's satisfaction that a good faith effort was made to ensure that minorities and women have been afforded equal opportunity to gain employment under the DPMC's contract with the contractor. Payment may be withheld from a contractor's contract for failure to comply with these provisions.

Evidence of a "good faith effort" includes, but is not limited to:

1. The Contractor shall recruit prospective employees through the State Job bank website, managed by the Department of Labor and Workforce Development, available online at <http://NJ.gov/JobCentralNJ>;
2. The Contractor shall keep specific records of its efforts, including records of all individuals interviewed and hired, including the specific numbers of minorities and women;
3. The Contractor shall actively solicit and shall provide the DPMC with proof of solicitations for employment, including but not limited to advertisements in general circulation media, professional service publications and electronic media; and
4. The Contractor shall provide evidence of efforts described at 2 above to the DPMC no less frequently than once every 12 months.
5. The Contractor shall comply with the requirements set forth at N.J.A.C. 17:27.

AMERICANS WITH DISABILITIES ACTS
State Contract Language

Equal Opportunity for Individuals with Disabilities

The **CONTRACTORS** and the **STATE** do hereby agree that the provision of Title II of the Americans With Disabilities Act of 1990 (the "Act") (42 U.S.C. S12101 *et. seq.*), which prohibits discrimination on the basis of disability by public entities in all services, programs and activities provided or made available by public entities, and the rules and regulations promulgated pursuant thereunto, are made a part of this contract. In providing any aid, benefit, or service on behalf of the **STATE** pursuant to this contract, the **CONTRACTOR** agrees that the performance shall be in strict compliance with the Act. In the event that the **CONTRACTOR**, its agents, servants, employees, or subcontractors violate or are alleged to have violated the Act during the performance of this contract, the **CONTRACTOR** shall defend the **STATE** in any action or administrative proceeding commenced pursuant to this Act. The **CONTRACTOR** shall indemnify, protect, and save harmless the **STATE**, its agents, servants, and employees from and against any and all suits, claims, losses, demands, or damages of whatever kind or nature arising out of or claimed to arise out of the alleged violation. The **CONTRACTOR** shall, at its own expense, appear, defend, and pay any and all charges for legal services and any and all costs and other expenses arising from such action or administrative proceeding or incurred in connection therewith. In any and all complaints brought pursuant to the **STATE's** grievance procedure, the **CONTRACTOR** agrees to abide by any decision of the **STATE** which is rendered pursuant to said grievance procedure. If any action or administrative proceeding results in an award of damages against the **STATE** or if the **STATE** incurs any expense to cure a violation of the **ADA** which has been brought pursuant to its grievance procedure, the **CONTRACTOR** shall satisfy and discharge the same at its own expense.

The **STATE** shall, as soon as practicable after a claim has been made against it, give written notice thereof to the **CONTRACTOR** along with full and complete particulars of the claim. If any action or administrative proceeding is brought against the **STATE** or any of its agents, servants, and employees, the **STATE** shall expeditiously forward or have forwarded to the **CONTRACTOR** every demand, complaint, notice, summons, pleading, or other process received by the **STATE** of its representatives.

It is expressly agreed and understood that any approval by the **STATE** of the services provided by the **CONTRACTOR** pursuant to this contract will not relieve the **CONTRACTOR** of the obligation to comply with the Act and to defend, indemnify, protect, and save harmless the **STATE** pursuant to this paragraph.

It is further agreed and understood that the **STATE** assumes no obligation to indemnify or save harmless the **CONTRACTOR**, its agents, servants, employees and subcontractors for any claim which may arise out of their performance of this Agreement. Furthermore, the **CONTRACTOR** expressly understands and agrees that the provisions of this indemnification clause shall in no way limit the **CONTRACTOR's** obligations assumed in this Agreement, nor shall they be construed to relieve the **CONTRACTOR** from any liability, nor preclude the **STATE** from taking any other actions available to it under any other provisions of the Agreement or otherwise at law.

ADVERTISEMENT FOR BIDS

Project No: A1346-00 Re-Bid– Repurpose Mod Lab Generator
Location: Department of Labor & Workforce Development Building, 1 John Fitch Way and South Warren Street – Trenton, Mercer County, NJ

**A MANDATORY PRE-BID MEETING IS SCHEDULED FOR 10:00 A.M. APRIL 25, 2023.
LOCATION: MAIN ENTRANCE – DEPARTMENT OF LABOR & WORKFORCE DEVELOPMENT BUILDING, 1 JOHN FITCH WAY AND SOUTH WARREN STREET – TRENTON, MERCER COUNTY, NJ 08625. (**GPS COORDINATES 40.21596, -74.76627**) BUILDING IS LOCATED BEHIND THE NEW TAXATION BUILDING. CONTACT PERSON: JOE POLIZZI VIA OFFICE 609-984-1656 OR CELL (609) 218-0260. ONLY BIDS SUBMITTED BY CONTRACTORS WHO ATTEND THIS MEETING WILL BE ACCEPTED.**

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

Sealed proposals must be received and time-stamped in the Plan Room, Division of Property Management & Construction, 33 West State Street, 9th Floor, (PO Box 034) Trenton, NJ 08625 until 2:00 p.m. on May 9, 2023 for:

Single Bid (lump sum all trades)
General Construction (C008) or
General Construction / Alterations & Additions (C009)
\$1,134,925

IN ACCORDANCE WITH N.J.S.A. 52:32-2, THIS PROJECT SHALL BE BID AS A SINGLE BID (LUMP SUM ALL TRADES). BIDDER MUST BE CLASSIFIED THEMSELVES OR NAME THEIR CLASSIFIED SUBCONTRACTOR(S) FOR THE FOLLOWING TRADE(S):

Structural Steel & Ornamental Iron (C029)
Plumbing (C030)
Electrical (C047)

Failure To List Classified Sub-Contractors Will Deem The Bid Non-Responsive.

A list of Classified Contractors / Sub-Contractors are available at the following Web site:
http://www.state.nj.us/treasury/dpmc/contract_search.shtml

Bid Documents may be examined at the DPMC Plan Room, 33 West State Street, 9th Floor, Trenton, NJ 08625 or obtained for a document fee based on the individual trade estimate shown above, as follows: For cost estimate under \$100,000 – bid documents are free of charge. For cost estimate over \$100,000 – a fee of \$65 is required. An additional \$25.00 fee is required for mailing of bid documents Via United States Postal Service. **Shipping via Fedex is not available. Shipping via UPS is possible if the Contractor wishes to have the documents delivered by UPS.** If shipping via UPS, Bidder is responsible for paying delivery costs as calculated by UPS. For UPS overnight delivery, Bidder must provide a UPS account number. All fees are non-refundable and must be received by the Division before documents will be released. A company check payable to the “Treasurer, State of New Jersey” is required. Contact **Anthony Mangine at Anthony.Mangine@treas.nj.gov** for further information. Mailing address is as follows: Regular Mail (DPMC, P.O. Box 034, Trenton, NJ 08625) or Overnight Mail (DPMC, 33 West State St, 9th Fl, Trenton, NJ 08608).

Bidders must be classified by the Division under N.J.S.A. 52:35-1 et seq and must submit bid security as provided in Instructions to Bidders and General Conditions, Revised December 2015. No bidder may withdraw his bid for 60 calendar days after the opening. The State may reject any and all bids in accordance with applicable law.

Bidders are required to comply with the requirements of N.J.S.A. 10:5-31 et seq. and N.J.A.C. 17:27.

Pursuant to Executive Order No. 166, signed by Governor Murphy on July 17, 2020, the Office of the State Comptroller (“OSC”) is required to make all approved State contracts for the allocation and expenditure of COVID-19 Recovery Funds available to the public by posting such contracts on an appropriate State website. Such contracts will be posted on the New Jersey transparency website developed by the Governor’s Disaster Recovery Office (GDRO Transparency Website).

The contract resulting from this [RFP/RFQ] is subject to the requirements of Executive Order No. 166. Accordingly, the OSC will post a copy of the contract, including the [RFP/RFQ], the winning bidder’s proposal and other related contract documents for the above contract on the GDRO Transparency website.

CHRISTOPHER R. GEARY, ASSISTANT DEPUTY DIRECTOR
CONTRACTS & PROCUREMENT
DIVISION OF PROPERTY MANAGEMENT & CONSTRUCTION
STATE OF NEW JERSEY
DEPARTMENT OF THE TREASURY
P. O. BOX 034
TRENTON, NJ 08625-0034

MANDATORY PRE-BID MEETING

PROJECT # A1346-00 Re-Bid

LOCATION: Labor & Workforce Development Building, 1 John Fitch Way and South Warren Street, Trenton, NJ 08608

DATE: April 25, 2023

TIME: 10:00 AM

CONTACT PERSON: Joe Polizzi

PHONE: 609-218-0260

MEETING LOCATION: 1 John Fitch Way and South Warren St, Trenton, NJ

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

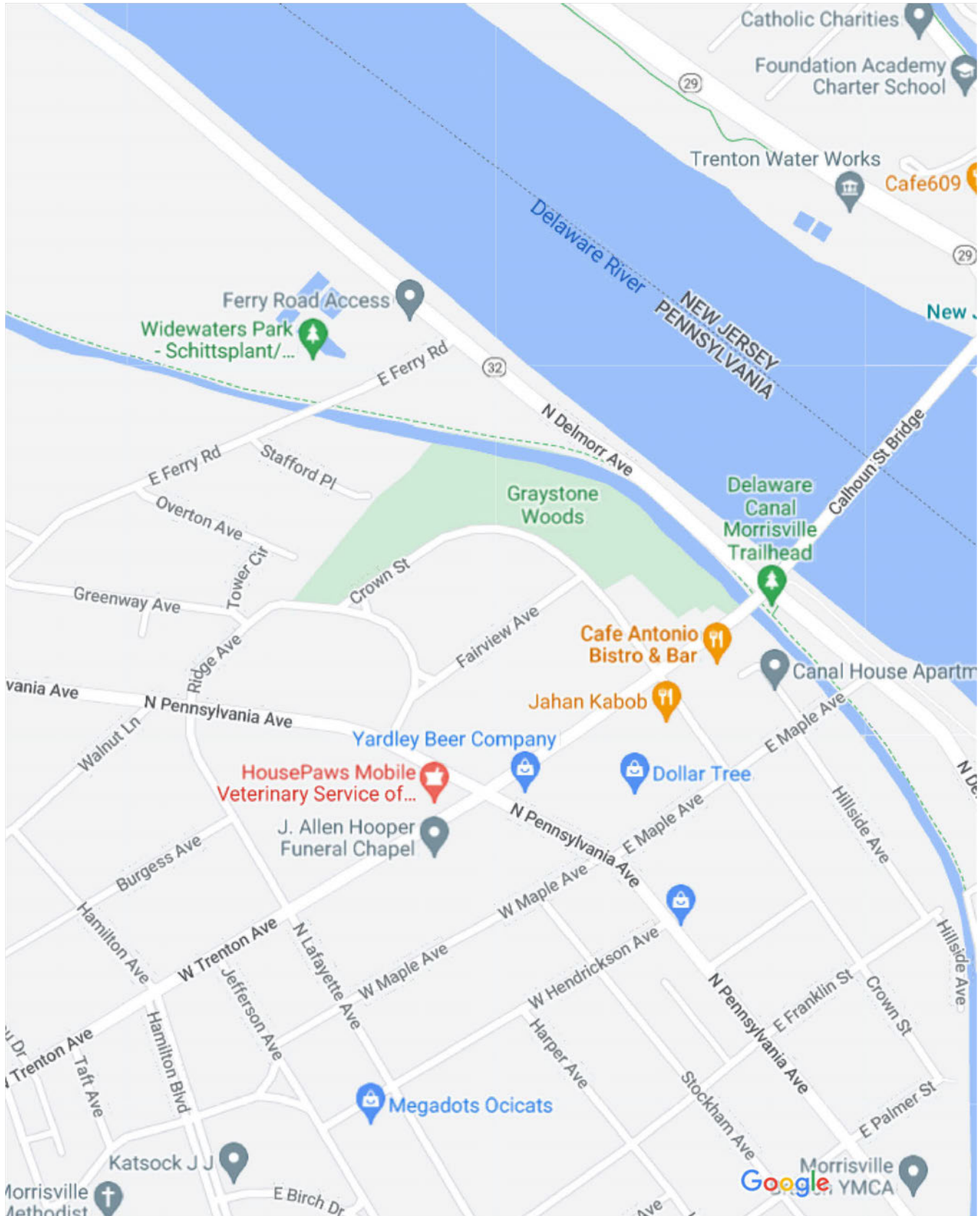
MUST ATTEND TO HAVE VALID BID

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

Google Maps

20 West State Street, Trenton, NJ to 1 John Fitch Way, Trenton, NJ

Drive 0.6 mile, 4 min





20 W State St
Trenton, NJ 08608

- ↑ 1. Head east on W State St toward S Warren St
135 ft
- ↪ 2. Turn right at the 1st cross street onto S Warren St
0.3 mi
- ↻ 3. At the traffic circle, continue straight to stay on S Warren St
430 ft
- ↪ 4. Turn right
0.1 mi
- ↪ 5. Turn right
344 ft
- ↪ 6. Turn right
i Destination will be on the right
384 ft

1 John Fitch Way
Trenton, NJ 08625

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

SPECIFICATION

Repurpose Mod Lab Generator

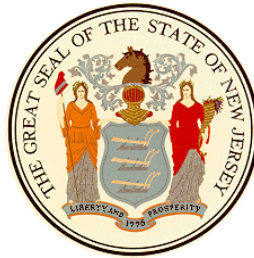
Labor and Workforce Development Building
Trenton, Mercer County, N.J.

A1346-00

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 LABOR AND WORKFORCE DEVELOPMENT

Rob Asaro-Angelo, Commissioner

SUBURBAN CONSULTING ENGINEERS, INC.

96 U.S. HIGHWAY 206, STE. 101
FLANDERS, NJ 07836

Date: February 28, 2022

Revised: March 15, 2022

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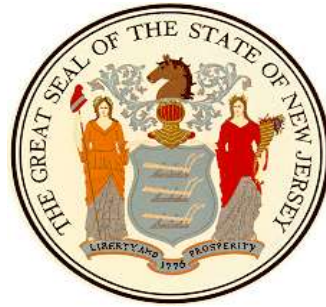
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ATTACHMENTS TO STANDARD SPECIFICATIONS

Attachment 1	SUBSURFACE SOIL AND FOUNDATION INVESTIGATION REPORT DATED NOVEMBER 2021
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STATE OF NEW JERSEY
DEPARTMENT OF THE TREASURY
DIVISION OF PROPERTY MANAGEMENT AND CONSTRUCTION



REVISED
DECEMBER 2015

INSTRUCTIONS TO BIDDERS
AND
GENERAL CONDITIONS

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INSTRUCTIONS TO BIDDERS

IB 1 Bid Proposals

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

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

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

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

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

DPMC BID DOCUMENTS FEE SCHEDULE (PER PACKAGE):

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

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

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

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

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

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

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

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

IB 1.11 Procurement Reform

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

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

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

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

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

IB 2 Bid Modification

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

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

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

IB 3 Consideration of Bids

IB 3.1 Award of Contracts or Rejection of Bids:

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

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

IB 4 Awards

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

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

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

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

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

IB 5 Qualification of Bidders

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

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

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

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

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

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

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

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

IB 6 Deposit and Bid Bond

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

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

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

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

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

IB 7 Performance and Payment Bond

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

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

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

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

IB 8 Bulletins and Interpretations

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

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

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

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

IB 9 Assignments

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

IB 10 Federal Excise Taxes and State Sales Tax

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

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

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

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

IB 11 Restrictive Specifications

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

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

IB 12 Offer of Gratuities

IB 12.1 Bidders are advised that the laws of New Jersey (NJSА 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 NJSА 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 NJSА 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 NJSА 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 NJSА 52:13D-13g. Any relationships subject to this provision shall be reported in writing forthwith to the Executive Commission on Ethical Standards, which may grant a waiver of this restriction upon application of the State offer or employee or special State officer or employee upon a finding that the present or proposed relationship does not present the potential, actuality or appearance of a conflict of interest.
- d. No vendor shall influence, or attempt to influence or cause to be influenced, any State officer or employee or special State officer or employee in his official capacity in any manner which might tend to impair the objectivity or independence of judgment of said officer or employee.
- e. No vendor shall cause or influence, or attempt to cause or influence, any State officer or employee or special State officer or employee to use, or attempt to use, his official position to secure unwarranted privileges or advantages for the vendor or any other person.

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

END OF INSTRUCTIONS TO BIDDERS

GENERAL CONDITIONS

ARTICLE 1 - GENERAL PROVISIONS

1.1 DEFINITIONS:

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

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

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

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

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

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

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

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

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

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

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

1.1.12 Day: A calendar day, unless otherwise designated.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1.2 CONTRACT DOCUMENTS TO BE PROVIDED BY DPMC

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

1.3 INTENT OF THE CONTRACT

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

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

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

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

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

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

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

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

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

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

1.4 WORKDAYS

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

1.5 ASSIGNMENTS

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

1.6 STATE SALES TAX

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

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

ARTICLE 2 - OWNER/DPMC

2.1 DPMC'S REPRESENTATION

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

2.2 RIGHT TO PERFORM WORK

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

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

2.3 MEANS AND METHODS

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

ARTICLE 3 - ARCHITECT/ENGINEER

3.1 DUTIES AND RESPONSIBILITIES

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

3.2 PROGRESS MEETINGS

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

3.3 SITE OBSERVATIONS

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

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

3.4 SHOP DRAWINGS AND SUBMITTALS AND INVOICES

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

3.5 PAYMENT APPROVALS

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

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

ARTICLE 4 - THE CONTRACTOR

4.1 REVIEW OF THE CONTRACT DOCUMENTS AND FIELD CONDITIONS

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

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

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

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

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

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

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

4.2 INSURANCE

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

4.3 PERMITS, LAWS, AND REGULATIONS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

4.4 RESPONSIBILITY FOR THE WORK

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

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

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

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

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

4.5 INDEMNIFICATION

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

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

4.6 SUPERVISION

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

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

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

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

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

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

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

4.7 SHOP DRAWINGS AND OTHER SUBMITTALS

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

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

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

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

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

4.7.5 Substitutions

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

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

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

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

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

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

4.7.6 Additional Submissions

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

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

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

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

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

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

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

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

4.8 AS-BUILT DRAWINGS

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

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

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

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

4.9 EXCAVATIONS, CUTTING AND PATCHING

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

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

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

4.10 TESTING

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

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

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

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

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

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

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

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

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

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

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

4.11 EQUIPMENT AND MATERIALS

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

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

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

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

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

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

4.12 TEMPORARY FACILITIES

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

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

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

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

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

4.12.4 Toilet Facilities

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

4.12.5 Access, Roads and Walks

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

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

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

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

4.12.6 Light and Power

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

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

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

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

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

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

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

4.12.7 Temporary Enclosures

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

4.12.8 Temporary Heating, Ventilation and Air Conditioning

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

b. Generally Enclosed

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

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

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

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

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

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

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

c. Permanent Enclosure

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

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

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

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

4.12.10 Temporary Water

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

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

4.12.11 Standby Personnel

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

4.12.12 Dust Control

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

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

4.13 STORAGE AND SITE MAINTENANCE

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

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

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

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

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

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

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

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

4.14 CUT-OVERS AND INTERRUPTIONS

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

4.15 PROTECTION/SAFETY

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

4.15.2 Protection of Persons

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

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

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

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

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

4.15.3 Protection of Property

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

4.15.4 Hazardous Materials

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

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

4.16.5 Emergencies

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

4.16 UNCOVERING AND CORRECTION OF WORK

4.16.1 Uncovering of Work

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

4.16.2 Correction of Work

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

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

4.16.3 Acceptance of Non-Conforming Work

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

4.17 LAYOUT AND DIMENSIONAL CONTROL

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

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

4.18 PROJECT SIGN

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

4.19 SECURITY

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

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

4.20 DPMC FIELD OFFICE

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

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

4.21 PHOTOGRAPHS

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

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

4.22 REPAIR OF FINISHED SURFACES, APPLIED FINISHES, GLASS

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

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

ARTICLE 5 - SUBCONTRACTORS

5.1 SUBCONTRACTORS AND MATERIAL SUPPLIER APPROVALS

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

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

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

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

5.2 CONTRACTOR-SUBCONTRACTOR RELATIONSHIP

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

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

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

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

ARTICLE 6 - CONSTRUCTION PROGRESS SCHEDULE

6.1 GENERAL

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

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

6.2.1 Critical Path Method

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

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

6.2.2 Initial Submittal

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

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

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

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

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

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

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

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

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

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

6.2.3 Review and Approval:

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

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

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

6.2.4 Progress Reporting and Changes:

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

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

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

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

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

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

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

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

6.2.5 Payments to Contractor

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

6.2.6 Biweekly Progress Meetings

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

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

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

6.2.7 Responsibility for Completion

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

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

6.2.8 Adjustment of Contract Completion Date

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

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

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

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

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

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

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

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

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

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

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

6.3 CONSTRUCTION PROGRESS SCHEDULING PROVIDED BY THE CONTRACTOR

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

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

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

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

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

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

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

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

6.3.8 The progress schedule shall show:

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

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

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

ARTICLE 7 - TIME OF COMPLETION

7.1 CONTRACT DURATION/NOTICE TO PROCEED

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

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

7.2 SUBSTANTIAL COMPLETION

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

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

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

7.3 FINAL COMPLETION

7.3.1 Final completion of the Contract shall occur when:

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

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

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

7.4 PARTIAL OCCUPANCY FOR USE

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

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

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

7.5 DELAY, DISRUPTION AND INTERFERENCE

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

7.5.2 Contractor's Damages for Delay, Disruption or Interference

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

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

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

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

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

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

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

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

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

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

ARTICLE 8 - CLOSE-OUT

8.1 CLOSE-OUT PROCEDURES/FINAL PAYMENT

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

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

8.2 OPERATIONS, EQUIPMENT AND MAINTENANCE MANUALS

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

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

8.3 TRAINING

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

8.4 GUARANTEE

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

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

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

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

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

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

ARTICLE 9 - PAYMENTS

9.1 INVOICES

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

9.2 INTEREST

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

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

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

9.3 SCHEDULE OF VALUES AND FINAL PAYMENT

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

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

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

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

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

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

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

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

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

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

9.4 CERTIFICATION OF PAYMENTS TO SUBCONTRACTOR

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

9.5 STORED MATERIALS

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

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

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

9.6 ALLOWANCES

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

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

9.6.2 Unless otherwise provided in the Contract Documents:

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

9.7 RETAINAGE

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

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

9.7.3 Withholding Payment for Non-Delivery of Data:

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

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

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

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

9.8 MISCELLANEOUS

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

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

ARTICLE 10 - CHANGES IN THE WORK

10.1 CHANGES IN THE WORK

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

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

10.1.2 Change Orders

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

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

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

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

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

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

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

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

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

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

10.2 ACCELERATION

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

ARTICLE 11 - CLAIMS AND DISPUTES

11.1 CONTRACTOR CLAIMS

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

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

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

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

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

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

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

ARTICLE 12 - TERMINATION/SUSPENSION

12.1 SUSPENSION OF THE WORK / STOP WORK

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

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

12.2 TERMINATION FOR CAUSE

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

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

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

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

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

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

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

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

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

12.3 OWNER'S RIGHT TO COMPLETE THE WORK

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

12.4 TERMINATION FOR CONVENIENCE

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

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

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

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

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

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

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

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

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

ARTICLE 13 – OTHER REQUIREMENTS

13.1 PREVAILING WAGE

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

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

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

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

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

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

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

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

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

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

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

13.2 PATENTS

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

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

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

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

13.3 RIGHT TO AUDIT

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

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

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

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

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

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

13.4 INSURANCE

13.4.1 Insurance To Be Carried By The Contractor:

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

a Commercial General Liability:

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

- Premises/Operations

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

b Business Automobile Liability:

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

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

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

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

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

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

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

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

13.5 ASSIGNMENT OF ANTITRUST CLAIMS

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

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

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

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

END, GENERAL CONDITIONS

**CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS FOR:
REPURPOSE MOD LAB GENERATOR**

**A1346-00
FILE NO.: SCE-R12340.011**

CITY OF TRENTON, COUNTY OF MERCER, STATE OF NEW JERSEY

DIVISION OF PROPERTY MANAGEMENT AND CONSTRUCTION

**FEBRUARY 2022
REVISED MARCH 2022**

MICHAEL K. MCALOON, PE **03/15/2022**
NJPE LICENSE #24GE05346500 **DATE**

SUBURBAN CONSULTING ENGINEERS, INC.

96 U.S. Highway 206, Suite 101, Flanders, New Jersey 07836
973-398-1776; Fax 973-398-212

DIVISION 01 – GENERAL REQUIREMENTS
SECTION 010000 – GENERAL REQUIREMENTS
DPMC No. A1346-00

1. GENERAL

The Work under the Agreement and in accordance with the specifications shall include the furnishing of all equipment, supervision, labor, trade skills, materials, and all other items necessary for the satisfactory completion of “**Division of Property Management and Construction, Trenton Repurpose Mod Lab Generator**”. The Contractor shall perform all Work for such construction and installation subject to the terms and conditions of the Contract, complete and ready for full duty use and service.

2. SCOPE OF WORK

- A. The following is a general description of the Work to be completed and thereby does not represent a complete description of all the Work to be performed as specified in the Contract Documents:

The Labor and Workforce Development Building is a thirteen (13) story office building, which was constructed in 1963. Approximately 1,500 State employees work in this building. The facility is located at 1 John Fitch Way, in the City of Trenton in Mercer County. The facility previously had a Modular (Mod) Lab that has since been decommissioned and removed. During operation, the Mod Lab was connected to a diesel-fueled 600 kW/750 kVA, 0.8 pF generator manufactured by Cummins Power, model #DFGB-5702789 to provide emergency power. Additionally, a 3,000-gallon auxiliary diesel fuel tank was connected to provide extended operation of the generator. With the decommissioning and removal of the Mod lab, the subject generator was no longer needed.

This Labor and Workforce Development facility is serviced by PSE&G with dual feeders at 480V/3 Ph. There are two sections of the switchgear lineups which are fed from each PSE&G Bus Ducts. Presently there is no automatic transfer between these two sections of switchgear. The existing PSE&G Bus Ducts are tapped to feed a gang of dual circuit breakers which feed the essential Panel HPIV. Failure of one source automatically transfers to the second power feeder. This arrangement forms a N+1 arrangement. Essential loads of the building such as the Data Center loads, elevators, smoke control and stairwell pressurization are fed from this essential panel.

The objective is to introduce additional level of redundancy for the essential Panel HPIV by utilizing the Mod Lab generator and auxiliary fuel tank. This will make the power system N+2. Failure of both PSE&G power sources will revert to the generator power, thus assuring continued operation of the Data Center loads. The existing generator is currently being stored off-site but was confirmed to be in good working order prior to the relocation..

The facility serves a critical function, particularly the 2nd floor data center which contains important servers necessary for serval operating systems by State employees and the public. Interruptions to the electrical service for this equipment is to be limited and restricted to nighttime working hours on Saturday nights which server traffic is reduced; any work not interrupting the electrical service can commence during normal working

hours identified. The scheduling and coordination of this shutdown is to be performed well in advance.

The project scope includes exterior site improvements including the construction of a new elevated generator and auxiliary fuel tank foundation to elevate the generator above the flood hazard area, relocation of the generator and auxiliary fuel tank from storage and installation on foundation, outdoor lighting on generator, fuel transfer pumps and piping, mezzanine and access stairs for maintenance, exploratory test pits, underground conduits, handholes, DGA firebreak ground cover, bollards and site restoration to existing conditions.

Electrical improvements include furnish and install new 2000 AMP Automatic Transfer Switch, new power panels (PP-PD & PP-PG), stepdown transformers (for UPS & CRAC Unit & Other), lightning protection, furnish and install circuit breakers in existing HPIV Panel, remote annunciator, battery charger, 1200 AMP generator tap box and related accessories, grounding and bonding, all conductors, signal and ground wires and rods.

The Contractor shall perform generator commissioning, startup and load bank testing, as well as auxiliary fuel tank certification.

3. WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: Repurpose Mod Lab Generator – DPMC No. A1346-00

1. Project Location: 1 John Fitch Way & South Warren Street, City of Trenton, Mercer County, New Jersey

B. Owner (State): State of New Jersey, Department of Treasury
Division of Property Management and Construction (DPMC)

State's Representative:
(Contracting Officer)

Joseph Polizzi (DPMC Design Project Manager)
State of New Jersey, Department of Treasury
Division of Property Management and Construction
DPMC Bureau of Design & Construction
Capitol Regional Office
20 West State Street, 3rd Floor, Trenton, New Jersey 08608-1206
Tel: (609) 218-0260

C. Architect/Engineer (A/E):

Andrew S. Holt, PE, PP, CME
SUBURBAN CONSULTING ENGINEERS, INC.,
96 U.S. Highway 206, Suite 101
Flanders, New Jersey 07836
Tel: (973) 398-1776
Fax: (973) 398-2121

4. DESCRIPTION

The principal elements of the Work: Repurpose Mod Lab Generator. This project consists of the repurpose of the 600 kW Mod Lab generator to serve as an optional standby generator for critical electrical loads at the Department of Labor and Workforce Development (DLWD).

5. MAINTENANCE OF OPERATIONS

The supply and distribution of electrical power at the above noted facilities are considered essential to the operation of the DLWD Building. Only minimal interruption of their normal operations will be permitted during the prosecution of Work. Such short duration interruptions will be allowed only with the coordination and approval of the Division of Property Management and Construction and its authorized agents.

- Interruptions to the electrical service for the essential loads of the building, such as the Data Center, elevators, smoke control, and stairwell pressurization equipment is to be limited and restricted to nighttime working hours on Saturday nights which facility impact is reduced; any work not interrupting the electrical service can commence during normal working hours identified. The Contractor shall include all costs within the respective bid items to complete this work during nighttime working hours on Saturday nights. The Contractor shall submit 2-week (minimum) notice for nighttime and weekend work to DPMC and the Engineer.

The Contractor shall make allowance for and give special consideration to the use of equipment and the installation of equipment at the Owner's facilities so that full operation and performance is maintained during his Work. Any damage to the existing facilities or malfunction of the process equipment or operation caused by the Contractor's neglect shall be immediately repaired by the Contractor at his expense, taking all necessary actions to the Owners satisfaction.

Should a conflict occur between the operation of the Owner's facilities and the Contractor's Work, the Owners facility operations shall take precedent. The Contractor shall not be entitled to any extra compensation or claims by which the facilities operations may interrupt his Work or time schedule.

The Contractor shall make his own investigations he may feel appropriate and allowed by the Owner to familiarize himself with the magnitude of Work involved at the facilities. The Owner shall provide such pertinent information as may be available, however, does not represent such information as all-inclusive or completely accurate. Variations that may exist and cause the Contractor's Work to become substantially different from the intent of the Contract Documents will be cause for claim under provisions of the Agreement.

6. USE OF PREMISES

Should the Contractor elect to obtain the temporary use of property, which the Owner has no rights, the Contractor shall provide the Owner written permission from the property owner securing such rights for use. The Contractor shall hold the Owner harmless from any third party actions by reason of any acts or omissions by the Contractor.

Prior to final acceptance of the Work, the Contractor shall provide the Owner a written release from parties having jurisdiction and rights over such lands used during the prosecution of his Work as to the satisfactory restoration of any disturbance.

The Contractor shall confine his Work, materials and equipment storage, and workman operations to the limits established by laws, ordinances, permits, and the direction of the Engineer or Owner. The Contractor shall not infringe on the premises and cause undue interference. The Contractor shall not overload any part of the Owners facilities or land, which compromises the structural integrity or safety.

The Contractor, his employees, suppliers, and agents shall maintain such parking areas as may be allowed on the Work site. Any damages or legal violations resulting from the inappropriate use of such designated parking areas, shall be the Contractor's responsibility to correct.

All areas of Work and other areas as may be used by the Contractor shall be kept clean, and free of rubbish, surplus or unused materials. Construction equipment and materials not needed for the execution of Work shall be removed in a timely manner.

END OF SECTION 010000

DIVISION 01 – GENERAL REQUIREMENTS
SECTION 012200 – MEASUREMENT AND PAYMENT
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

- A. Items shall not be limited to the exact extent described but shall include all additional and miscellaneous work normally necessary and generally understood to be required for the completion of that item, in accordance with best modern practice, for the scope of item or class of work involved, regardless of whether or not such additional and/or miscellaneous necessary work is specifically shown on the Drawings and described in the Specifications.
- B. All work included on the Drawings and in the Specifications shall be completed in full without further compensation than is provided for in the aggregate of all price items, regardless of whether or not such work is specifically mentioned in the condensed summary in the following paragraphs.

1.2 DEFINITIONS

- A. Lump sum price is an amount proposed by bidders, stated on the Proposal Form, as a price for the full compensation for all Work shown on the plans and required by these specifications and any other incidental work in the Contract Documents. Cost shall include but not limited to transportation, equipment, supplies, appurtenances, disposal, etc. to perform the Work shall be included in the Lump Sum Price named in the Bid Proposal.

1.3 LUMP SUM ITEMS

- A. Lump sum prices submitted in the Bid Proposal shall constitute full compensation for all Work shown on the Plans and required by these specifications and any other incidental work in the Contract Documents. Measurement and payment for all bid items included as Lump Sums shall include the cost of all labor, materials, and equipment necessary to furnish, install, clean, test, and place each item into operation. No item of Work that is required by the Contract will be paid for outside of or in addition to the prices submitted for Lump Sum Prices.
- B. All Work of incidental nature or necessary to complete the fully functional use of Lump Sum Items, not specifically set forth in the Bid Proposal as a pay Item, shall be considered a subsidiary obligation of the Contractor, and all costs in connection therefore shall be included in the Lump Sum Prices named in the Bid Proposal.
- C. Any Work not specifically called for or set forth in the Bid Proposal as part of Lump Sum items, but which is considered necessary for the proper execution of the Work, shall be considered an obligation of the Contractor in furnishing such labor, equipment, materials, and appurtenances for the satisfactory completion of the Contract, and no separate payment will be made. Such work shall include, but not necessarily be limited to: inspection surveys; working and shop drawing preparation and submittals; removal and disposal of unsuitable materials; demolition; providing operation and maintenance manuals; testing; materials and equipment required for testing; conforming to all requirements of

necessary project permits and obtaining same; startup services of factory trained service engineers; compliance with all other general requirements and industry standards; and all Work required by the specifications.

- D. Pricing for all work included in the Contract Drawings and in the Specifications not covered by another bid item, shall be included in lump sum pricing.
- E. The Total Contract Price shall constitute full compensation of all Work for the sum of Bid Items as required by and in accordance with the Contract Documents.
- F. Measurement and Payment: Refer to Section 012900 "Payment Procedures" for work that requires establishment of The Schedule of Values for allowance of partial payments for lump sum price item(s).
- G. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit or lump sum prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- H. Any materials sampling and laboratory testing required in order to load, transport and dispose of regulated, non-hazardous or hazardous substances, materials or wastes in accordance with Federal, State, County, Local and facility laws, rules, and regulations are the sole responsibility of the Contractor.
- I. The cost for any additional testing shall be included in the Contractor's overall Bid Price. Measurement and payment for materials sampling and testing of various types will not be made; the cost(s) therefore to be included in the cost for the disposal of the various materials.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 LUMP SUM ITEMS

- A. **Mobilization and Staging (3% Max.)**
- B. **Exploratory Test Pits**
 1. Payment for **Exploratory Soil Test Pits** is to be paid on a lump sum basis. Work shall include the completion, disposal of soils, backfill and restoration of test pits.
 2. Confine test pits to the most practicable limit possible with the use of appropriate excavation equipment and protection and shoring. All test pits will be properly backfilled and restored at all measures necessary to meet existing conditions.
 3. The location of the test pits shall be necessary to confirm the elevation of existing utilities which may be impacted during the work. Contractor shall be responsible to locate these underground utilities to avoid conflict with the proposed work.
- C. **Furnish And Install Outdoor Lighting on Generator and Fuel Tank Area**

1. **Furnish and Install Outdoor Lighting on Generator and Fuel Tank Area** is to be paid on a lump sum basis. The work shall be as called out in the Contract Documents. Work shall include but is not limited to the following:
 - a. Furnish and install lighting fixture as specified.
 - b. Test to confirm proper functionality of installed lighting fixture.
- D. **Concrete Generator and Auxiliary Fuel Tank Foundation**
 1. **Concrete Generator and Auxiliary Fuel Tank Foundation** shall be paid on a lump sum basis. The work shall include concrete, reinforced steel, and necessary components of reinforcement.
- E. **Concrete Landing**
 1. **Concrete Landing** is to be paid on a lump sum basis. The work shall include concrete, reinforced steel, and necessary components of reinforcement. The work shall be as called out in the Contract Documents.
- F. **Furnish And Install 2000 AMP, 480V/3P ATS**
 1. **Furnish and Install 2000 AMP, 480V/3P ATS** is to be paid on a lump sum basis. The work shall be as called out in the Contract Documents. Work shall include but is not limited to the following:
 - a. Furnishment and installation of 2000 AMP, 480V/3P ATS as specified.
 - b. Complete installation of electrical components to establish proper function.
 - c. Test completed work to ensure proper functionality and quality of work.
- G. **Install Existing 600-kW/3P Generator and Enclosure, Complete In Place**
 1. **Install Existing 600-kW/3P Generator and Enclosure, Complete in Place** is to be paid on a lump sum basis. The work shall be as called out in the Contract Documents. Work shall include but is not limited to the following:
 - a. Load, transportation, unload and installation of 600-kW Generator and Enclosure as specified including security fencing.
 - b. Contractor to provide initial fuel fill of generator belly tank as well as auxiliary fuel tank prior to testing, and final fuel fill of generator belly tank and auxiliary fuel tank following generator testing.
 - c. Complete installation of electrical and components to establish proper function.
 - d. Test completed work to ensure proper functionality and quality of work.
- H. **Furnish And Install Panel PP-PD and 112.5 kVA, 480/120-208V Stepdown Transformer for UPS and CRAC Unit**
 1. **Furnish and Install Panel PP-PD and 112.5 kVA, 480/120-208V Stepdown Transformer for UPS and CRAC Unit** is to be paid on a lump sum basis. The work shall be called out in the Contract Documents. Work shall include but is not limited to the following:
 - a. Furnishment and installation of Panel PP-PD and 112.5 KVA, 480/120-208V Stepdown Transformer for UPS and CRAC Unit as called out in Contract Documents.
 - b. Complete installation of electrical and components to establish proper function.
 - c. Test completed work to ensure proper functionality and quality of work.
 - d. The Contractor shall include costs to perform interruptions to the electrical service for the essential loads of the building during nighttime working hours on Saturday Nights.

- I. **Furnish And Install Emergency Panel, PP-PG, 30-kVA Transformer, 480/120-208V Stepdown Transformer**
1. **Furnish and Install Emergency Panel, PP-PG, 30-kVA Transformer, and 480/120-208V Stepdown Transformer** is to be paid on a lump sum basis. The work shall be as called out in the Contract Documents. Work shall include but is not limited to the following:
- Furnishment and installation of Emergency Panel, PP-PG, 30-kVA Transformer, and 480/120-208V Stepdown Transformer as specified.
 - Complete installation of electrical and components to establish proper function.
 - Test completed work to ensure proper functionality and quality of work.
 - The Contractor shall include costs to perform interruptions to the electrical service for the essential loads of the building during nighttime working hours on Saturday Nights.
- J. **Lightning Protection**
1. **Lightning Protection** is to be paid on a lump sum basis. The work shall be as called out in the Contract Documents. Work shall include but is not limited to the following:
- Complete installation of generator enclosure lightning protection system and related components to establish proper function.
- K. **Furnish and Install Circuit Breakers in Existing HPIV Panel**
1. **Furnish and Install Circuit Breakers in Existing HPIV Panel** is to be paid on a lump sum basis. The work shall be called out in the Contract Documents. Work shall include but is not limited to the following:
- Complete installation of circuit breakers in existing HPIV panel and related components to establish proper function.
 - The Contractor shall include costs to perform interruptions to the electrical service for the essential loads of the building during nighttime working hours on Saturday Nights.
- L. **Furnish and Install Generator Mezzanine and Stairs**
1. **Furnish And Install Mezzanine and Stairs** is to be paid on a lump sum basis. The work shall be as called out in the Contract Documents. Work shall include but is not limited to the following:
- Furnishment, installation, and assembly of prefabricated mezzanine, stairs, landing, and all necessary components as specified.
 - Complete installation of specified components including shipping, assembly, furnishment of additional hardware, and labor.
- M. **Auxiliary Tank Piping & Certification**
1. **Auxiliary Tank Piping & Certification** is to be paid on a lump sum basis. The work shall be as called out in the Contract Documents. Work shall include but is not limited to the following:
- Furnishment and Installation of Auxiliary Tank Fuel Piping and related appurtenances as specified.
 - Complete installation of specified components including shipping, assembly, furnishment of additional hardware, and labor.
 - Test completed work to ensure proper functionality and quality of work.

N. Furnish and Install Remote Annunciator

1. **Furnish And Install Remote Annunciator** is to be paid on a lump sum basis. The work shall be as called out in the Contract Documents. Work shall include but is not limited to the following:
 - a. Furnishment and installation of Remote Annunciator as specified.
 - b. Complete installation of electrical and components to establish proper function.
 - c. Test completed work to ensure proper functionality and quality of work.

O. Furnish and Install Battery Charger

1. **Furnish And Install Battery Charger** is to be paid on a lump sum basis. The work shall be as called out in the Contract Documents. Work shall include but is not limited to the following:
 - a. Furnishment and installation of Battery Charger as specified.
 - b. Complete installation of electrical and components to establish proper function.
 - c. Test completed work to ensure proper functionality and quality of work.

P. Furnish and Install Temporary 1200 AMP/3P Generator Tap Box And Related Accessories

1. **Furnish And Install Temporary 1200 AMP/3P Generator Tap Box and Related Accessories** is to be paid on a lump sum basis. The work shall be as called out in the Contract Documents. Work shall include but is not limited to the following:
 - a. Furnishment and installation of Generator Tap Box and Related Accessories as specified.
 - b. Complete installation of electrical and components to establish proper function.
 - c. Test completed work to ensure proper functionality and quality of work.

Q. Furnish and Install Dual Fuel Transfer Pumps with Control Panel

1. **Furnish And Install Dual Fuel Transfer Pumps with Control Panel** is to be paid on a lump sum basis. The work shall be as called out in the Contract Documents. Work shall include but is not limited to the following:
 - a. Furnishment and installation of Dual Fuel Transfer Pumps with Control Panel as specified.
 - b. Complete installation of specified components including shipping, assembly, furnishment of additional hardware, and labor.
 - c. Test completed work to ensure proper functionality and quality of work.
 - d. The Contractor shall include costs to perform interruptions to the electrical service for the essential loads of the building during nighttime working hours on Saturday Nights.

R. Grounding and Bonding

1. **Grounding and Bonding** is to be paid on a lump sum basis. The work shall be as called out in the Contract Documents. Work shall include but is not limited to the following:
 - a. Grounding of installed conduit system, metal enclosures, equipment frames, motors, and receptables as called out in the Contract Documents
 - b. Bonding of each run of raceways to form continuous path for ground faults from end to end as called out in the Contract Documents.

S. Furnish and Install Power Conduits, Conductors, Signal and Ground Wires, and Rod (Includes Trenching and Backfill) (Bid Item No. 25)

1. **Furnish And Install Power Conduits, Conductors, Signal and Ground Wires, And Rod (Includes Trenching and Backfill)** is to be paid on a lump sum basis. The work shall be as called out in the Contract Documents. Work shall include but is not limited to the following:

- a. Furnishment and installation of Power Conduits, Conductors, Signal And Ground Wires, And Rod as specified.
- b. Complete installation of specified components including excavation, trenching, proper disposal of excavated material and backfill.
- c. Shoring and proper dewatering of trench.

T. **Heat Tracing System**

1. **Heat Tracing System** is to be paid on a lump sum basis. The work shall be as called out in the Contract Documents. Work shall include but is not limited to the following:
 - a. Complete installation of Heat Tracing System including associated control panel with alarm, power connection kit, insulation end seal kit, pipe straps, thermostat, and insulation as stated in Contract Documents.

U. **Furnish and Install Electrical Wiring and Conduit and Conduit Support System**

1. **Furnish and Install Electrical Wiring and Conduit and Conduit Support System** is to be paid on a lump sum basis. The work shall be called out in the Contract Documents. Work shall include but is not limited to the following:

V. **Furnish And Install 4 Ft. Diameter Pre-Cast Electrical Handholes**

1. **Furnish And Install 4 Ft Diameter Pre-Cast Electrical Manholes** shall be paid on a Lump Sum basis. The work shall be as called out in the Contract Documents. Work shall include but is not limited to the following:
 - a. Furnishment and installation of 4 FT Diameter Pre-Cast Electrical Manholes as specified.
 - b. Complete installation of specified components including excavation, trenching, proper disposal of excavated material and backfill.
 - c. Shoring and proper dewatering of trench.

W. **Generator Commissioning/Start Up & Load Bank Testing**

1. **Generator Commissioning/Start Up & Load Bank Testing** is to be paid on a Lump Sum basis. The work shall be as called out in the Contract Documents. Work shall include but is not limited to the following:
 - a. Load Bank Test completed for duration as specified in Contract Documents and in accordance with NFPA standards to ensure proper functionality and quality of work.

X. **Generator Maintenance and Overhaul**

1. **Generator Maintenance and Overhaul** is to be paid on an Lump Sum basis. The work shall include; change lube oil and filters, change fuel filters, change coolant level, adjust belt tension, and change air filters.

Y. **Dense Course Aggregate Surface Course, ¾” Diameter Stone (Firebreak Ground Cover)**

1. **Dense Course Aggregate Surface Course, ¾” Diameter Stone** is to be paid on a Lump Sum basis. The work shall include compaction of existing subgrade, furnishing and installing geotextile membrane, furnishing ¾” diameter crushed river stone to depth of 6-inches, transport, and labor to install. The work shall be as called out in the Contract Documents.

Z. **Removable Bollards**

1. **Removable Bollards** is to be paid on a Lump Sum basis. The work shall include steel removable bollards, transport, and labor to install. The work shall be as called out in the Contract Documents.

AA. **Site Restoration**

1. **Site Restoration** is to be paid on a Lump Sum basis. The work shall be as called out in the Contract Documents. Work shall include but is not limited to the following:
 - a. Restoration of surfaces including seeding of grass areas, repair of damaged asphalt, concrete, gravel, and other surfaces.
 - b. Clearing of dust, debris, and items as directed by the Engineer or Owner.

END OF SECTION 012200

**DIVISION 01 – GENERAL REQUIREMENTS
SECTION 012900 – PAYMENT PROCEDURES
DPMC No. A1346-00**

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections include the following:
 - 1. Division 01 Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 2. Division 01 Section 012200 "Measurement and Payment" for administrative requirements governing use of unit prices.
 - 3. Division 01 Section 013200 "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.

1.3 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF AMOUNT FOR CONTRACT PAYMENT SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
 - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with Continuation Sheets.
 - b. Submittals Schedule.
 - c. Contractor's Construction Schedule.
 - 2. Submit the Schedule of Values to Engineer at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
 - 3. Sub-schedules: Where the Work is separated into phases requiring separately phased payments, provide sub-schedules showing values correlated with each phase of payment.

- B. Format and Content: Use the Specification table of contents as a guide to establish line items for the Schedule of Values. Provide at least one (1) line item for each Specification Section.
1. Identification: Include the following Project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Name of Engineer.
 - c. Engineer's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value.
 - 1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
 3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
 4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.
 6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
 7. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
 8. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
 9. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Engineer and paid for by Owner.
 - 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: Progress payments shall be submitted to Engineer by the fifteenth day of the month. The period covered by each Application for Payment is one (1) month, ending on the last day of the month.
- D. Payment Application Forms: Use forms provided by Owner for Applications for Payment.
- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Engineer will return incomplete applications without action.
 - 1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
 - 2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- F. Transmittal: Submit three (3) signed and notarized original copies of each Application for Payment to Engineer by a method ensuring receipt within 24 hours. One (1) copy shall include waivers of lien and similar attachments if required.
 - 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from every entity who is lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
 - 1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 - 2. When an application shows completion of an item, submit final or full waivers.
 - 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 - 4. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.
- H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
 - 1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 - 2. When an application shows completion of an item, submit final or full waivers.
 - 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.

4. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit waivers of lieu on forms, executed in a manner acceptable to Owner.
- I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of Values.
 3. Contractor's Construction Schedule (preliminary if not final).
 4. Products list.
 5. Schedule of unit prices.
 6. Submittals Schedule (preliminary if not final).
 7. List of Contractor's staff assignments.
 8. List of Contractor's principal consultants.
 9. Copies of building permits.
 10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 11. Initial progress report.
 12. Report of preconstruction conference.
 13. Certificates of insurance and insurance policies.
 14. Performance and payment bonds.
 15. Data needed to acquire Owner's insurance.
 16. Initial settlement survey and damage report if required.
- J. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- K. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Sum.
 4. Complete payment forms provided by DPMC as follows:
 - a. DPMC "Contractors Application and Certification for Payment"
 - b. DPMC Form 11, "DPMC Invoice"
 - c. DPMC Form 11-2, "Monthly Estimate for Payment to Contractor"
 - d. DPMC Form 11-2a, "Certification of Prime Contractor"
 - e. DPMC "Contractor's Certification Statement"
 - f. DPMC "Partial Release and Waiver of Lien and Payment Warranty"
 - g. DPMC Form 20, "Final Contract Acceptance"
 5. Evidence that claims have been settled if applicable.

6. If applicable, final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
7. Final, liquidated damages settlement statement if applicable.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION 012900

DIVISION 01 – GENERAL REQUIREMENTS
SECTION 013100 – PROJECT MANAGEMENT AND COORDINATION
DPMC No. A1346-00

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
1. Coordination Drawings.
 2. Administrative and supervisory personnel.
 3. Project meetings.
 4. Requests for Interpretation (RFIs).
- B. Related Sections include the following:
1. Division 01 Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's Construction Schedule.
 2. Division 01 Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 3. Division 01 Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

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

1.4 COORDINATION

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
- B. Coordination:
1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.

4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
- C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's Construction Schedule.
 2. Preparation of the Schedule of Values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Pre-installation conferences.
 7. Project closeout activities.
 8. Startup and adjustment of systems.
 9. Project closeout activities.
- E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.5 SUBMITTALS

- A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.
1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:
 - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - b. Indicate required installation sequences.
 - c. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
 2. Sheet Size: At least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
 3. Number of Copies: Submit six (6) opaque copies of each submittal. Engineer, through Construction Manager, will return two (2) copies.

- a. Submit five (5) copies for operation and maintenance manuals. Engineer and Construction Manager will retain two (2) copies; remainder will be returned. Mark up and retain one (1) returned copy as a Project Record Drawing.
- B. Key Personnel Names: Within fifteen (15) days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.6 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Engineer, within three (3) days of the meeting.
- B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Engineer, but no later than fifteen (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: Authorized representatives of Owner, Construction Manager, Engineer, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. It is mandatory for the contractor's superintendent to attend preconstruction meeting. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following as may apply to this Contract:
 - 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. LEED requirements.
 - l. Preparation of Record Documents.
 - m. Use of the premises and existing building.

- n. Work restrictions.
 - o. Owner's occupancy requirements.
 - p. Responsibility for temporary facilities and controls.
 - q. Construction waste management and recycling.
 - r. Parking availability.
 - s. Office, work, and storage areas.
 - t. Equipment deliveries and priorities.
 - u. First aid.
 - v. Security.
 - w. Progress cleaning.
 - x. Working hours.
3. Minutes: Engineer will record and distribute meeting minutes.
- C. Progress Meetings: Frequency of progress meeting shall be coordinated with Owner at pre-construction meeting.
- 1. Attendees: In addition to representatives of Owner, Construction Manager, and Engineer, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Status of correction of deficient items.
 - 14) Field observations.
 - 15) RFIs.
 - 16) Status of proposal requests.
 - 17) Pending changes.
 - 18) Status of Change Orders.

- 19) Pending claims and disputes.
- 20) Documentation of information for payment requests.
3. Minutes: Engineer will record and distribute to Contractor the meeting minutes.
4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
 - a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

1.7 REQUEST FOR INTERPRETATION (RFIs)

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

- c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Architect's actions on submittals.
 - f. Incomplete RFIs or RFIs with numerous errors.
2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section 012600 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Engineer and Construction Manager in writing within 10 days of receipt of the RFI response.
- E. On receipt of Engineer and Construction Manager action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Engineer and Construction Manager within seven (7) days if Contractor disagrees with response.
- F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Use CSI Log Form 13.2B. Include the following: Software log with not less than the following:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Engineer and Construction Manager
 4. RFI number including RFIs that were dropped and not submitted.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Engineer and Construction Manager response was received.
 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION - NOT USE

END OF SECTION 013100

**REQUEST
FOR
INFORMATION**

Project #: _____

RFI #: _____

Request Date: _____

Requestor: _____

I. REQUEST

[Empty box for request details]

REQUESTOR'S SIGNATURE : _____

II. RESPONSIBILITY

THIS SECTION TO BE COMPLETED BY A/E.

ACTION PERSON (S): _____

ACTION NLT DATE: _____

III. RESPONSE

[Empty box for response details]

ACTION PERSON SIGNATURE: _____ DATE: _____

DIVISION 01 – GENERAL REQUIREMENTS
SECTION 013200 – CONSTRUCTION PROGRESS DOCUMENTATION
DPMC No. A1346-00

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
1. Preliminary Construction Schedule.
 2. Contractor's Construction Schedule.
 3. Submittals Schedule.
 4. Daily construction reports.
 5. Material location reports.
 6. Field condition reports.
 7. Special reports.
- B. Related Sections include the following:
1. Division 01 Section 012900 "Payment Procedures" for submitting the Schedule of Values.
 2. Division 01 Section 013100 "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
 3. Division 01 Section 013300 "Submittal Procedures" for submitting schedules and reports.
 4. Division 01 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 activities** are activities on the critical path. They 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 Engineer.

- C. **Critical Path:** The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- D. **Event:** The starting or ending point of an activity.
- E. **Float:** The measure of leeway in starting and completing an activity.
 - 1. Float time belongs to Owner and is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
- F. **Fragment:** A partial or fragmentary network that breaks down activities into smaller activities for greater detail.
- G. **Major Area:** A story of construction, a separate building, or a similar significant construction element.
- H. **Milestone:** A key or critical point in time for reference or measurement.
- I. **Network Diagram:** A graphic diagram of a network schedule, showing activities and activity relationships.
- J. **Resource Loading:** The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 SUBMITTALS

- A. **Qualification Data:** For scheduling consultant.
- B. **Submittals Schedule:** Submit three (3) copies of schedule. Arrange the following information in a tabular format:
 - 1. Scheduled date for first submittal.
 - 2. Specification Section number and title.
 - 3. Submittal category (action or informational).
 - 4. Name of subcontractor.
 - 5. Description of the Work covered.
 - 6. Scheduled date for Engineer and Construction Manager final release or approval.
- C. **Preliminary Construction Schedule:** Submit two (2) opaque copies.
 - 1. Approval of cost-loaded preliminary construction schedule will not constitute approval of Schedule of Values for cost-loaded activities.
- D. **Contractor's Construction Schedule:** Submit two (2) opaque copies of initial schedule, large enough to show entire schedule for entire construction period.
 - 1. Submit one (1) electronic copy of schedule, using software indicated, on CD-R, and labeled to comply with requirements for submittals. Include type of schedule (Initial or Updated) and date on label.
- E. **Daily Construction Reports:** Submit two (2) copies at monthly intervals.

- F. Material Location Reports: Submit two (2) copies at monthly intervals.
- G. Field Condition Reports: Submit two (2) copies at time of discovery of differing conditions.
- H. Special Reports: Submit two (2) copies at time of unusual event.

1.5 QUALITY ASSURANCE

- A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Division 01 Section 013100 "Project Management and Coordination". Review methods and procedures related to the Preliminary Construction Schedule and Contractor's Construction Schedule, including, but not limited to, the following:
 - 1. Review software limitations and content and format for reports.
 - 2. Verify availability of qualified personnel needed to develop and update schedule.
 - 3. Discuss constraints, including work stages, interim milestones and partial Owner occupancy.
 - 4. Review delivery dates for Owner-furnished products.
 - 5. Review schedule for work of Owner's separate contracts.
 - 6. Review time required for review of submittals and re-submittals.
 - 7. Review requirements for tests and inspections by independent testing and inspecting agencies.
 - 8. Review time required for completion and startup procedures.
 - 9. Review and finalize list of construction activities to be included in schedule.
 - 10. Review submittal requirements and procedures.
 - 11. Review procedures for updating schedule.

1.6 COORDINATION

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

PART 2 PRODUCTS

2.1 SUBMITTALS SCHEDULE

- A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, re-submittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
 - 1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.

2. Initial Submittal: Submit concurrently with preliminary bar-chart schedule. Include submittals required during the first 60 days of construction. List those 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.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Procedures: Comply with procedures contained in AGC's "Construction Planning & Scheduling".
- B. Time Frame: Extend schedule from date established for commencement of the Work the Notice of Award the Notice to Proceed to date of Substantial 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.
- C. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
 1. Activity Duration: Define activities so no activity is longer than 30 days, unless specifically allowed by Engineer.
 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. Rotary Distributor
 - b. Filter Block
 - c. Filter Media
 - d. Filter Ventilation
 3. Submittal Review Time: Include review and re-submittal times indicated in Division 01 Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
 4. Startup and Testing Time: Include not less than 30 days for startup and testing.
 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Engineer's administrative procedures necessary for certification of Substantial Completion.
- D. 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. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Division 01 Section 011000 "Summary". Delivery dates indicated stipulate the earliest possible delivery date.
 3. 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.
 4. 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.
 - l. Startup and placement into final use and operation.
 5. Area Separations: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Permanent space enclosure.
 - c. Completion of mechanical installation.
 - d. Completion of electrical installation.
 - e. Substantial Completion.
- E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragments to demonstrate the effect of the proposed change on the overall project schedule.
- F. 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.
 7. Accidents.
 8. Meetings and significant decisions.
 9. Unusual events (refer to 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.
- B. Material Location Reports: At weekly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.
- C. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation on CSI Form 13.2A. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.4 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner within one (1) 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 time intervals, update schedule to reflect actual construction progress and activities. Issue schedule one (1) week time 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 Actual Completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Engineer, Construction 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

DIVISION 01 – GENERAL REQUIREMENTS
SECTION 013300 – SUBMITTAL PROCEDURES
DPMC No. A1346-00

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Sections include the following:
1. Division 01 Section 012900 "Payment Procedures" for submitting Applications for Payment and the Schedule of Values.
 2. Division 01 Section 013100 "Project Management and Coordination" for submitting and distributing meeting and conference minutes and for submitting Coordination Drawings.
 3. Division 01 Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule and the Submittals Schedule.
 4. Division 01 Section 014000 "Quality Requirements" for submitting test and inspection reports.
 5. Division 01 Section 017700 "Closeout Procedures" for submitting warranties.
 6. Division 01 Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 7. Division 01 Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 8. Division 01 Section 017900 "Demonstration and Training" for submitting videotapes of demonstration of equipment and training of Owner's personnel.
 9. Divisions 02 through 48 Sections for specific requirements for submittals in those Sections.

1.2 SUMMARY

- A. The Contractor shall prepare and submit all principal items of equipment and materials to be furnished and installed under the Contract for review and approval by the Engineer. As part of the submittal process, the Contractor shall provide a list of all items he proposes to submit for approval by the Engineer. The list will serve as a checklist to confirm that all necessary submittals have been properly provided and processed. The Engineer may require supplemental submittals in addition to items on the approved submittal list.
- B. Working drawings, in addition to equipment and materials submittals, shall be prepared by the Contractor and provide all dimensions and size requirements. The Contractor shall accurately show all existing features and a detailed dimensional layout showing the relationship of new equipment or materials to be installed or constructed. Where multiple equipment or materials are to be installed, the working drawing shall show all components of the installation. The Engineer will not process shop drawings, equipment or material submittals that do not adequately show all components and their relative position. Working drawings and equipment or materials submittals shall show any variations from the requirements of the Contract Documents, and the Contractor shall make specific mention in his letter of transmittal.

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

1.3 DEFINITIONS

- A. **Action Submittals:** Written and graphic information that requires Engineer and Construction Manager responsive action.
- B. **Informational Submittals:** Written information that does not require Engineer and Construction Manager responsive action. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTALS PROCEDURES

- A. General: Electronic copies of CAD Drawings of the Contract Drawings will not be provided by Architect for Contractor's use in preparing submittals.
- 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.
- C. Submittals Schedule: Comply with requirements in Section 013200 "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 Engineer 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 fifteen (15) days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
 - 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 - 3. Resubmittal Review: Allow fifteen (15) days for review of each resubmittal.
- 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. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Engineer
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Submittal number or other unique identifier, including revision identifier.

- i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Other necessary identification.
- F. Deviations: Highlight or otherwise specifically identify deviations from the Contract Documents on submittals.
- G. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Engineer will return 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.
 - 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 Engineer 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.
- 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 "approval" notation from Engineer.

PART 2 PRODUCTS**2.1 ACTION SUBMITTALS**

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
1. Submit paper copies submittals directly to FedEx specifically established for Project.
- 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 printed 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 written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Standard color charts.
 - e. Manufacturer's catalog cuts.
 - f. Wiring diagrams showing factory-installed wiring.
 - g. Printed performance curves.
 - h. Operational range diagrams.
 - i. Mill reports.
 - j. Standard product operation and maintenance manuals.
 - k. Compliance with specified referenced standards.
 - l. Testing by recognized testing agency.
 - m. Application of testing agency labels and seals.
 - n. Notation of coordination requirements.
 4. Submit Product Data before or concurrent with Samples.
 5. Number of Copies: Submit six (6) copies of Product Data, unless otherwise indicated. Engineer will return two (2) copies. Mark up and retain one (1) returned copy as a Project Record Document.
- 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. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - f. Shop work manufacturing instructions.
 - g. Templates and patterns.
 - h. Schedules.
 - i. Design calculations.
 - j. Compliance with specified standards.
 - k. Notation of coordination requirements.

- l. Notation of dimensions established by field measurement.
 - m. Relationship to adjoining construction clearly indicated.
 - n. Seal and signature of professional engineer if specified.
 - o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
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 but no larger than 30 by 40 inches.
 3. Number of Copies: Submit six (6) copies of each submittal, unless copies are required for operation and maintenance manuals. Submit five (5) copies for operation and maintenance manuals. Engineer will retain two (2) copies; remainder will be returned.
- D. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section 013200 "Construction Progress Documentation" for Construction Manager's action.
- E. Submittals Schedule: Comply with requirements specified in Division 01 Section 013200 "Construction Progress Documentation".
- F. Application for Payment: Comply with requirements specified in Section 012900 "Payment Procedures".
- G. Schedule of Values: Comply with requirements specified in Division 0 Section 0129000 "Payment Procedures".

2.2 INFORMATIONAL SUBMITTALS

- A. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation".
- B. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- C. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- D. Installer Certificates: Prepare 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.
- E. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- F. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- G. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

- H. Material Test Reports: Prepare 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.
- I. Product Test Reports: Prepare written reports indicating 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.
- J. Research/Evaluation Reports: Prepare 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.
- K. Schedule of Tests and Inspections: Comply with requirements specified in Division 01 Section 014000 "Quality Requirements."
- L. Preconstruction Test Reports: Prepare 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.
- M. Compatibility Test Reports: Prepare 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.
- N. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, 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.
- O. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 01 Section 017823 "Operation and Maintenance Data".
- P. Design Data: Prepare 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.

- Q. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
1. Preparation of substrates.
 2. Required substrate tolerances.
 3. Sequence of installation or erection.
 4. Required installation tolerances.
 5. Required adjustments.
 6. Recommendations for cleaning and protection.
- R. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
1. Name, address, and telephone number of factory-authorized service 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.
- S. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
- T. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to Architect.
1. Engineer will not review submittals that include MSDSs and will return the entire submittal for resubmittal.
 2. Include list of codes, loads, and other factors used in performing these services.

2.3 OPERATION AND MAINTENANCE MANUALS

- A. The Contractor shall furnish five (5) bound operation and maintenance manuals of all approved equipment and principal materials used in the construction of the Work. Complete manuals shall include such information as manufacturer's brochures; drawings; cut sheets; wiring diagrams; maintenance procedures; parts lists, and any other pertinent information to clearly and fully describe operation, performance, and maintenance criteria.

2.4 CERTIFIED SHOP TEST REPORTS

- A. Equipment specified for pressure, duty point, capacity, rating, efficiency, performance, function, or special requirement shall be shop tested by the manufacturer. A report shall be provided which certifies and proves that the equipment to be and furnished and installed will meet or exceed the requirements of the Contract Documents. Tests shall be made in accordance with applicable industry standards.

2.5 SAMPLES

- A. Where required in the Contract Documents, the Contractor shall provide an adequate number and size of manufactured product samples. Samples shall exhibit the quality, type, color range, texture, trade name, manufacturer, and indicate location where the material is proposed for use.

PART 3 EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. 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 Engineer.
- B. 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.

3.2 ENGINEERS' AND CONSTRUCTION MANAGERS' ACTION

- A. General: Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Engineer will review each submittal, make marks to indicate corrections or modifications required, and return it. Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
 - 1. No Exceptions Taken.
 - 2. Make Corrections Noted.
 - 3. Amend and Resubmit.
 - 4. Rejected – See Remarks.
- C. Informational Submittals: Engineer will review each submittal and will not return it, or will return it if it does not comply with requirements. Engineer will forward each submittal to appropriate party.
- D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300

DIVISION 01 – GENERAL REQUIREMENTS
SECTION 015000 – TEMPORARY FACILITIES AND CONTROLS
DPMC No. A1346-00

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Sections include the following:
 - 1. Division 01 Section 011000 "Summary" for limitations on utility interruptions and other work restrictions.
 - 2. Division 01 Section 013300 "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
 - 3. Division 01 Section 017300 "Execution" for progress cleaning requirements.

1.3 USE CHARGES

- A. Water Service: 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.
- B. Electric Power Service: Electric power from Owner's existing system is not available for use without metering and payment of use charges. Provide connections and extensions of services as required for construction operations.

1.4 SUBMITTALS

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

1.5 PROJECT CONDITIONS

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

PART 2 PRODUCTS**2.1 TEMPORARY FACILITIES**

- A. Sanitary Facilities, General: Prefabricated units suitable for number of personnel to be situated as directed shall be provided and maintained throughout the project.

2.2 EQUIPMENT

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

PART 3 EXECUTION**3.1 INSTALLATION – GENERAL**

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
 - 1. Locate facilities to limit site disturbance as specified in Division 01 Section 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 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
- B. Parking: Use designated areas by Owner for construction personnel.

3.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 - 1. Comply with work restrictions specified in Division 01 Section 011000 "Summary".
 - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Owner with one set of keys.
- B. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- C. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
 - 1. Prohibit smoking in construction areas.

2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.4 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.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 1. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures".

END OF SECTION 015000

DIVISION 01 – GENERAL REQUIREMENTS
SECTION 015050 – SOIL EROSION AND SEDIMENTATION CONTROL
DPMC No. A1346-00

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

- A. The Contractor shall furnish all labor, materials, and equipment necessary and shall take all measures necessary to preserve and protect the site from environmental impact due to construction activities at the site during phases of the project construction. The required measures shall include, but are not necessarily limited to; providing erosion and sediment control methods and devices; confining the activities of his and his subcontractor's equipment and workmen to the designated site boundaries, except as may be required for site ingress and egress; taking effective measures to minimize and control noise due to construction operations; complying with all municipal, State and Federal regulations regarding open burning, air pollution control and water pollution control; disposing of all surplus, unusable and unsuitable excavated material, brush, trees, debris and rubbish to off-site locations; providing sanitary facilities in sufficient numbers for all workmen and visitors to the site, including the Owner, the Engineer, their representatives and representatives of all agencies authorized to visit the site; protection of all surface and ground waters at the site and in proximity to the site; and all else as described hereinafter and as required to fulfill the intent of this section of the specifications.
- B. In general, the methods and materials used under this specification shall be in accordance with the *Standards for Soil Erosion and Sediment Control in New Jersey, July 1999* (hereafter referred to as Standards) or as otherwise adopted by the local Town agency or department having such jurisdiction.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 GENERAL DESCRIPTION

- A. Before commencing any other construction activities, exclusive of clearing and grubbing, the Contractor shall first provide ditching, construct temporary sediment barriers and grade the construction area so as to completely prohibit any excavated or fill soils, silts and other materials resulting from construction operations from being carried off and away from the construction area thence into the local storm sewer system. No other excavation work shall be permitted and no fill shall be brought onto the site until the Contractor has completed works for controlling soil erosion and sediment control.
- B. When ordered by the Owner or Engineer, all existing temporary work as specified in the preceding paragraph shall be removed and the site restored and brought to the specified finish conditions.
- C. All temporary disposal sites and stockpile areas shall be so located so as to prohibit runoff of silt and soil to any watercourses or natural drainage channels.

- D. All clearing shall be done in such a manner to provide minimum exposure of soils wherever possible.
- E. The Contractor shall provide mulching and shall take other protective measures as required to protect disturbed and new soils from erosion.

3.2 CONSTRUCTION PROCEDURES

A. General

The scope of work covered under this item is the restoration of areas disturbed during construction, including but not limited to ground covers, vegetation, tree removal, and replacement.

The Contractor shall incorporate all permanent control features into the project at the earliest practicable time. Temporary soil erosion and sediment control measures shall be coordinated with the permanent pollution control features and with the construction of pavement, drainage facilities such as pipes, culverts, headwalls, channels, ditches, etc., to the maximum extent practical to assure economical, effective and continuous erosion control throughout the life of the contract, as outlined in the approved progress schedule.

Prior to all grubbing operations, soil erosion and sediment control measures shall be installed. When un-stabilized areas caused by site development, grading, or other earth disturbing activities exist beyond fourteen (14) calendar days, the areas disturbed shall be seeded and mulched. These requirements pertain to perimeter controls, berms, dams, swales, ditches, and slopes. Upon completion of the grading or construction, disturbed areas shall be permanently stabilized within seven (7) calendar days in accordance with applicable Town or *Standards for Soil Erosion and Sediment Control in New Jersey*.

When excavation or embankment construction reaches the finished subgrade, those areas on which paving is to be placed are exempt from the above stabilization requirements. Roadways and haul roads actively being used for daily conveyance of equipment as well as areas between temporary berms, except median areas, are also exempt.

Streams shall be protected from soil erosion and sediment. Streams being diverted shall be protected through the use of silt fences. Temporary diversion channels shall be lined with geotextile fabric to protect against embankment erosion.

The turbid discharge from dewatering construction activities shall be contained in a dewatering basin in order to control sediment and provide filtration of water prior to it being released into adjacent streams or other watercourses.

Soil being stockpiled shall be placed in well-drained areas no closer than 50 feet from streams, wetland, flood plains and other watercourses, unless otherwise directed. The stockpiles shall be seeded and mulched in accordance with applicable Standards. Adequate temporary soil erosion and sediment controls shall be provided around the stockpiles until such time as vegetation is established on the piles.

Temporary soil erosion and sediment control measures shall be used to correct conditions that develop during construction that were not foreseen during design and may include construction work outside of the project limits. These temporary measures will not be paid for separately and thereby shall be included for the Work under this item.

In the event that temporary soil erosion and sediment control measures are required due to the contractor's failure, for any reason, to install or maintain soil erosion and sediment controls, either as part of the work or as directed, such work shall be performed by the contractor at no cost to the Owner.

If the Contractor is not in compliance with soil erosion and sediment control provisions, corrective actions shall be taken immediately. The Engineer may suspend the work, wholly or in part until such time as the Contractor is fully in compliance. All corrective and remedial work required to bring the Contractor into compliance shall be performed at no cost to the Owner.

Temporary soil erosion and sediment control measures shall be removed when necessary to allow for the installation of permanent control features or as permanent controls become functional. Before acceptance of the project, all items used for temporary soil erosion and sediment control shall be removed unless the Engineer directs that specific items remain in place.

Upon completion of backfilling, the Contractor shall restore all areas of work to their original condition or better. All areas shall be restored by topsoil and seeding. The Contractor shall control soil erosion caused by or resulting from construction per the *Standards for Soil Erosion and Sediment Control in New Jersey* latest revision, as adopted by the New Jersey Soils Conservation Committee. The Contractor shall furnish all materials, equipment, and labor as necessary for the completion of this item.

B. Prohibited Construction Procedures

The following construction procedures shall be prohibited and the Contractor should be aware that he must not plan on using any method or methods of construction that will cause temporary or permanent damage to the environment.

1. Dumping of spoil material into any stream corridor, any wetlands, and any surface water or at locations not approved by the Engineer.
2. Indiscriminate, arbitrary, or capricious operation of equipment in any stream corridors, any wetlands, or any surface waters.
3. Dumping of silt-laden water from trenches or other excavations into any surface waters, any stream corridors, or any wetlands.
4. Damaging vegetation adjacent to or outside of access roads or rights-of-way. ALL CONSTRUCTION OPERATIONS MUST BE CONFINED TO WITHIN SPECIFIED EASEMENT WIDTHS.
5. Disposal of trees, brush, and other debris in any stream corridors, any wetlands, any surface waters or at locations not approved by the Engineer.
6. Permanent or unspecified alteration of the flow line or alignment of streams or any watercourses.
7. Burning of water project debris.
8. Disposal of tree trunks and roots, vegetation and water project debris in trenches or excavations.

C. Site Access and Clearing

The Contractor shall confine all clearing operations to within specified easement widths and then only the areas that are essential for site excavation and construction of the underground utilities. All clearing schedules should be formulated to provide minimum practical exposure of soils in order to prevent erosion. Any damaged area outside the working easement will be replaced or restored at the Contractor's expense.

D. Protection of Trees and Shrubs

The Contractor shall make every effort to avoid the destruction of common native trees and shrubs so as not to unduly disturb the ecological or environmental quality of the project area. If, in the opinion of the Engineer, the Contractor is not taking sufficient precautions in the construction operations to prevent damage to trees and the natural vegetation, he may order all operations to be stopped. The Engineer shall mark trees and shrubs that are to be preserved by the Contractor.

The Contractor shall make himself aware of and shall comply with all current local, State and Federal regulations governing air and water pollution control and solid waste control, including especially, regulations prohibiting open burning of trees, logs, stumps, brush, vegetation, wood chips or construction debris be buried on site. All such materials shall be removed and disposed of at off-site locations.

E. Erosion and Sediment Control

The Contractor will follow all the specifications faithfully and, in addition, his attention is called to the environmentally sensitive sections of this Contract, such as construction in wetlands, wetland transition areas and adjacent to streams and any other small tributaries.

Erosion Control: The Contractor shall use any necessary method as dictated by the situation to control erosion caused by or resulting from construction directly attributable to or incidental to the prosecution of this contract. The methods shall be in strict conformance with the most recent environmental safeguard practices and shall include, but not be limited to construction of berms, dikes, temporary and permanent structures, soil stabilization compounds and rip-rap or gabions as necessary to prevent erosion. Erosion control methods shall be employed from initial site preparation, during construction and at the time of final restoration. Methods and materials used for erosion control shall be subject to approval by the New Jersey Department of Environmental Protection, the United States Environmental Protection Agency, and the United States Department of Agriculture Soil Conservation Service.

Sediment Control: The Contractor will not be allowed to pump any sediment-laden water directly into or indirectly (via surface routes) into nearby watercourses or storm drainage facilities. He will employ proven, environmentally sound methods to allow sediment to settle out of the water or prevent sediment from entering the water which interferes with prosecution of this contract before it is discharged to any nearby watercourse or storm drainage facility. Discharge of sediment-laden water from dewatering operations shall be a minimum of 40 linear feet from any watercourse and storm drainage facility. Only clear water (no turbidity) will be allowed to discharge into a watercourse and the point of discharge will be diffused sufficient that no turbulence will be created by its introduction. No erosion caused by discharge from dewatering operations will be permitted either.

If sedimentation ponds are constructed, they will be constructed so as to produce the least detrimental environmental damage during their operation. Accumulated sediment will be removed as directed by the Engineer. No sedimentation pond will be constructed unless prior written authorization is obtained from the Engineer. Upon removal of said ponds, the environment will be restored to original condition. Color slides must be taken of each prospective pond site and will be used as the standard for restoration. In the event of loss of, or damage to the slides of the original site, restoration will be as required to the written satisfaction of the owners of the properties involved and the Engineer.

Silt Fence: Silt fences shall consist of geotextile fabric whose width shall be at least three feet (3') to provide for a two-foot (2') high fence after one foot (1') of fabric is buried in the existing soil. Heavy duty silt fence shall consist of geotextile fabric whose width shall be at least four feet (4') to provide for a three-foot (3') high fence after one foot (1') of fabric is buried in the existing soil. Sections of fabric shall be joined in such a manner that, when in operation, the sections work effectively as a continuous fence. Fence posts shall be installed at a slight angle toward the anticipated runoff source.

Heavy duty silt fence shall include a welded wire mesh backing for the geotextile fabric. This welded steel wire mesh shall be galvanized and contain four-inch (4") square openings. The geotextile fabric shall be secured to the welded wire mesh.

Hay bale check dams with temporary stone outlets: Hay bales shall be embedded four inches (4”) into the ground and anchored in place with two (2) wood stakes per bale. The temporary stone outlets, consisting of rip-rap stones conforming to the requirements for temporary for temporary rip-rap, shall be placed in the center of each flow line. Coarse aggregate size No. 2 shall be placed immediately upgrade of each stone outlet.

Inlet Sediment Traps: Inlet sediment traps, consisting of silt fence and temporary stone inlets, shall be constructed to control sedimentation at existing and proposed inlet drainage structures.

The temporary stone inlets, consisting of coarse aggregate size No. 2, shall be placed in each flow line upgrade of the inlet structure. The coarse aggregate shall be placed on geotextile fabric which shall be buried in the soil. When sections of geotextile fabric need to be joined, the sections shall be overlapped a minimum of eighteen inches (18”) in the direction of flow.

F. Dust Control

The Contractor shall employ construction methods and means that keep flying dust to a minimum and shall provide for the laying of water or other dust control materials on the project and on roads, streets and other areas immediately adjacent to the project limits, wherever traffic or buildings that are occupied or in use, are affected by such dust caused by his hauling or other construction operations. The materials and methods used for dust control are subject to approval and shall be as directed.

When calcium chloride is used for dust control, the calcium chloride shall be grade 2 in the form of loose dry granules or flakes and be fine enough to feed through commonly used spreaders at a rate of application of approximately 1.5 pounds per square yard. Care shall be exercised when using calcium chloride on steep slopes in order to prevent the calcium chloride from washing into streams or accumulating around plants. Calcium chloride shall not be applied in solution.

G. Sediment Control

The Contractor shall provide for prompt removal from existing roadways of all sediment and other materials that have been spilled, washed, tracked, or otherwise deposited thereon by his hauling and other operations whenever the accumulation is sufficient to cause the formation of mud, interfere with drainage, damage pavements, or create a traffic hazard.

Details of acceptable soil erosion and sediment control measures are included in the construction plans and in the Standards.

3.3 RESTORATION PROCEDURES

A. General

Immediately after backfilling the trench, disturbed areas either in rights-of-way or along roadways, shall be prepared immediately for restoration. Erosion control measures shall be utilized immediately, and final restoration shall be undertaken as soon as an area is no longer needed for construction, stockpile, or access. The Contractor shall restore the disturbed surfaces along the rights-of-way and easements to their original condition and grade. The widths of the area eligible for payment shall be the width actually disturbed.

All surplus soil must be removed from the area. The natural drainage must be restored to the disturbed area. The Contractor shall be responsible to keep his entire operations within the limits of construction as required. Any damage to area outside the working easement will be replaced or repaired at the

Contractor's expense. Care should be taken to avoid damage to adjacent vegetation and to prevent the formation of depressions that would serve as mosquito pools.

3.4 TOPSOIL AND SEEDING (NON-WETLANDS AREAS)

A. General

1. Seeding mixtures and application shall be in accordance with contract drawings.

3.5 TIME OF RESTORATION

- A. Restoration of all disturbed areas must begin seven (7) calendar days after backfilling and will be completed thirty (30) calendar days from the time of backfill completion unless approval is obtained from the Engineer to delay the restoration. Standard open and lawn area seeding and sodding procedures shall be completed from March 1 to May 15 or August 15 to October 1. Wetland area seeding should be carried out between mid-October to mid-May. Table 4-3 of the *Standards for Soil Erosion and Sediment Control in New Jersey* may also be used to determine optimal and acceptable seeding periods.

The Contractor shall be responsible for the maintenance of the desired ground surface restoration for a period of one-year after substantial completion. Additional seed shall be applied as necessary to complete a full and substantial growth. Wetland seed growth shall be cut to a height of not less than six inches by weed eater type rotary mowing when the first stage vegetation reaches a height of twelve to eighteen inches (12"-18").

3.6 PROTECTION OF RESTORED AREAS

- A. Whenever required, because of local conditions, the seeded areas shall be protected by a method approved by the Engineer. All protection materials, anchoring and placement procedures shall be in accordance with the *Standards for Soil Erosion and Sediment Control in New Jersey*, latest revision. The cost of all materials and work incidental to the placement and maintenance of protection materials shall be included in the unit price bid for this Item.

3.7 LIMITATIONS OF OPERATIONS

- A. Clearing and grubbing operations shall be so scheduled and performed that grading, and mulching, seeding and other permanent pollution control features can follow immediately thereafter according to the approved progress schedule. Should seasonal limitations make such coordination unrealistic, additional temporary soil erosion and sediment control measures shall be required between successive construction stages, as directed by the Engineer at no additional cost to the Owner.

The amount of surface area of eroded earth material exposed at one time by clearing and grubbing, excavation, borrow or fill operations, without stabilization, shall be limited to the least extent practical, but in any case, shall not exceed not exceed 25,000 square feet for clearing and grubbing operations, or 15,000 square feet for grading operations without prior approval. The engineer may increase or decrease these amounts commensurate with the contractor's capability and progress in keeping the construction current with the approved progress schedule.

3.8 SOIL EROSION AND SEDIMENT CONTROL MAINTENANCE

- A. Soil erosion and sediment control measures shall be maintained during the construction season as well as during winter months and other times when the project is closed down, throughout the life of the project, to ensure that the measures function properly. Soil erosion and sediment controls shall be immediately inspected after each rain and any corrective work shall immediately be performed to return the soil erosion and sediment control measures to proper function, as directed. Rip-rap stones, coarse aggregate, silt fence, or hay bales damaged due to washouts or siltation shall be replaced as directed by the Engineer at no additional cost to the Owner.

Sediment traps and basins shall be cleaned out and material properly disposed of when they are 50 percent filled. Silt fences, stone outlet structures, dams, and hay bales shall have sediment removed when the sediment reaches 50 percent of the height of the soil erosion and sediment control measure.

END OF SECTION 015050

DIVISION 01 – GENERAL REQUIREMENTS
SECTION 016000 – PRODUCT REQUIREMENTS
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.
- B. Related Sections include the following:
 - 1. Division 01 Section 012200 "Measurement and Payment" for products selected under an allowance.
 - 2. Division 01 Section 017700 "Closeout Procedures" for submitting warranties for Contract closeout.
 - 3. Divisions 02 through 48 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.2 DEFINITIONS

- A. **Products:** Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material", "equipment", "system", and terms of similar intent.
 - 1. **Named Products:** Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. **New Products:** Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. **Comparable Product:** Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. **Substitutions:** Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
- C. **Basis-of-Design Product Specification:** Where a specific manufacturer's product is named and accompanied by the words "basis of design", including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

1.3 SUBMITTALS

- A. Product List: Submit a list, in tabular form, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.
 - 1. Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule.
 - 2. Form: Tabulate information for each product under the following column headings:
 - a. Specification Section number and title.
 - b. Generic name used in the Contract Documents.
 - c. Manufacturer's name and address.
 - d. Supplier's name and address.
 - e. Projected delivery date or time span of delivery period.
- B. Comparable Product Requests: Submit three (3) copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Engineer Action: If necessary, Engineer will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Engineer will notify Contractor through Construction Manager of approval or rejection of proposed comparable product request within fifteen (15) days of receipt of request, or seven (7) days of receipt of additional information or documentation, whichever is later.
 - a. Form of Approval: As specified in Division 01 Section 013300 "Submittal Procedures".
 - b. Use product specified if Engineer cannot make a decision on use of a comparable product request within time allocated.
- C. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section 013300 "Submittal Procedures". Show compliance with requirements.

1.4 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two (2) or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store cementitious products and materials on elevated platforms.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.6 WARRANTY

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
- B. Submittal Time: Comply with requirements in Division 01 Section 017700 "Closeout Procedures".

1.7 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.

PART 2 PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.

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

B. Product Selection Procedures:

1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
3. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.

2.2 COMPARABLE PRODUCTS

- A. Conditions: Engineer will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Engineer will return requests without action, except to record noncompliance with these requirements:
1. Evidence that the proposed product does not require extensive revisions to the Contract Documents that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 3. Evidence that proposed product provides specified warranty.
 4. List of similar installations for completed projects with project names and addresses and names and addresses of Engineers and owners, if requested.
 5. Samples, if requested.

PART 3 EXECUTION – NOT USED

END OF SECTION 016000

DIVISION 01 – GENERAL REQUIREMENTS
SECTION 017300 – EXECUTION
DPMC No. A1346-00

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. General installation of products.
 - 2. Progress cleaning.
 - 3. Starting and adjusting.
 - 4. Protection of installed construction.
 - 5. Correction of the Work.
- B. Related Sections include the following:
 - 1. Division 01 Section 013100 "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
 - 2. Division 01 Section 013300 "Submittal Procedures" for submitting surveys.
 - 3. Division 01 Section 017329 "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
 - 4. Division 01 Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.3 SUBMITTALS

- A. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION**3.1 EXAMINATION**

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
 - 1. Before construction, verify the location and points of connection of utility services.
- B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning site work, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Verify compatibility with and suitability of substrates.
 - 2. Examine walls, floors, for suitable conditions where products and systems are to be installed.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Contractor shall use appropriate personal protection equipment where required.
- F. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.3 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold materials more than seven (7) days during normal weather or three (3) days if the temperature is expected to rise above 80 degrees Fahrenheit.
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.4 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 Section 017329 "Cutting and Patching".
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

DIVISION 01 – GENERAL REQUIREMENTS
SECTION 017329 – CUTTING AND PATCHING
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. Related Sections include the following:
 - 1. Divisions 02 through 48 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1.2 DEFINITIONS

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

1.3 SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least ten (10) days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
 - 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
 - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
 - 3. Products: List products to be used and firms or entities that will perform the Work.
 - 4. Dates: Indicate when cutting and patching will be performed.
 - 5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
 - 6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
 - 7. Engineer Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.4 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
- C. Operating elements include the following:
 - 1. Primary operational systems and equipment.
 - 2. Mechanical systems piping and ducts.
 - 3. Electrical wiring systems.
- D. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended or results in increased maintenance or decreased operational life or safety. Miscellaneous elements include the following:
 - 1. Equipment supports.
 - 2. Piping, ductwork, vessels, and equipment.
- E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.5 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.

PART 2 PRODUCTS

2.1 MATERIALS

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

PART 3 EXECUTION**3.1 EXAMINATION**

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

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

3.3 PERMITTING

- A. The Contractor shall obtain all municipal construction permits as required to perform the work as described in the contract documents.

3.4 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
 - 5. Proceed with patching after construction operations requiring cutting are complete.

6. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.

- C. Cleaning: Clean areas and spaces where cutting and patching are performed

END OF SECTION 017329

DIVISION 01 – GENERAL REQUIREMENTS
SECTION 017419 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
DPMC No. A1346-00

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.
- B. Waste management and disposal shall comply with the NJDEP Division of Solid and Hazardous Waste and the provisions and regulations of the Solid Waste Management Act, N.J.S.A. 13:1E et. seq. as amended and supplemented. The Contractor shall be responsible to be familiar with the regulatory standards that govern the disposition of waste disposal under this Contract and conduct his Work accordingly.
- C. Disposal shall be in conformance with all Federal, State and Local Laws. Recyclable components of those materials removed under Selective Structure Demolition shall be recycled and written documentation of the tonnage of material recycled shall be provided to the Owner. Documentation shall be in the form of accurate weight slips or other form acceptable by the municipality's Recycling Coordinator as will satisfy the States requirements for eligibility for state tonnage grants. Recycling components shall be any NJDEP Class "B" recyclable material, including but not limited to concrete, brick, block, asphalt-based roofing scrap and tree stumps/trunks or any other components.

1.2 SUMMARY

- A. The treatment, handling and disposal of construction waste from the demolition materials is based on the assumption that these waste materials will be non-hazardous and suitable for ultimate transport and disposal to an approved landfill, recycling facility or onsite beneficial reuse. Analytical test results of solids and liquids at the facility are appended to these specifications.
- B. The Contractor shall stage components of the demolition work at the designated staging areas or areas designated for onsite disposal.
- C. The Contractor shall notify the Engineer and Owner of any material that indicates characteristics of a hazardous material classification. Such the material must be managed in accordance with the hazardous waste regulations (N.J.A.C. 7:26-G-4-10 et. seq.) including transportation by a registered hazardous waste transporter in accordance with hazardous waste manifest and transportation requirements for disposal at an authorized hazardous waste facility. Engineer shall approve the means and method for handling and ultimate disposal of any hazardous waste.
- D. This Section includes procedural requirements for the following:
 - 1. Schedule testing to be conducted by the Contractor to classify materials for appropriate recycling, reuse and disposal.
 - 2. Recycling of non-hazardous demolition waste
 - 3. Disposing of non-hazardous demolition and construction waste.
 - 4. Reuse of non-hazardous demolition waste.

E. Related Sections include the following:

1. Division 02 Section 024119 "Selective Demolition" for disposition of waste resulting from demolition of components of the abandoned wastewater treatment plant and pump stations.

1.3 DEFINITIONS

- A. **Construction Waste:** Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. **Demolition Waste:** Building and site improvement materials resulting from demolition or selective demolition operations.
- C. **Disposal:** Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction. The phrase "to be removed" is consistent with disposal activities.
- D. **Recycle:** Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. **Salvage:** Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. **Salvage and Reuse:** Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 PERFORMANCE GOALS

- A. General: Comply with Waste Management Plan contained in the Appendix that results in ultimate disposal of materials generated by the demolition Work.
- B. Recycle Goals: Owner's goal is to recycle as much nonhazardous demolition and construction waste as possible including but not limited to the following materials:
 1. Demolition Waste:
 - a. Steel Water Storage Tank
 - b. Ductile Iron Pipe and Fittings
 - c. Existing general construction building materials.
- C. If a material or solid waste has been classified as other than nonhazardous, the Contractor shall be responsible to take appropriate measures to render the material as a nonhazardous product prior to recycling or disposal of the material.

1.5 SUBMITTALS

- A. Waste Management Plan: Submit three (3) copies of plan within seven (7) days of date established for the Notice to Proceed.

- B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit three copies of report. Include separate reports for demolition and construction waste. Include the following information:
1. Material category.
 2. Generation point of waste.
 3. Total quantity of waste in tons.
 4. Quantity of waste salvaged, both estimated and actual in tons.
 5. Quantity of waste recycled, both estimated and actual in tons.
 6. Total quantity of waste recovered (salvaged plus recycled) in tons.
 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- C. Waste Reduction Calculations: Before request for Substantial Completion, submit three (3) copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- E. Recycling and Processing Facility Records: Recycling shall be delivered to City of Trenton recycling and processing facility. Contractor to provide ticket to Owner and shall be made out to City of Trenton.
- F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

1.6 WASTE MANAGEMENT

- A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Include separate sections in plan for demolition and construction waste. Indicate quantities by weight or volume but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of demolition and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill, incinerator or other approved disposal facility. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
 2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
 3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.

6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement waste management plan as approved by Engineer. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 1. Comply with Division 01 Section 015000 "Temporary Facilities and Controls" for operation, termination, and removal requirements.
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
 1. Distribute waste management plan to everyone concerned within three days of submittal return.
 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 1. Designate and label specific areas on Project site necessary for temporary storage of materials that are to be recycled, reused, donated, and sold.
 2. Comply with Division 01 Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING DEMOLITION WASTE, GENERAL

- A. General: Recycle materials to an approved recycling facility.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor
- C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
 1. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 2. Stockpile materials away from construction area. Do not store within drip line of remaining trees.

3. Store components off the ground and protect from the weather.
4. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.3 RECYCLING DEMOLITION WASTE

- A. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
 1. Pulverize masonry to maximum four-inch (4") size.
- B. Piping and Valves: Separate pipe and valves.

3.4 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Burning waste materials is prohibited.
- C. Disposal: The ultimate disposal of materials shall be dependent on the result of classification tests as follows:
 1. Materials tested and classified as hazardous material shall be disposed in accordance with the following:
 - a. New Jersey's Hazardous Waste Regulations at NJAC 7:26G
 - b. NJ DOT requirements at NJAC 7:26-1
 - c. US DOT requirements at 40 CFR 177-179
 - d. US EPA rules for transporters of Hazardous Waste at 40 CFR 260.10
 - e. OSHA requirements at 29 CFR 1910 and 1926
 2. Materials tested and classified as non-hazardous material shall be handled, transported and disposed in compliance with New Jersey solid waste regulations at NJAC 7:26 and NJDOT rules at NJAC Title 16, Chapter 49 as may be directed by the Owner.
 - a. Contractor to provide tonnage ticket to the Owner.
 - b. Ticket shall be made out to "City of Trenton"
 3. Materials tested and classified as non-hazardous material that is suitable for onsite disposal or beneficial reuse shall be placed in designated areas of the existing treatment plant as may be directed by the Engineer and Owner. The Contractor shall provide all necessary site work for the placement of reuse material at designated areas on Owner's property.

END OF SECTION 017419

DIVISION 01 – GENERAL REQUIREMENTS
SECTION 017700 – CLOSEOUT PROCEDURES
DPMC No. A1346-00

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
1. Inspection procedures.
 2. Warranties.
 3. Final cleaning.
- B. Related Sections include the following:
1. Division 01 Section 012900 "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
 2. Division 01 Section 017300 "Execution" for progress cleaning of Project site.
 3. Division 01 Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 4. Division 01 Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
 5. Division 01 Section 017900 "Demonstration and Training" for requirements for instructing Owner's personnel.
 6. Divisions 02 through 48 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 2. Advise Owner of pending insurance changeover requirements.
 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs.

6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
 7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 8. Complete startup testing of systems.
 9. Submit test/adjust/balance records.
 10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 11. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
 12. Complete final cleaning requirements, including touchup painting.
 13. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Engineer and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer 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 Engineer, that must be completed or corrected before certificate will be issued.
1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
1. Submit a final Application for Payment according to Division 01 Section 012900 "Payment Procedures".
 2. Submit certified copy of Engineer Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Engineer. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect and 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. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Preparation: Submit two (2) copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use CSI Form 14.1A.

1. Include the following information at the top of each page:
 - a. Project name
 - b. Date
 - c. Name of Engineer and Construction Manager
 - d. Name of Contractor
 - e. Page number.

1.6 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Partial Occupancy: Submit properly executed warranties within fifteen (15) days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Remove tools, construction equipment, machinery, and surplus material from Project site.

- c. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - d. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - e. Replace parts subject to unusual operating conditions.
 - f. Leave Project clean and ready for occupancy.
- C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 017700

DIVISION 01 – GENERAL REQUIREMENTS
SECTION 017823 – OPERATION AND MAINTENANCE DATA
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
1. Operation and maintenance documentation directory.
 2. Operation manuals for systems, subsystems, and equipment.
 3. Maintenance manuals for the care and maintenance of systems and equipment.
- B. Related Sections include the following:
1. Division 01 Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 2. Division 01 Section 017700 "Closeout Procedures" for submitting operation and maintenance manuals.
 3. Division 01 Section 017839 "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
 4. Divisions 02 through 48 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.2 DEFINITIONS

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

1.3 SUBMITTALS

- A. Initial Submittal: Submit two (2) draft copies of each manual at least fifteen (15) days before requesting inspection for Substantial Completion. Include a complete operation and maintenance directory. Engineer will return one copy of draft and mark whether general scope and content of manual are acceptable.
- B. Final Submittal: Submit one (1) copy of each manual in final form at least fifteen (15) days before final inspection. Engineer will return copy with comments within fifteen (15) days after final inspection.
1. Correct or modify each manual to comply with Engineer comments. Submit three (3) copies of each corrected manual within fifteen (15) days of receipt of Engineer comments.

1.4 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.

1.5 COORDINATION

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

PART 2 PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

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

2.2 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - 2. Table of contents.
 - 3. Manual contents.
- B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
 - 1. Subject matter included in manual.

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

2.3 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions.
 2. Performance and design criteria if Contractor is delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.

5. Operating logs.
 6. Wiring diagrams.
 7. Control diagrams.
 8. Piped system diagrams.
 9. Precautions against improper use.
 10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
1. Product name and model number.
 2. Manufacturer's name.
 3. Equipment identification with serial number of each component.
 4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.
 7. Performance curves.
 8. Engineering data and tests.
 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
 2. Equipment or system break-in procedures.
 3. Routine and normal operating instructions.
 4. Regulation and control procedures.
 5. Instructions on stopping.
 6. Normal shutdown instructions.
 7. Seasonal and weekend operating instructions.
 8. Required sequences for electric or electronic systems.
 9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUAL

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Product Information: Include the following, as applicable:
1. Product name and model number.

2. Manufacturer's name.
 3. Color, pattern, and texture.
 4. Material and chemical composition.
 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
 2. Types of cleaning agents to be used and methods of cleaning.
 3. List of cleaning agents and methods of cleaning detrimental to product.
 4. Schedule for routine cleaning and maintenance.
 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
1. Standard printed maintenance instructions and bulletins.
 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training videotape, if available.

- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
 - 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 - 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

PART 3 EXECUTION

3.1 MANUAL PREPARATION

- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
 - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- C. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- D. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original Project Record Documents as part of operation and maintenance manuals.

2. Comply with requirements of newly prepared Record Drawings in Division 01 Section 017839 "Project Record Documents".
- E. Comply with Division 01 Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

3.2 PAYMENT

- A. Contractor shall not receive final payment until O&M manuals have been received and approved by Owner and Engineer.

END OF SECTION 017823

DIVISION 01 – GENERAL REQUIREMENTS
SECTION 017837 – WARRANTIES AND BONDS
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes
 - 1. Preparation and submittal.
 - 2. Time of submittals.
- B. Related Sections
 - 1. Division 01, Section 013300, “Submittal Procedures”
 - 2. Division 01, Section 017700, “Closeout Procedures”
- C. Individual Specifications sections: Warranties required for specific products or Work.

1.2 FORM OF SUBMITTALS

- A. Bind in commercial quality, eight and one-half inch by eleven-inch (8-1/2” X 11”), three (3)-ring side binders with hardback, cleanable, plastic covers.
- B. Label cover of each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor, and equipment supplier; and name of responsible principal.
- C. Table of contents: Neatly typed, in the sequence of the table of contents of the Project manual, with each item identified with the number and title of the Specification section in which specified, and the name of the product or work item.
- D. Separate each warranty or bond with index tab sheets keyed to the table of contents listing. Provide full information, using separate typed sheets as necessary. List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

1.3 PREPARATION OF SUBMITTALS

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within fourteen (14) calendar days after completion of the applicable item or Work. Except for items put into use with Owner’s permission, leave date of beginning of time of warranty until the Date of Substantial Completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.

1.4 TIME OF SUBMITTALS

- A. Make submittals within fourteen (14) calendar days after Date of Substantial Completion, before final Application for Payment.
- B. For items of Work when acceptance is delayed beyond Date of Substantial Completion, submit within fourteen (14) calendar days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION 017837

**DIVISION 01 – GENERAL REQUIREMENTS
SECTION 017839 – PROJECT RECORD DOCUMENTS
DPMC No. A1346-00**

PART 1 GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.

- B. Related Sections include the following:
 - 1. Division 01 Section 017700 "Closeout Procedures" for general closeout procedures.
 - 2. Division 01 Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 3. Divisions 02 through 48 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.2 SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one (1) set of marked-up Record Prints and one (1) set of Record CAD Drawing plots.

- B. Record Specifications: Submit one (1) copy of Project's Specifications, including addenda and contract modifications.

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

1.3 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.

PART 2 PRODUCTS**2.1 RECORD DRAWINGS**

- A. Record Prints: Maintain one (1) set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.
1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an understandable drawing technique.
 - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Locations and depths of underground utilities.
 - d. Revisions to routing of piping and conduits.
 - e. Revisions to electrical circuitry.
 - f. Actual equipment locations.
 - g. Duct size and routing.
 - h. Locations of concealed internal utilities.
 - i. Changes made by Change Order.
 - j. Changes made following Engineer written orders.
 - k. Details not on the original Contract Drawings.
 - l. Field records for variable and concealed conditions.
 - m. Record information on the Work that is shown only schematically.
 3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Engineer will prepare As Built Record Drawings:
1. Drawings shall be red-line record prints that will encompass all field changes and as-built conditions. Revised CADD files may be furnished if requested by Owner.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
5. Note related Change Orders Record Product Data and Record Drawings where applicable.

2.3 RECORD PRODUCT DATA

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

2.4 MISCELLANEOUS RECORD SUBMITTALS

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

PART 3 EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one (1) copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents: Store Record Documents in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Engineer and Construction Manager reference during normal working hours.
- C. Submittal of Record Documents: Once project record drawings have been approved by the Owner, a copy will be submitted by the Engineer to the NJDEP for their review and file, if required.

END OF SECTION 017839

DIVISION 01 – GENERAL REQUIREMENTS
SECTION 017844 – SPARE PARTS AND MAINTENANCE MANUALS
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes requirements for spare parts and maintenance materials.
- B. Related Sections
 - 1. Division 01, Section 017700 “Closeout Procedures”.
 - 2. Division 01, Section 017823 “Operation and Maintenance Data”.

1.2 DESCRIPTION

- A. Before final inspection, Contractor shall provide spare parts and maintenance materials as described in individual Specification sections.
- B. Deliver spare parts and maintenance materials to Project site; obtain receipt before final payment.
- C. Submit spare parts and maintenance materials in accordance with Division 01, Section 013300, “Submittal Procedures”.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION 017844

DIVISION 01 – GENERAL REQUIREMENTS
SECTION 017900 – DEMONSTRATION AND TRAINING
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
1. Demonstration of operation of systems, subsystems, and equipment.
 2. Training in operation and maintenance of systems, subsystems, and equipment.
 3. Demonstration and training videotapes.
- B. Related Sections include the following:
1. Division 01 Section 013100 "Project Management and Coordination" for requirements for pre-instruction conferences.
 2. Divisions 02 through 48 Sections for specific requirements for demonstration and training for products in those Sections.

1.2 SUBMITTALS

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

1.3 QUALITY ASSURANCE

- A. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.

1.4 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.

1.5 COORDINATION

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

PART 2 PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections. In general, the training shall cover all aspects necessary to operate, monitor and maintain the facilities constructed. The Contractor shall anticipate performing the training twice to accommodate various work shifts. The training shall be half classroom and half hands-on training. The Contractor shall anticipate the training session will be a full eight-hour day.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:
 - 1. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
 - 2. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
 - 3. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.

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

PART 3 EXECUTION

3.1 PREPARATION

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

3.2 INSTRUCTION

- A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 1. Contractor will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
- B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 1. Schedule training with Owner, through Engineer with at least seven days' advance notice.
- C. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of an oral performance-based test.
- D. Cleanup: Collect used and leftover educational materials and remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION 017900

DIVISION 02 – EXISTING CONDITIONS
SECTION 024010 – DEWATERING
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

- A. This section includes requirements for dewatering of excavations.

1.2 SYSTEM DESCRIPTION

- A. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction to properly dewater, remove and dispose of water entering into trenches and other excavations and to prevent saturated soil from flowing into the excavation.
- B. The Contractor shall establish any dewatering rates for the purpose of obtaining the required permits. For temporary ground diversions in excess of 100,000 gallons of water per day, the Contractor shall obtain a Dewatering Allocation Permit, or Dewatering permit-by-rule, depending on the duration of the diversion and method employed.
- C. The design and operation of the dewatering system shall maintain the stability of existing utilities, structures and pavements and prevent settlement of original ground, existing utilities, structures and pavements in the project area.
- D. Unless otherwise shown on the drawings the groundwater level shall be maintained at least two feet (2') below the bottom of the excavation or controlled fill.
- E. It is the intent of these specifications to not include the use of additional stone beneath the pipe or stone filled sump holes as dewatering. The intent of the specifications is to specify a dewatering system that provides the required groundwater level at two feet (2') below the specified bottom of the trench. The need for additional stone or sumps is not considered a part of a designed dewatering system and, therefore, no separate payment for stone or labor will be approved. The use of additional stone below the pipe bedding or for sumps for dewatering may only be used if approved by the Inspector and the Engineer.
- F. Due to limited space available, the use of sediment basins or frac tanks as part of the dewatering system may not be practical. In this event, the Contractor may use alternate devices such as Geotube as manufactured by Miratech, Division of TenCate Nicolon, or equal, for purposes of silt or sediment removal prior to discharge of water to nearby drainage facilities.
1. Dewatering bags shall be composed of high-tenacity polypropylene yarns, woven into a stable condition that retains its relative position when in use. The yarns shall be inert to biological degradation and resistant to chemicals, alkalis and acids.
 2. Mechanical properties shall include the following;

FACTORY SEAM STRENGTH	300 LBS/IN
PUNCTURE STRENGTH	280 LBS
OPENING SEWS SIEVE #	40

1.3 REFERENCES

- A. Standards for Soil Erosion and Sediment Control In New Jersey.

1.4 SUBMITTALS

- A. The Contractor shall submit a comprehensive dewatering plan, signed and sealed by a NJ Licensed Professional Engineer, to the Engineer for review including design and location of settlement basins, frac tanks, or other drainage sedimentation devices, and plans for monitoring adjacent groundwater, surface water, existing utilities and structures and water supplies to prevent loss or settlement.
- B. During dewatering operations, the Contractor shall record permanently, in a book to be kept on the premises, the total hours of operation and the pumping rate. The computed amount of water diverted each month shall be reported to the water allocation section of the Division of Water Resources, New Jersey Department of Environmental Protection and Energy, and to the Engineer.
- C. When required by the field conditions hereinafter described or the regulatory agencies, the following parameters of the dewatering discharge shall be submitted: salinity, pH, and hydrogen sulfide content.
- D. Soundings of natural bottom elevations of all water courses in the vicinity of and downstream of dewatering discharge points and drainage outfalls, if discharge is into a storm drainage system, shall be submitted after all discharge has been terminated. Both pre-dewatering and post dewatering survey submittals shall be signed by a licensed professional land surveyor in the state of the project.
- E. Where dewatering is discharged into a storm drainage system, no silt shall be deposited into the storm system by this construction and to determine pre- and post- conditions of the storm sewer system, siltation levels shall be measured at each manhole or basin downstream of the discharge point both prior to dewatering and after termination.

1.5 SITE CONDITIONS

- A. Where existing pipelines enter the construction area, they may be supported on permeable crushed stone material. This stone may act as a point source for large quantities of water at each such pipe location.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 PREPARATION

- A. As required, water observation pipes shall be installed to monitor the groundwater level during the dewatering operation. Daily observation of the groundwater level in relation to bottom of the excavation shall be taken and recorded by the Contractor under the observation of the Inspector or Engineer.

3.2 INSTALLATION

- A. The water level obtained by dewatering shall be maintained at the specified depth below the excavation or controlled fill across the entire width of the excavation or controlled fill. Excavations shall be kept dry until the structures, pipes and appurtenances to be built therein have been completed to such extent that they will not be floated or otherwise damaged and the placement and compaction of backfill material has taken place.
- B. All water pumped or drained from the work shall be disposed of in a suitable manner without undue interference with other work or damage to surfaces and property. Suitable temporary channels shall be provided for water that may flow along or across the site of the work. No water shall be pumped or drained into work built or under construction. Water shall be disposed in such a manner as not to be a menace to public health.
- C. Suitable provisions for adequate drainage of the discharge shall be made considering normal and flood conditions of both surface and groundwater.
- D. Silt laden water or water contaminated by acid soils shall not be discharged directly into storm sewers, surface waters, stream crossings, wetlands or any critical impact area. Care shall be taken not to damage or kill vegetation by excessive watering or by silt accumulations in the discharge area. Settlement basins shall be employed where necessary to remove silt and to treat acid water to the ambient pH of the receiving waters.
- E. To allow sediment to settle out of water that interferes with construction before such water enters any surface waters, dewatering operations shall direct pumpage as far from the critical impact area as possible and into suitable settlement basins. Settlement basins shall be constructed and used as specified to protect vegetation and to achieve environmental objectives.
- F. All dewatering of excavations shall be done on the upland side of the excavation, away from the stream crossings, wetland habitats or critical impact areas, and the effluent shall be discharged through a manifold apparatus of no less than 50 feet in length with multiple discharge holes upland of an overlapped, anchored double hay bale barrier to prevent sediment discharge into the waterway, stream, wetland habitat or critical impact area or into suitable settlement basins.
- G. All dewatering of excavations shall be maintained functional throughout their use period and siltation deposits in settlement basins, storm sewers, surface waters, streams or wetlands resulting from the dewatering operation shall be removed by the Contractor periodically during construction and prior to the removal of the siltation control devices. Removed siltation deposits shall be disposed of in accordance with section 017419 "Construction Waste Management and Disposal," Division 1. All areas shall be restored by the Contractor to the condition existing prior to commencement of the dewatering operation.
- H. In the event that the excavations are to be carried below the elevations shown on the drawings, no work will proceed until the water level is lowered to a depth of at least two feet (2') below the anticipated depth of the excavation.
- I. In the event that the settlement basin, storm sewer, surface waters, streams or wetlands become surcharged or flooded, whether due to dewatering discharge or rainfall or a combination of both, the Contractor shall throttle back or terminate his dewatering, until the adverse conditions subside.

- J. Upon removal of well points, deep wells or other dewatering equipment, the Contractor shall be responsible to seal all holes in accordance with the NJDEP's "Guidelines Pertaining to Permitting, Installation, Construction, Sealing, and Abandonment of Dewatering/Well Point Systems and Licensing of Dewatering Contractors."

3.3 FIELD QUALITY CONTROL

- A. When encountering acid soil conditions, the effluent pH from the settling basin shall be tested a minimum of two times daily and adjusted to ambient receiving water pH by the Contractor.
- B. Monitoring and testing of hydrogen sulfide content of dewatering discharge shall be the responsibility of the Contractor. When hydrogen sulfide is present, means of oxidizing the hydrogen sulfide content of the discharge and, if required, neutralization of the acid shall be employed.

3.4 PROTECTION

- A. In the event that the bottom of the excavation is disturbed due to the failure of the dewatering operation resulting in a loss of bearing capacity as determined by the Owner and Engineer, the Contractor shall assume full responsibility and bear the expense of all additional dewatering, excavating and backfilling required to correct the condition to the satisfaction of the Owner and Engineer. To this end, the Contractor shall provide all emergency generating equipment necessary to maintain dewatering operation during power outages.

END OF SECTION 024010

DIVISION 02 – EXISTING CONDITIONS
SECTION 024113 – SELECTIVE SITE DEMOLITION
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition of designated site structures, utilities, and foundations.
2. Demolition and removal of pavements, curbs and gutters, drainage structures, drainage pipe, utilities, site signs, and landscaping.
3. Disconnecting and capping or removal of identified utilities.
4. Removal of underground tanks and piping.
5. Filling voids in subgrade created as a result of removals or demolition.
6. Disposal of demolished materials.

B. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.2 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Contractor to conform to applicable local code for demolition of structures, safety of adjacent buildings and structures, dust control and runoff control.
2. Contractor to obtain required permits and licenses from authorities having jurisdiction. All associated fees shall be including within the disposal charges.
3. Contractor to notify affected utility companies before starting work and comply with utility company requirements.
4. Contractor not to close or obstruct roadways, sidewalks or fire hydrants without permits.
5. Contractor to install temporary barricade and mark hazards as necessary.
6. Contractor to conform to all applicable regulatory procedures when discovering hazardous or contaminated materials. Notify Contracting Officer immediately upon discovery of hazardous or contaminated materials. Do not commence removals, remediation, or abatement without authorization from Contracting Officer.

1.3 PROJECT CONDITIONS

A. Existing Conditions:

1. Structures indicated for demolition will be discontinued in use and vacated prior to start of Work.
2. The State of New Jersey assumes no responsibility for condition of structures to be demolished.
3. Unless otherwise indicated in the Contract Documents or specified by the Contracting Officer, remove items of salvageable value to Contractor from project site and structure. Storage or sale of removed items on project site not permitted.
4. Burning or fires of any nature not permitted.

5. Do not bring explosives on site without written approval of authorities having jurisdiction. Such written approval will not relieve Contractor of total responsibility for injury to persons or for damage to property due to blasting operations. Comply with governing regulations for use of explosives. Notify company of procedures and schedule in advance of explosive use.

PART 2 PRODUCTS

2.1 FILL MATERIALS

- A. Refer to Section 312300 – Excavation and Fill

PART 3 EXECUTION

3.1 EXAMINATION

- A. Site Verification of Conditions: Verify that field measurements, surfaces, substrates, and conditions are as required, and ready to receive Work.
- B. Report in writing to Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the State of New Jersey.

3.2 PREPARATION

- A. Provide, erect, and maintain erosion control devices, dust control measures, temporary barriers, and security devices at locations indicated on Drawings and as specified.
- B. Protect appurtenances and structures which are not indicated to be demolished. Repair damage caused by demolition operations at no additional cost to State of New Jersey.
- C. Prevent movement or settlement of adjacent structures. Provide bracing and shoring as required.
- D. Mark location of utilities. Protect and maintain, in safe and operable condition, utilities to remain. Provide temporary services during interruptions to existing utilities acceptable to governing authorities and State of New Jersey.
- E. Clear areas around items and structures indicated to be demolished as specified in Section 311000 – Site Clearing.

3.3 CONSTRUCTION

- A. Demolition Requirements:
 1. Conduct demolition to minimize interference with adjacent structures or pavements.

2. Stop operations immediately if adjacent structures appear to be in danger. Notify Contracting Officer immediately. Do not resume operations until directed by Contracting Officer.
3. Conduct operations with minimum interference to public or private access. Maintain access and egress at all times.
4. Obtain written permission from adjacent property owners when demolition equipment will traverse, infringe upon, or limit access to their property.
5. Sprinkle soil and demolition work area with water to minimize dust. Provide hoses and water connections for this purpose.
6. Comply with governing regulations pertaining to environmental protection.
7. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing prior to start of work.

B. Demolition:

1. Disconnect and remove designated utilities within demolition areas.
2. Notify inhabitants of on-site structures of intent to demolish two weeks prior to demolition and verify property is vacated prior to starting demolition.
3. Verify structures are unoccupied; then demolish structures completely and remove from site using methods as required to complete work within limitations of governing regulations. Small structures may be removed intact when acceptable to Contracting Officer and authorities having jurisdiction.
4. Proceed with demolition in systematic manner, from top of structure to ground.
5. Locate demolition equipment and remove materials using procedures to prevent excessive loading to supporting walls, floors, or framing.
6. Demolish concrete and masonry in small sections. Break up concrete slabs-on-grade that are 2 or more feet below proposed subgrade.

C. Filling Voids:

1. Completely fill below grade areas and voids existing or resulting from demolition or removal of structures (pits, wells, cisterns, etc.) using approved select fill materials consisting of stone, gravel, or sand free from debris, trash, frozen materials, roots, and other organic matter, as noted on the Drawings.
2. Remove standing water, frost, frozen, or unsuitable material, trash, and debris from areas to be filled before fill placement.
3. Place fill materials in horizontal layers and compact each layer at optimum moisture content of fill material to proposed density as specified in Section 312300 – Excavation and Fill
4. Grade surface to match adjacent grades and to provide flow of surface drainage after fill placement and compaction.

D. Disposal of Demolished Materials:

1. Collect, recycle, reuse and dispose of demolished materials as specified and as approved by Owner.

END OF SECTION 024113

DIVISION 02 – EXISTING CONDITIONS
SECTION 024119 – MINOR ELECTRICAL DEMOLITION
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: The work specified in this Section consists of material for demolition and salvaging existing electrical systems, wiring, raceways, supports, equipment and minor repair of underlying structure.
- B. Comply with the requirements and provisions of the following:
 - 1. Division 01 – General Requirements
 - 2. Section 260500 – Common Work Results for Electrical

1.2 REFERENCES

- A. National Fire Protection Association (NFPA):
 - 1. NFPA 70 National Electrical Code (NEC)

1.3 SUBMITTALS

- A. Submit demolition plan.

1.4 COORDINATION AND SEQUENCING

- A. Coordinate all power outages with Owner.
- B. Perform demolition in a manner not to delay or interfere with other operations of work in the Project and operations of the Owner.

1.5 SCHEDULING

- A. Schedule all work with the Owner through the Owner’s designated representative. Start no work in an area until a schedule has been prepared, submitted and approved.
- B. Coordinate the work schedule with the Owner, Engineer, and other Contractors. Coordinate the work so not to interfere or conflict with the performance of work by the Owner and the Owner’s tenants.

1.6 PROJECT/SITE CONDITIONS

- A. Care shall be used so as not to impede the ongoing operations of the Owner.

- B. Demolition work, as specified herein, is not intended to be performed as a wrecking operation but as work relative to the performance of the various construction operations of the Project.
- C. Existing Conditions:
1. Demolition information shown or otherwise indicated on the Drawings is based on visual field examination and existing record documents. While the information provided is believed to be correct, no assurance is implied relative to its total completeness or accuracy. Report discrepancies to Construction Manager for disposition of the Engineer before disturbing existing installations.
 2. The Contractor hereby distinctly agrees that neither the Construction Manager, the Engineer nor the Owner is responsible for the correctness or sufficiency of the information given and after his own Site Investigation:
 - a. That he must have no claim for delay or extra compensation or damage on account of the information given; and
 - b. That he must have no claim for relief from any obligation or responsibility under the Contract with respect to the above stated stipulations.
- D. Protection: Exercise care during demolition work to confine demolition operations to the areas as indicated on the Drawings. The physical means and methods used for protection are at the Contractor's option. However, the Contractor will be completely responsible for replacement and restitution work, of whatever nature, at no expense to the Owner.
1. Additionally, if public safety is endangered during the progress of the demolition work, provide adequate protective measures to protect public pedestrian and vehicular traffic on streets and walkways.
 2. Conform signs, signals and barricades to requirements of Federal, State and local laws, rules, regulations, precautions, orders and decrees.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Basic Electrical Materials: Those products such as conduit, raceway, wire and cable, support devices, fasteners, and control devices as required for work of this Section are specified in other Sections.
- B. Equipment along with machinery and apparatus, motorized or otherwise, used to perform the demolition may be chosen at the Contractor's discretion. However, the chosen equipment shall perform the work within the limits of the Contract requirements.
- C. Patching Materials: Patching materials shall match, as nearly as practical, the existing material for each surface being patched.

PART 3 EXECUTION

3.1 INSPECTION

- A. Verify that measurements and existing circuiting arrangements are as shown on Drawings.

- B. Equipment, machinery and apparatus, motorized or otherwise, used to perform the demolition work may be used as chosen at the Contractor's discretion, but which will perform the work within the limits of the Contract requirements.
- C. Verify that abandoned wiring and electrical equipment serve only the abandoned facility.

3.2 DEMOLITION

- A. General: The means and methods of performing electrical demolition and removal operations are the sole responsibility of the Contractor, except as otherwise specified. However, equipment used, and methods of demolition and removal will be subject to approval of the Construction Manager and the Engineer.
 - 1. Remove, relocate and extend existing installations to accommodate new construction as indicated and/or as required.
 - 2. Remove exposed abandoned conduit systems, including abandoned conduit systems above accessible ceiling systems.
 - 3. Remove wiring in abandoned conduit systems to source of power supply.
 - 4. Maintain access to existing electrical installations, which remain active. Modify installations and provide access panels or plates as appropriate.
 - 5. Extend existing installations using materials and methods compatible with existing electrical installations, and as specified in other Sections of these Specifications.
 - 6. Wiring Devices:
 - a. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduits serving them is abandoned and removed. Provide blank covers for abandoned outlets, which are not removed.
 - b. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
 - 7. Lighting:
 - a. Disconnect and remove abandoned luminaires and poles, lighting fixtures and floodlighting units. Remove brackets, stems, hangers and other accessories.
 - b. Disconnect and remove abandoned concrete luminaire pole bases.
 - 8. Equipment:
 - a. Disconnect and remove electrical equipment where so indicated on the Drawings.
 - b. Disconnect and remove abandoned distribution equipment, panelboards, disconnect switches and motor starters as indicated on the drawings or as otherwise required due to the removal of associated equipment.
 - 9. In exposed through-structure conduit locations, or where concealed conduits become exposed by penetrating a structural floor, wall or ceiling, the abandoned conduits must be cut below the finished structural surface in order to perform surface patching.
- B. System De-activation: Prior to demolition and removal work, de-activate existing electrical systems as indicated.
- C. Use means and methods for permanent disconnection, which render the remaining electrical systems and apparatus in conformity with NFPA 70.
- D. Provide temporary wiring and connections to maintain existing systems in service during construction.
 - 1. Conform temporary wiring to the requirements of NEC Article 305, General Requirements.

2. Temporary electrical service work as specified in Division 1, General Requirements.
- E. Remove all wiring from disconnected circuits, feeders, and equipment unless otherwise specified or indicated. Remove all exposed raceways and related supports. Cut all exposed raceways flush with floor and plug.
- F. Coordinate electrical power outages with the Owner.
- G. General: The means and methods of performing electrical demolition and removal operations are the sole responsibility of the Contractor except as otherwise specified. Use equipment and methods that do not damage items to remain or salvaged and areas adjacent to demolition operations. Use methods that do not interfere with Owner's operations and which do not cause excessive dust. Remove debris as it accumulates.
- H. Cutting: Perform cutting work of existing structure materials by such methods as will prevent extensive damage beyond the immediate area of cutting.
- I. Debris Removal: Dispose of demolition debris off site in a lawful manner. Containerize or otherwise store debris as work is in progress.
- J. Patching: After demolition and removal work is performed patch the existing structure as required to match surrounding finish and appearance including the appropriate surface decoration.
- K. Abandoned Electrical Equipment and Apparatus: Existing electrical equipment and apparatus in or on the structures not claimed as salvage by the Owner shall become the property of the Contractor and may not be disposed of on the site but removed and disposed of in a lawful manner off-site.
- L. Salvage: The Owner shall have the right to claim as salvage any items and materials removed under the work of this Section. Should such right of salvage be exercised by the Owner, move and neatly store removed items on the site in a location agreeable to the Owner and in a manner approved by the Engineer.

END OF SECTION 024119

DIVISION 03 – CONCRETE
SECTION 033000 – CAST-IN-PLACE CONCRETE
DPMC No. A1346-00

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions 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. Concrete sidewalk on grade.
 - 2. Concrete landings and equipment pads.

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 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.
- E. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
- F. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.

2. Admixtures.
3. Steel reinforcement and accessories.
4. Curing compounds.
5. Bonding agents.
6. Adhesives.
7. Semi rigid joint filler.
8. Repair materials.

1.5 QUALITY ASSURANCE

- A. 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. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
- B. 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.
- C. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5.
 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- D. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.

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. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
 2. Products: Subject to compliance with requirements, provide one of the products specified.
 3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

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

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

2.3 REINFORCEMENT ACCESSORIES

- A. 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:

2.4 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 1. Portland Cement: ASTM C 150, Type I
- B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Select coarse-aggregate size from three options in subparagraph below; add gradation requirements if preferred. Aggregate size limits relate to spacing of steel reinforcement, depth of slab, or thickness of concrete member.
 1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94 and potable.

2.5 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.

2.6 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: 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 less

than 40 percent. Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.
2. Combined Fly Ash and Pozzolan: 25 percent.
3. Ground Granulated Blast-Furnace Slag: 50 percent.
4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.

2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
 1. 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. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
 1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
 2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 EXECUTION

3.1 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
- B. 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. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.2 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Engineer.

- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously 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. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Maintain reinforcement in position on chairs during concrete placement.
 - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 4. Slope surfaces uniformly to drains where required.
 - 5. 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.
- F. 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 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.
 - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- G. Hot-Weather Placement: Comply with ACI 301 and as follows:
 - 1. 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.
 - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.3 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction joints: Install so strength and appearance of concrete are not impaired, at location indicated or as approved by the Engineer.
 - 1. Place joints perpendicular to main reinforcement across construction joint, unless otherwise indicated. Do not continue reinforcement through sides of strip placement of floors and slabs.
 - 2. Form keyed joints as indicated. Embed at least 1 ½ inches into concrete.

3. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas.
1. In areas that are scheduled to receive floors coverings, form contraction joints using zip strips.
 2. Sawed Joints: In areas where floor finish is exposed concrete, form contraction joints with power saws with shatterproof abrasive or diamond-rimmed blades. Cut 1/8 inch wide joints with vertical surfaces, such as column pedestals, foundation walls, and other locations.
- D. 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, and other locations.
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 joints where joint sealants are located.
 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half length to prevent concrete bonding to one side of joint.

3.4 FINISHING FORMED SURFACES

- A. 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 that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-formed Finish: As-cast concrete texture imparted by form-facing material arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects... Remove fins and other projections that exceed ACI 347R limits on formed-surface irregularities.
1. Apply to concrete surfaces exposed to public view.
- C. 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.
- D. Related Uniformed 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 unformed surfaces, unless otherwise indicated.

3.5 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
 - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Engineer before application.

3.6 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. 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.

3.7 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- C. 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 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 days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3.8 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Engineer. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.

- B. 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.
- C. 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 patching mortar. Finish repaired areas to blend into adjacent concrete.
 - 4. Correct other low areas scheduled to receive floor coverings with a 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.

3.9 FIELD QUALITY CONTROL

- A. Testing and Inspecting: the Contractor shall engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- B. Inspections:
 - 1. Steel reinforcement placement.
 - 2. Steel reinforcement welding.
 - 3. Headed bolts and studs.
 - 4. Verification of use of required design mixture.
 - 5. Concrete placement, including conveying and depositing.
 - 6. Curing procedures and maintenance of curing temperature.
 - 7. 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. Retain subparagraph above or below. Above is an example that produces more frequent testing than below, which is testing frequency required to comply with ACI 301.
 2. Testing Frequency: Obtain at least one composite sample for each 50 cu. yd. or fraction thereof of each concrete mixture placed each day at a minimum.
 - 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.
 3. Slump: ASTM C 143/C 143M; 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.
 4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 5. Unit Weight: ASTM C 567, 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.
 6. Compression Test Specimens: ASTM C 31/C 31M.
 - 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.
 7. Compressive-Strength Tests: ASTM C 39/C 39M; 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.
 8. 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.
 9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
 10. 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.
 11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
 12. Additional Tests: 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. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
 13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

END OF SECTION 033000

DIVISION 03 – CONCRETE
SECTION 034100 - PRECAST STRUCTURAL CONCRETE
DPMC No. A1346-00

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. See Division 33, Section 33719 Utilities Section “Underground Ducts and Manholes”

- B. Related Requirements:

- 1. Section 033000 "Cast-in-Place Concrete" for **concrete topping and** placing connection anchors in concrete.

END OF SECTION 034100

DIVISION 03 – CONCRETE
SECTION 036000 - GROUT
DPMC No. A1346-00

PART 1 GENERAL

1.1 DESCRIPTION

A. Scope:

1. Provide all labor, materials, equipment, and incidentals as shown, specified and required to furnish and install grout.
2. The types of grout include the following:
 - a. Non-Shrink Grout: This type of grout is to be used wherever grout is shown in the Contract Documents, unless another type is specifically referenced. Two classes of non-shrink grout (Class I and II) and areas of application are specified herein.
 - b. Non-Shrink Epoxy Grout (Class III).

- B. Application: The following is a listing of typical applications and the corresponding type of grout which is to be used. Unless otherwise indicated, grouts shall be provided as listed below whether called for on the Drawings or not.

APPLICATION	TYPE OF GROUT
Beam and column (1 or 2 story) base plates and precast concrete bearing less than 16-inches in the least dimension.	Non-shrink Class II.
Column base plates and precast concrete bearing (greater than 2 story or larger than 16- inches in the least dimension).	Non-shrink Class I.
Base plates for storage tanks and other non-motorized equipment and machinery less than 50 horsepower.	Non-shrink Class I.
Machinery over 50 horsepower and equipment under 50 horsepower but subject to severe shock loads and high vibration.	Non-shrink Class III.
Filling blockout spaces for embedded items such as railing posts, gate guide frames, etc.	Non-shrink Class II (Class I where placement time exceeds 15 minutes).
Toppings and concrete fill less than 4-inches thick.	Grout Fill, Topping Grout.
Toppings and concrete fill greater than 4-inches thick.	Class "A" Concrete in accordance with Section 03300, Cast-In-Place Concrete.
All anchor bolts and reinforcing steel set in grout.	Class "A" Concrete in accordance with Section 03300, Cast-In-Place Concrete.
Applications not listed above, where grout is called for on the Drawings.	Non-shrink Class I, unless noted otherwise.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. ACI 211.1, Practice for Selecting Proportions for Normal, Heavy-Weight and Mass Concrete.
2. ACI 301, Specification for Structural Concrete (Includes ASTM Standards referred to herein).
3. ASTM C33, Specification for Concrete Aggregates.
4. ASTM C109, Test Method for Compressive Strength of Hydraulic Cement Mortars (using 2 in. or 50 mm. Cube Specimens).
5. ASTM C150, Specification for Portland Cement.
6. ASTM C230, Specification for Flow Table for use in Tests of Hydraulic Cement.
7. ASTM C531, Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacing.
8. ASTM C579, Test Method for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing and Polymer Concretes.
9. ASTM C827, Test Method for Early Volume Change of Cementitious Mixtures.
10. ASTM C882, Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete.
11. ASTM C937, Specification for Grout Fluidifier for Preplaced-Aggregate Concrete.
12. ASTM C939, Text Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method).
13. ASTM C1107, Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink).
14. ASTM C1181, Test Method for Compressive Creep of Chemical-Resistant Polymer Machinery Grouts.
15. ASTM D696, Test Method for Coefficient of Linear Thermal Expansion of Plastics.

1.3 QUALITY ASSURANCE

A. Field Tests:

1. Compression test specimens will be taken during construction from the first placement of each type of grout, and at intervals thereafter as selected by the Engineer to ensure continued compliance with these Specifications. The specimens shall be made by the Contractor or its representative.

1.4 SUBMITTALS

A. Shop Drawings: Submit the following:

1. For Grout Fill and Construction Joint Grout, copies of grout design mix and laboratory test reports for grout strength tests.

B. Reports and Certificates, submit for approval the following:

1. For proprietary materials, submit copies of manufacturer's certification of compliance with the specified properties for Class I, II, and III grouts.
2. Submit certified testing lab reports for ASTM C 1107, Grade B and Grade C (as revised herein) requirements for Class I and II grouts tested at a fluid consistency for temperatures of 45, 73.4, 90°F with a pot life of 30 minutes at fluid consistency.
3. Submit certification that materials conform to the Specifications requirements for nonproprietary materials.
4. Submit certifications that all grouts used on the project are free of chlorides or other chemicals causing corrosion.
5. Manufacturer's specifications and installation instructions for all proprietary materials.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery of Materials: Grout materials from manufacturers shall be delivered in unopened containers and shall bear intact manufacturer's labels.
- B. Storage of Materials: Store grout materials in a dry shelter and protect from moisture.

PART 2 PRODUCTS

2.1 GROUTS

- A. General: Non-shrink grout shall be a prepackaged, inorganic, flowable, non-gas-liberating, non-metallic, cement-based grout requiring only the addition of water. Manufacturer's instructions shall be printed on each bag or other container in which the materials are packaged. The specific formulation for each class of non-shrink grout specified herein shall be that recommended by the manufacturer for the particular application.
- B. Class I, Non-Shrink Grout:
 - 1. Class I, non-shrink grouts shall have a minimum 28-day compressive strength of 7,000 psi. Grout is for precision grouting and where water-tightness and non-shrink reliability in both plastic and hardened states are critical. Refer to areas of application as specified in this Section.
 - 2. Meet requirements of ASTM C1107 Grade C and B (as modified below) when tested using amount of water required to achieve the following properties:
 - a. Fluid consistency (20 to 30 seconds) in accordance with ASTM C939.
 - b. At temperatures of 45, 73.4, and 95 degrees F.
 - 3. Length change from placement to time of final set shall not have a shrinkage greater than amount of expansion measured at three or fourteen days. Expansion at three or fourteen days shall not exceed the 28-day expansion.
 - 4. Non-shrink property is not based on a chemically generated gas or gypsum expansion.
 - 5. Fluid grout shall pass through the flow cone, with a continuous flow, one hour after mixing.
 - 6. Products and Manufacturer: Provide products of one of the following:
 - a. Masterflow 928, manufactured by Master Builders, Inc.
 - b. Five Star Grout, manufactured by Five Star Products, Inc.
 - c. Hi-Flow Grout, manufactured by the Euclid Chemical Company.
 - d. Or equal.
- C. Class II Non-Shrink Grout:
 - 1. Class II, non-shrink grouts shall have a minimum 28-day compressive strength of 7,000 psi. Grout is for general purpose grouting applications as specified in this Section.
 - 2. Meet requirements of ASTM C1107 and the following requirements when tested using amount of water required to achieve the following properties:
 - a. Flowable consistency (140 percent flow on ASTM C230, five drops in 30 seconds).
 - b. Fluid working time of at least 15 minutes.
 - c. Flowable for at least 30 minutes.
 - 3. Grout when tested shall not bleed at maximum allowed water.
 - 4. Non-shrink property is not based on a chemically generated gas or gypsum expansion.
 - 5. Products and Manufacturer: Provide products of one of the following:
 - a. Construction Grout, manufactured by Master Builders, Inc.
 - b. NBEC Grout, manufactured by Five Star Products, Inc.
 - c. NS Grout, manufactured by the Euclid Chemical Company.
 - d. Or equal.

2.2 CURING MATERIALS

- A. Curing materials shall conform to Section 03300, Cast-in-Place Concrete, and as recommended by manufacturer of prepackaged grouts.

2.3 CONSISTENCY

- A. Consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application. Dry pack consistency is such that grout is plastic and moldable, but will not flow. Where “dry pack” is required per the Contract Documents, it shall mean a grout of that consistency; type of grout to be used shall be as specified in this Section for the application.
- B. Slump for topping grout and grout fill shall be adjusted to match placement and finishing conditions, but shall not exceed four inches.
- C. Slump for construction joint grout shall be seven inches (plus or minus one inch).

PART 3 EXECUTION

3.1 INSPECTION

- A. Contractor shall examine substrate and conditions under which grout is to be placed and notify Engineer in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

3.2 INSTALLATION

- A. General:
 - 1. Place grout as shown and in accordance with manufacturer's instructions. If manufacturer's instructions conflict with the Contract Documents, request clarification from Engineer and do not proceed until Engineer provides clarification.
 - 2. Manufacturers of proprietary products shall make available upon 72 hours notification services of qualified, full time employee to aid in assuring proper use of product under job conditions.
 - 3. Placing grout shall conform to temperature and weather limitations in Section 03300, Cast-In-Place Concrete.
 - 4. Cure grout per manufacturer's instructions for prepackaged grout and requirements of Section 03300, Cast-In-Place Concrete
- B. Columns, Beams and Equipment Bases:
 - 1. Epoxy Grout: After shimming equipment to proper grade, securely tighten anchorages. Properly form around base plates, allowing sufficient room around edges for placing grout. Provide adequate depth between bottom of base plate and top of concrete base to assure that void is completely filled with epoxy grout.
 - 2. Non-shrink, Non-metallic Grout: After shimming columns, beams and equipment to proper grade, securely tighten anchorages. Properly form around base plates allowing sufficient room around edges for placing grout. Provide adequate depth between bottom of base plate and top of concrete base to assure that void is completely filled with non shrink, non metallic grout.

C. Handrails and Railings:

1. After posts have been properly inserted into holes or sleeves, fill annular space between posts and sleeve with non shrink, non metallic grout. Bevel grout at juncture with post so that moisture flows away from post.

END OF SECTION 036000

DIVISION 05 – METALS
SECTION 050510 – ANCHORS, BOLTS, AND CONCRETE INSERTS
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install anchor systems.
2. This Section includes all anchor systems required for the Work, but not specified under other Sections.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before anchor systems Work.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. ACI 318, Building Code Requirements for Structural Concrete.
2. ACI 350, Code Requirements for Environmental Engineering Concrete Structures.
3. ACI 355.2, Standard for Evaluating the Performance of Post Installed Mechanical Anchors in Concrete.
4. ASTM A194, Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
5. ASTM A276, Specification for Stainless Steel Bars and Shapes.
6. ASTM A493, Specification for Stainless Steel Wire and Wire Rods for Cold Heading and Cold Forging.
7. ASTM A563, Specification for Carbon and Alloy Steel Nuts.
8. ASTM B633, Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
9. ASTM C307, Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacing.
10. ASTM C579, Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
11. ASTM C580, Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
12. ASTM C881, Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
13. ASTM D695, Test Method for Compressive Properties of Rigid Plastics.
14. ASTM D790, Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
15. ASTM E329, Specification for Agencies Engaged in Construction Inspection and/or Testing.
16. ASTM F593, Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
17. ASTM F1554, Specification for Anchor Bolts, Steel, 36, 55 and 105-ksi Yield Strength.
18. FS A-A-1922A for Shield, Expansion (Caulking Anchors, Single Lead).

19. FS A-A-1923A for Concrete Expansion Anchors.
20. FS A-A-55614 for Shield, Expansion (non-drilling expansion anchors).
21. FS FF-B-588, Bolt, Toggle and Expansion Sleeve Screw.
22. ICC Evaluation Service (ES) AC 01, Acceptance Criteria for Expansion Anchors in Masonry Elements.
23. ICC ES AC 58, Acceptance Criteria for Adhesive Anchors in Masonry Elements.
24. ICC ES AC 193, Acceptance Criteria for Mechanical Anchors in Concrete Elements.
25. ICC ES AC 308, Acceptance Criteria for Post-Installed Anchors in Concrete Elements.
26. ANSI/MSS SP-58, Pipe Hangers and Supports - Materials, Design and Manufacturer.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Testing Laboratory: Comply with ASTM E329 and shall be experienced in tension testing of adhesive anchoring systems.
2. Adhesive Anchor Installer: Shall be experienced and certified by adhesive anchor system manufacturer as possessing training necessary for installing manufacturer's products. Distributors or manufacturer's representatives shall not provide product training unless qualified as certified trainers by anchor manufacturer.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
 - a. Listing of all anchor systems products intended for use in the Work including product type, intended location in the Work, and embedded lengths.
2. Product Data:
 - a. Copies of manufacturer's specifications, load tables, dimension diagrams, acceptable base material conditions, acceptable drilling methods, and acceptable bored hole conditions.
 - b. Copies of valid ICC ES reports certifying load-carrying capacities and installation requirements for anchor systems.
 - c. Clearly indicate allowable strength design safety factors when ultimate load carrying capacities are submitted for approval.

B. Informational Submittals: Submit the following:

1. Certificates:
 - a. Adhesive anchor system manufacturer's certification that installer is qualified for installing manufacturer's products.
2. Manufacturer's Instructions:
 - a. Installation instructions for anchor systems, including bore hole cleaning procedures and adhesive injection, cure and gel time tables, and temperature ranges (storage, installation and in-service).
3. Site Quality Control Submittals: Reports of site quality control testing, as applicable.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling, and Unloading:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchorage products to be embedded in concrete or masonry to avoid delaying the Work.
2. Inspect materials upon delivery to the Site and notify Engineer in writing of loss or damage to materials and promptly replace lost or damaged materials. Do not install damaged materials.

B. Storage and Protection:

1. Keep materials dry during delivery and storage.
2. Protect anchor systems from damage at the Site. Protect products from corrosion and deterioration.

PART 2 PRODUCTS

2.1 SYSTEM PERFORMANCE

A. Design Criteria

1. Size, Length, and Load-carrying Capacity: Comply with the Contract Documents. When size, length or load-carrying capacity of anchor system is not otherwise shown or indicated, provide the following:
 - a. Anchor Bolts: Provide size, length, and capacity required to carry design load based on values and requirements of Paragraph 3.2.A of this Section. For conditions outside limits of critical edge distance and spacing in Paragraph 3.2.A of this Section, minimum anchor bolt embedment as shown or indicated in Paragraph 3.2.A of this Section apply and capacity shall be based on requirements of Laws and Regulations, including applicable building codes.
 - b. Adhesive Anchors, Expansion Anchors, or Concrete Inserts: Provide size, length, type, and capacity required to carry design load based on values and requirements in manufacturer's load tables. Alternately, capacity may be based on tension and shear strength capacities determined by independent testing laboratory retained by manufacturer or Contractor, using minimum safety factor of four.
 - 1) Determine capacity considering reductions due to embedment length, strength of base fastening materials, spacing, and edge distance.
2. Design Loads:
 - a. Equipment Anchors: Use design load recommended by equipment manufacturer.
 - b. Pipe Hangers and Supports: Use full weight of pipe, and fluid contained in pipe that are tributary to the support plus the full weight of valves and accessories located between the hanger or support being anchored and the next hanger or support.

B. Application:

1. Anchor Bolts:
 - a. Where anchor bolt is shown or indicated, use cast-in-place anchor bolt unless another anchor type is approved by Engineer.
 - b. Provide anchor bolts as shown or indicated, or as required to secure structural element to appropriate anchor surface.

2. Adhesive Anchors:
 - a. Use where adhesive anchors are shown or indicated for installation in concrete, grout-filled concrete masonry units, or hollow concrete unit masonry.
 - b. Use where subject to vibration or where subject to freezing.
 - c. Use where submerged or buried.
 - d. Use for floor-mounted pipe supports.
 - e. Do not use in ceilings.
 - f. Do not use for pipe hangers.
3. Expansion Anchors:
 - a. Use where expansion anchors are shown or indicated for installation in concrete, grout-filled concrete masonry units, hollow concrete unit masonry, or solid brick.
 - b. Do not use where subject to vibration.
 - c. Do not use where submerged or buried.
 - d. Do not use in exterior locations subject to freezing.
 - e. Use in ceilings.
 - f. Expansion anchors may be used for hanging or supporting piping two-inch diameter and smaller. Do not use expansion anchors for supporting piping larger than two-inch diameter unless otherwise shown or approved by Engineer.
4. Concrete Inserts:
 - a. Use only where shown or indicated in the Contract Documents.
 - b. Use for pipe hangers and supports for pipe size and loading recommended by the insert manufacturer.
5. Toggle Bolts:
 - a. Use only when approved by Engineer for light-duty fastening brackets and other elements onto hollow concrete elements or hollow masonry units.

2.2 MATERIALS

A. Anchor Bolts:

1. Interior and Dry Locations: Provide threaded carbon steel rods complying with ASTM F1554, Grade 36, with heavy hex nuts complying with ASTM A563 Grade A, unless otherwise shown or indicated on the Drawings.
2. Exterior, Buried, or Submerged Locations, or When Exposed to Wastewater: Provide stainless steel threaded rods complete with washers complying with ASTM F593, AISI Type 316, Condition A, with ASTM A194, Grade 8S (nitronic 60) stainless steel nuts. Other AISI types may be used if approved by Engineer. Use locknuts when required by equipment manufacturer.
 - a. Stainless steel threaded rod shall comply with ductility requirements of ACI 350 or ACI 318 Appendix D, Section D.3.3.
3. Equipment: Provide anchor bolts conforming material requirements of this Section and equipment manufacturer's requirements relative to size, embedment length, and anchor bolt projection.
4. Anchoring of Structural Elements: Provide anchor bolts of size, material, and strength shown or indicated in the Contract Documents.

B. Concrete Adhesive Anchors:

1. General:
 - a. Adhesive anchors shall consist of threaded rods anchored into hardened concrete using an adhesive system.

2. Products and Manufacturers: Provide one of the following:
 - a. HIT-RE 500-SD Injection Epoxy Adhesive Anchoring System, by Hilti Fastening Systems, Inc.
 - b. Acrylic-Tie Adhesive, by Simpson Strong-Tie Co.
 - c. FM Stainless, LLC,
 - d. Or Village Engineer approved equal.
 3. Adhesive:
 - a. Adhesive system shall use two-component adhesive mix.
 - b. Epoxy adhesives shall conform to physical requirements of ASTM C881 Type IV, Grade 2 and 3, Class A, B, and C except gel times.
 - c. Adhesives shall have an evaluation report by ICC ES and be successfully tested in accordance with ICC ES AC 308.
 4. Anchor:
 - a. Provide stainless steel adhesive anchor rod complying with ASTM F593, AISI Type 316, Condition CW, with ASTM A194, Grade 8S (nitronic 60) stainless steel nuts. Use locknuts when required by equipment manufacturer.
- C. Grout-filled Masonry Adhesive Anchors:
1. General:
 - a. Adhesive anchors shall consist of threaded rods anchored into grout-filled concrete block masonry using an adhesive system.
 2. Products and Manufacturers: Provide one of the following:
 - a. HIT-HY 150 MAX Adhesive Anchoring System, by Hilti Fastening Systems, Inc.
 - b. Acrylic-Tie Adhesive, by Simpson Strong-Tie Co.
 - c. FM Stainless, LLC,
 - d. Or equal.
 3. Adhesive:
 - a. Adhesive system shall use two-component adhesive mix.
 - b. Adhesives shall conform to physical requirements of ASTM C881 Type I and IV, Grade 3, Class A, B, and C.
 - c. Acrylate hybrid adhesives shall conform to the following:
 - 1) ASTM C579 Compressive Strength >7,252 psi
 - 2) ASTM C580 Flexural Strength > 2,900 psi
 - 3) ASTM C307 Modulus of Elasticity > 507,000 psi
 - d. Adhesives shall have evaluation report by ICC ES and be tested in accordance with ICC ES AC 58 for the following:
 - 1) Seismic and wind loading
 - 2) Long-term creep at elevated temperatures
 - 3) Static loading at elevated temperatures
 - 4) Damp and water-filled holes
 - 5) Freeze-thaw conditions
 - 6) Critical and minimum edge distance and spacing
 4. Anchor:
 - a. Provide stainless steel adhesive anchor rod complying with ASTM F593, AISI Type 316, Condition CW, with ASTM A194, Grade 8S (Nitronic 60) stainless steel nuts.
- D. Hollow Concrete Masonry Adhesive Anchors:
1. General:

- a. Adhesive anchors shall consist of threaded rods with a cylindrical mesh screen tube anchored into hollow concrete block masonry using an adhesive system.
 2. Products and Manufacturers: Provide one of the following:
 - a. HIT-HY 20 for Masonry Anchoring System, by Hilti Fastening Systems, Inc.
 - b. Acrylic-Tie Adhesive, by Simpson Strong-Tie Co.
 - c.
 - d. Or equal.
 3. Adhesive:
 - a. Adhesive system shall use two-component adhesive mix.
 - b. Adhesives shall conform to physical requirements of ASTM C881 Type I and IV, Grade 3, Class A, B, and C.
 - c. Hybrid adhesives shall conform to the following:
 - 1) ASTM D695 Compressive Strength: 10,420 psi
 - 2) ASTM D790 Modulus of Elasticity: 1.02×10^6 psi
 - d. Adhesives shall have an evaluation report by ICC ES and be tested in accordance with ICC ES AC 58 for the following
 - 1) Seismic and wind loading
 - 2) Long-term creep at elevated temperatures
 - 3) Static loading at elevated temperatures
 - 4) Damp and water-filled holes
 - 5) Freeze-thaw conditions
 - 6) Critical and minimum edge distance and spacing
 4. Anchor:
 - a. Provide stainless steel adhesive anchor rod complying with ASTM F593, AISI Type 316, Condition CW, with ASTM A194, Grade 8S (nitronic 60) stainless steel nuts.
 5. Mesh Screen Tube:
 - a. Provide with mesh size, length, and diameter as specified by adhesive anchor manufacturer.
 - b. Mesh shall be manufactured of AISI 304 stainless steel.
- E. Concrete Wedge Expansion Anchors:
1. Where expansion anchors are shown or indicated to be installed in concrete, provide concrete wedge expansion anchors.
 2. Products and Manufacturers: Provide one of the following:
 - a. Kwik Bolt TZ Wedge Anchor, by Hilti Fastening Systems, Inc.
 - b. Strong-Bolt Wedge Anchor, by Simpson Strong-Tie Co.
 - c. Nova Fasteners Co., Inc. Wedge Anchor,
 - d. Or equal.
 3. Anchors shall conform to physical requirements of FS A-A-1923A, Type 4. Provide concrete wedge expansion anchors in accordance with ACI 318 and ACI 350, Appendix D. Demonstrate suitability of cracked concrete wedge anchors in accordance with ACI 355.2 prequalification tests.
 4. Interior and Dry Locations: Provide carbon steel anchors complete with nuts and washers, zinc plated, in accordance with ASTM B633.
 5. Exterior or Wet Locations: Provide expansion anchors complete with nuts and washers, AISI Type 304 stainless steel anchor body, in accordance with ASTM A276 or ASTM A493.
 6. Anchors shall be tested in accordance with ICC ES AC 193 for mandatory tests and the following:
 - a. Seismic and wind loading.
- F. Grout-filled Masonry Wedge Expansion Anchors:

1. Product and Manufacturers: Provide one of the following:
 - a. Kwik-Bolt 3 Expansion Anchors, by Hilti Fastening Systems, Inc.
 - b. Wedge-All Wedge Anchors, by Simpson Strong-Tie Co.
 - c. Nova Fasteners Co., Inc. Wedge Anchor,
 - d. Or equal.
 2. Interior Locations: Where expansion anchors are shown or indicated as being installed in grout-filled masonry, provide masonry wedge type expansion anchors.
 3. Anchors shall conform to physical requirements of FS A-A-1923A, Type 4. Anchors shall be non-bottom bearing type with single-piece steel expansion clip providing 360-degree contact with base material and shall not require oversized holes for installation.
 4. Provide carbon steel anchors complete with nuts and washers, zinc plated, in accordance with ASTM B633.
 5. Anchors shall have an evaluation report issued by ICC ES and be tested in accordance with ICC ES AC 01 for the following:
 - a. Seismic and wind loading.
 - b. Combination of tension and shear loads.
 - c. Critical and minimum edge distance.
- G. Sleeve Expansion Anchors:
1. Where expansion anchors are shown or indicated for installation in hollow concrete unit masonry or solid brick, provide sleeve-type expansion anchors.
 2. Products and Manufacturers: Provide one of the following:
 - a. HLC Sleeve Anchors, by Hilti Fastening Systems, Inc.
 - b. Sleeve-All Sleeve Anchor, by Simpson Strong-Tie Co.
 - c. Nova Fasteners Co., Inc. Sleeve Expansion Anchor,
 - d. Or equal.
 3. Anchors shall conform to physical requirements of FS A-A-1922A. Anchors shall be non-bottom bearing type with single-piece steel expansion sleeve providing 360-degree contact with base material, and shall not require oversized holes for installation.
 4. Interior Locations: Provide carbon steel anchors complete with nuts and washers, zinc plated, in accordance with ASTM B633.
 5. Exterior Locations: Provide expansion anchors complete with nuts and washers, Type 304 stainless steel, in accordance with ASTM A276 or ASTM A493.
 6. Anchors shall be tested in accordance with ICC ES AC 01 for the following:
 - a. Static loads.
 - b. Critical and minimum edge distance and spacing.
- H. Drop-in Expansion Anchors:
1. Where light-duty expansion anchors, to be installed in concrete or grout-filled concrete unit masonry, are required by Contractor for supporting piping or conduit two-inch diameter or smaller, properly sized drop-in anchors will be acceptable.
 2. Products and Manufacturers: Provide one of the following:
 - a. HDI Drop-In Anchors, by Hilti Fastening Systems, Inc.
 - b. Drop-In Anchor, by Simpson Strong-Tie Co.
 - c. Nova Fasteners Co., Inc. Drop-in Expansion Anchor,
 - d. Or equal.
 3. Provide carbon steel anchors complete with nuts and washers, zinc plated, in accordance with ASTM B633, conforming to physical requirements of FS A-A-55614, Type I. Anchors shall be

bottom-bearing type with slotted, single-piece steel shell and tapered expander plug providing 360-degree contact with base material.

4. Anchors shall be tested in accordance with ICC ES AC 01 for the following:
 - a. Seismic and wind loading.
 - b. Combination of tension and shear loads.
 - c. Critical and minimum edge distance and spacing.

- I. Concrete Inserts:
 1. Provide malleable iron inserts for pipe hangers, grating, floor plate, and masonry lintels. Comply with ANSI/MSS SP-58. Provide inserts recommended by insert manufacturer for required loading.
 2. Finish shall be black.
 3. Products and Manufacturers: Provide one of the following:
 - a. Figure 282, by Anvil International Inc.
 - b. No. 380E, by Hohmann and Barnard, Inc.
 - c. Nova Fasteners Co.,
 - d. Or equal.

- J. Toggle Bolts:
 1. Where light-duty toggle bolts, to be installed in hollow concrete unit masonry, hollow brick or gypsum wallboard, are required by Contractor to support piping or conduit one-inch diameter or smaller, properly sized toggle bolts are acceptable.
 2. Products and Manufacturers: Provide one of the following:
 - a. Toggler Bolt by Hilti Fastening Systems, Inc.
 - b. Toggle Bolt by The Simpson Strong-Tie Co.
 - c. Or equal.
 3. Toggle Bolts: FS FF-B-588, Type I, Class A, Style 1. Provide spring-wing toggle bolts, with two-piece wings.
 4. Provide carbon steel bolts with zinc coating in accordance with ASTM B633.

- K. Do not use power activated fasteners and other types of bolts and fasteners not specified in this Section, unless approved by Engineer.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine conditions under which materials will be installed and notify Engineer in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Anchor Bolts:
 1. Provide anchor bolts as shown or indicated in the Contract Documents, or as required to secure structural element to the appropriate anchor surface.

2. Locate and accurately set anchor bolts using templates or other devices as required, prior to placing concrete. Wet setting of anchor bolts is not allowed.
3. Protect threads and shank from damage during installation and subsequent construction operations.
4. Unless otherwise shown or approved by Engineer anchor bolts shall conform to Table 05051-A:

Table 05051-A - Single Anchor Allowable Loads on Anchor Bolts ¹

Bolt Diameter (inch)	F1554 Grade 36				F1554			
	F593 Type 316, Condition A				Grade 55			
	Minimum Embedment (inch)	Minimum Edge Distance and Spacing ² (inch)	Shear ^{3,4} (lb)	Tension ³ (lb)	Minimum Embedment (inch)	Minimum Edge Distance and Spacing ² (inch)	Shear ³ (lb)	Tension ³ (lb)
1/2	6	9	1,262	2,420	8.5	12.75	1,660	3,190
5/8	7.5	11.25	2,010	3,860	10.5	15.75	2,640	5,080
1/4	9	13.5	2,974	5,720	13	19.5	3,910	7,520
7/8	10.5	15.75	4,106	7,890	15	22.5	5,400	10,390
1	12	18	5,386	10,360	17	25.5	7,090	13,450
1 1/8	13.5	20.25	6,787	13,052	19	28.5	8,930	16,580
1 1/4	15	22.5	8,617	16,572	21	31.5	11,340	20,040

Table Notes:

1. Table is based on ACI 318 and ACI 350, Appendix D, $f'c = 4000$ psi. Table 05051-A is not applicable to anchor bolts embedded in grouted masonry.
2. Critical edge distance and spacing are indicated in the table. Capacity of anchor bolts for other combination of edge distances and spacing shall be evaluated in accordance with ACI 318 and ACI 350, Appendix D.
3. Values for shear and tension listed are not considered to act concurrently. Interaction of tension and shear will be evaluated by Engineer in accordance with ACI 318 and ACI 350, Appendix D.

B. Adhesive Anchors:

1. Comply with manufacturer's installation instructions regarding hole diameter, drilling method, embedment depth required to fully develop tensile strength of anchor ($0.75 \times F_u$), and hole cleaning/preparation. Unless more-stringent standards are required by adhesive system manufacturer, comply with the following.
2. Drill holes to adhesive system manufacturer's recommended diameter and depth to develop required tensile strength. Hole diameter shall not be greater than 1/8-inch more than nominal rod diameter. Holes shall be hammer-drilled with carbide bits; do not core-drill holes.
3. Unless otherwise shown or indicated in the Contract Documents or approved by Engineer, provide minimum anchor spacing and edge distance of 12 anchor diameters. Effect on anchor capacity of deviations, if any, in spacing and edge distance shall be investigated by Engineer in accordance with adhesive anchor system manufacturer's requirements.
4. Before setting adhesive anchor, hole shall be made free of dust and debris by method recommended by adhesive anchor system manufacturer. Hole shall be brushed with adhesive system manufacturer-approved brush and blown clean with clean, dry, oil-free compressed air to remove all dust and loose particles. Hole shall be dry as defined by adhesive system manufacturer.

5. Before injecting adhesive, obtain Engineer's concurrence that hole is dry and free of oil and other contaminants.
6. Inject adhesive into hole through injection system-mixing nozzle and necessary extension tubes, placed to bottom of hole. Discharge end shall be withdrawn as adhesive is placed but kept immersed to prevent formation of air pockets. Fill hole to depth that ensures that excess material is expelled from hole during anchor placement.
7. Before installing, verify that anchor is dry and free of oil and other contaminants.
8. Twist anchors during insertion into partially filled hole to guarantee full wetting of rod surface with adhesive. Insert rod slowly to avoid developing air pockets.
9. Limitations:
 - a. Installation Temperature: See manufacturer's instructions for installation temperature requirements.
 - b. Oversized Holes: Notify Engineer immediately if size of drilled hole is larger than recommended by anchor system manufacturer. Cost of corrective measures, including but not limited to redesign of anchors due to decreased anchor capacities, shall be paid by Contractor.
 - c. Embedment depths shall be based on compressive strength of 2,000 psi when embedded in existing concrete and 4,000 psi when embedded in new concrete.

C. Expansion Anchors:

1. Unless otherwise shown or approved by Engineer, provide minimum anchor spacing and edge distance of seven anchor diameters. Effect on anchor capacity of deviations, if any, in spacing and edge distance shall be evaluated in accordance with requirements of the anchor system manufacturer.
2. Protect threads from damage during anchor installation. Set anchors to manufacturer's recommended torque, using a torque wrench.

D. Concrete Inserts:

1. Protect embedded items from damage and, during concrete placing, ensure that embedded items are not filled with concrete.

3.3 CLEANING

- A. After embedding concrete is placed, remove protection and clean bolts and inserts.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Services:

1. Provide services at the Site of qualified adhesive manufacturer's representative during initial installation of adhesive anchor systems to train Contractor personnel in proper selection and installation procedures. Manufacturer's representative shall observe to confirm the installer demonstrates proper installation procedures for adhesive anchors and adhesive material.

END OF SECTION 050510

DIVISION 05 – METALS
SECTION 055205 – ALUMINUM HANDRAILS AND RAILINGS
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

A. Scope

1. The Contractor shall provide all labor, materials, tools, equipment, and incidentals as shown, specified, and required to furnish and install aluminum handrail and railing systems. The Work also includes:
 - a. Providing openings in, and attachments to, aluminum handrail and railing systems to accommodate the Work under this and other Specification Sections. Provide all items for aluminum handrails and railings, including anchorages, fasteners, studs, and other items required for which provision for is not specifically included under other Sections.
 - b. Provide openings in and attachments to aluminum handrails and railings to accommodate work under other contracts. Assist other contractors in building on or attaching to aluminum handrails and railings all items such as fasteners and other items required for which provision is not specifically included under other contracts.
2. Aluminum handrails and railings Work shall include components and features shown and specified, and all components and features available from specified manufacturers required for providing complete aluminum handrail and railing system in accordance with the Contract Documents.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before aluminum handrails and railings Work.
2. Notify other contractors in advance of installing aluminum handrail and railings to provide them with sufficient time to install items included in their contracts that are to be installed with or before aluminum handrails and railings Work.
3. Aluminum handrail and railing locations shall conform with Laws and Regulations.

C. Related Sections:

1. Section 050510, Anchor Bolts, Toggle Bolts and Concrete Inserts.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. Aluminum Association (AA), Aluminum Design Manual.
2. ASTM B26/B26M, Specification for Aluminum-Alloy Sand Castings.
3. ASTM B117, Standard Practice for Operating Salt Spray (Fog) Apparatus.
4. ASTM B136, Standard Method for Measurement of Stain Resistance of Anodic Coatings on Aluminum.
5. ASTM B137, Standard Test Method for Measurement of Coating Mass per Unit Area on Anodically Coated Aluminum.
6. ASTM B221, Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
7. ASTM B241/B241M, Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube.

8. ASTM B244, Standard Test Method for Measurement of Thickness of Anodic Coatings on Aluminum and of Other Nonconductive Coatings on Nonmagnetic Basis Metals with Eddy-Current Instruments.
9. ASTM B247, Specification for Aluminum and Aluminum-Alloy Die Forgings, Hand Forgings, and rolled Ring Forgings.
10. ASTM B429, Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
11. ASTM E 935, Standard Test Methods for Permanent Metal Railing Systems and Rails for Buildings.
12. NAAMM/Architectural Metal Products Division (AMP), Pipe Railing Manual.
13. NAAMM/AMP AMP 501 Finishes for Aluminum.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer:
 - a. Manufacturer shall be able to document at least five years successful experience in fabricating aluminum handrail and railing systems of scope and type similar to that required.
 - b. Manufacturer shall be able to capable of providing custom detail drawings for the products required.
2. Professional Engineer:
 - a. The Contractor or handrail and railing manufacturer shall retain a registered professional engineer legally qualified to practice in same state as the Site. Professional engineer shall have at least five years experience designing aluminum handrails and railings.
 - b. Responsibilities include:
 - 1) Reviewing aluminum handrail and railing system performance and design criteria stated in the Contract Documents.
 - 2) Preparing written requests for clarifications or interpretations of performance or design criteria for submittal to the Engineer by the Contractor.
 - 3) Preparing or supervising preparation of design calculations verifying compliance of aluminum handrail and railing system with requirements of the Contract Documents.
 - 4) Signing and sealing all calculations.
 - 5) Certifying that:
 - a) Design of aluminum handrail and railing system was performed in accordance with performance and design criteria stated in the Contract Documents, and
 - b) Design conforms to all applicable local, state, and federal Laws and Regulations, and to prevailing standards of practice.
3. Installer Qualifications:
 - a. Retain a single installer trained and with record of successful experience in installing aluminum handrail and railing systems.
 - b. Installer shall have record of successfully installing aluminum handrail and railing systems in accordance with recommendations and requirements of manufacturer, or shall provide evidence of being acceptable to the manufacturer.
 - c. Installer shall employ only tradesmen with specific skill and successful experience in the type of Work required.
 - d. When requested by the Engineer, submit name and qualifications of installer with the following information for at least three successful, completed projects:
 - 1) Names and telephone numbers of owner and architect or engineer responsible for each project.
 - 2) Approximate contract cost of the aluminum handrail and railing systems for which installer was responsible.
 - 3) Amount (linear feet) of aluminum handrail and railing installed.

B. Component Supply and Compatibility:

1. Obtain all products included in this Section regardless of component manufacturer, from a single aluminum handrail and railing system manufacturer.
2. Aluminum handrail and railing system manufacturer shall review and approve or prepare all Shop Drawings and other submittals (except for delegated design submittals, when professional engineer is retained by other than handrail and railing manufacturer) for all components furnished under this Section.
3. Components shall be specifically constructed for specified service conditions and shall be integrated into overall assembly by aluminum handrails and railings manufacturer.

C. Regulatory Requirements: Conform to Laws and Regulations including:

1. OSHA Part 1910.23, Guarding Floor and Wall Openings and Holes.

D. Certifications:

1. Furnish certification, signed by authorized officer of manufacturer and notarized, stating that handrail and railing systems conform to the design prepared by the professional engineer.
2. Furnish certification, signed by authorized officer of CONTRACTOR and notarized, stating that all components and fittings are furnished by the same manufacturer.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
 - a. Drawings for fabrication and installation of aluminum handrail and railing systems with sizes of members, pipe wall thickness, information on components, and anchorage devices. Show all anchorages. Provide details drawn at scale of 1.5-inch equal to one foot.
 - b. Indicate required location of posts.
 - c. Indicate locations and details of all expansion joints, if any.
 - d. Indicate locations and details of gaps across seismic joints, if any.
 - e. Profile drawings of aluminum handrail and railing system components.
 - f. Custom detail drawings. Details of forming, jointing, sections, connections, internal supports, trim and accessories. Provide details drawn at scale of 1.5-inch equal to one foot.
2. Product Data:
 - a. Manufacturer's specifications, standard detail drawings, and installation instructions for aluminum handrail and railing systems.
 - b. Manufacturer's catalogs showing complete selection of standard and custom components and miscellaneous accessories for selection by the Engineer.
3. Delegated Design Submittals:
 - a. Design Data:
 - 1) Design computations or complete structural analysis of handrail and railing systems, signed and sealed by professional engineer. Professional engineer's seal shall be clearly legible, including state of registration, registration number, and name on seal.
 - 2) Certification by professional engineer that professional engineer has performed design of aluminum handrail and railing systems in accordance with performance and design criteria stated in the Contract Documents, and that design conforms to all local, state, and federal Laws and Regulations, and to prevailing standards of practice.

B. Informational Submittals: Submit the following:

1. Certificates:
 - a. Certification on source of supply, as specified in Article 1.3 of this Section.
 - b. Manufacturer certification specified in Article 1.3 of this Section.
2. Source Quality Control Submittals:

- a. Manufacturer's load testing report in accordance with ASTM E935 for completed aluminum handrail and railing systems, demonstrating compliance with applicable requirements of building codes, safety codes, and other Laws and Regulations.
3. Qualifications Statements: Submit qualifications for the following:
 - a. Manufacturer, when requested by the Engineer.
 - b. Professional engineer.
 - c. Installer, when requested by the Engineer. Qualifications statement shall include record of experience with references specified.
- C. Closeout Submittals: Submit the following:
 1. Maintenance Manuals: Furnish detailed maintenance manuals that include the following:
 - a. Product name and number.
 - b. Detailed procedures for routine maintenance and cleaning, including cleaning materials, application methods and precautions in use of products that may be detrimental to finish when improperly applied.
 - c. Handrail and railings systems manufacturer's current catalog including individual parts.
 - d. Conform to Section 01781, Operations and Maintenance Data.
 2. Guarantee: Provide in maintenance manual the guarantee specified.
- D. Maintenance Material Submittals: Submit the following:
 1. Extra Stock Materials:
 - a. After completing installation, deliver to OWNER two percent of actual quantity of each handrail and railing system component used in the Work.
 - b. Label each piece or sealed container with name and product number.
 - c. Conform to Section 01783, Spare Parts and Maintenance Materials.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, and Unloading:
 1. Prior to shipping, completely inspect products to assure that components are complete and comply with requirements of Contract Documents and recommendations of manufacturer. Box or crate products as required to prevent damage during shipment.
 2. Deliver products to Site to ensure uninterrupted progress of the Work. Deliver anchorage products that are to be embedded in concrete in ample time to prevent delaying the Work.
 3. Inspect all boxes, crates, and packages upon delivery to Site and notify the Engineer in writing of loss or damage to products. Promptly remedy loss and damage to new condition per manufacturer's instructions.
- B. Storage and Protection:
 1. Keep products off ground using pallets, platforms, or other supports. Protect products from corrosion and deterioration.
- C. Handling of Products:
 1. Do not subject handrail and railing products to bending or stress.
 2. Do not damage edges or handle products in a manner that will cause scratches, warping, or dents.
 3. Protect handrails and railings by paper or coating as acceptable to handrail and railing manufacturer, against scratching, splashes of mortar, paint, and other marring during transportation, handling, and erection. Protect until completion of adjacent work.

1.6 GUARANTEE

- A. Guarantee: Manufacturer shall provide written guarantee of availability of replacement parts and components for period of at least five years after completion of the Project.

PART 2 PRODUCTS

2.1 SYSTEM PERFORMANCE

- A. System Description: Aluminum handrail and railing system shall consist of equally spaced horizontal rails with totally concealed mechanical fasteners, internally threaded tubular rivets and components fastened to posts spaced no more than 5.0 feet on centers and system of handrails supported from adjacent construction by mounting brackets spaced at no more than 5.0 feet on centers.
- B. System Description: Aluminum handrail and railing system shall consist of top and bottom rail with vertical pickets with totally concealed mechanical fasteners, internal threaded tubular rivets, and components fastened to posts spaced no more than 5.0 feet on centers and system of handrails supported from adjacent construction by mounting brackets spaced at no more than 5.0 feet on centers.
- C. Design Criteria and Performance Criteria:
1. Design, fabricate, and install aluminum handrail and railing systems to withstand the most critical effects resulting from the following loads (loads listed below do not act concurrently):
 - a. Uniform Load: 50 pounds per foot, applied at top in any direction.
 - b. Concentrated Load: 200 pounds single load, applied at any point along the top in any direction.
 - c. Components: Intermediate rails (all rails except the handrail), balusters, and panel fillers, if any, shall withstand horizontally-applied normal load of 50 pounds on an area equal to one square foot, including openings and space between rails. Reactions due to this loading are not required to be superimposed to loading specified for main supporting members of handrails and railings.
 - d. Conform to requirements of AA Aluminum Design Manual for determining allowable stresses and safety factors for aluminum structural components.
 - e. Limit deflection in each single span of railing and handrail to 1.5-inch maximum, and to 1.4-inch maximum on railing posts. Applied loads shall not produce permanent deflection in the completed Work when loads are removed.
 2. Thermal Control: Provide adequate expansion within fabricated systems that allows for thermal expansion and contraction caused by material temperature change of 140 degrees F to -20 degrees F without warp or bow of system components. Distance between expansion joints shall be based on providing 1/4-inch wide joint at 70 degrees F, which accommodates movement of 150 percent of calculated amount of movement for specified temperature range.
 3. Where handrail and railing systems cross expansion joints in the building or structure, provide expansion joints in handrail and railings systems.
 4. For posts located at or near end of runs as shown, uniformly space intermediate posts as required to conform to loading and deflection criteria specified, at intervals no greater than maximum post spacing specified. Where posts are shown for handrails along both sides of walkways and other similar locations, locate posts opposite each other; do not stagger post locations.

2.2 MANUFACTURERS

- A. Products and Manufacturers: Provide one of the following:
1. Custom Fabricated Connectorail System by Julius Blum & Company, Inc.
 2. Custom Fabricated Series 500 Non-Welded Aluminum Pipe Aluminum handrails and railing systems by Superior Aluminum Products, Inc.

3. Wesrail by Moultrie Manufacturing Company.
4. Alumaguard by Alumaguard – A division of Bettinger West, Inc.
5. Or Approved Equal.

2.3 MATERIALS

- A. Extruded Aluminum Architectural and Ornamental Shapes: ASTM B221, Alloy 6063-T52.
- B. Aluminum Forgings: ASTM B247.
- C. Extruded or Drawn Aluminum Pipe and Tube:
 1. ASTM B429 or ASTM B241/B241M, Alloy 6063-T5, 6063-T52, or 6063-T832 as required by loadings, deflections, and post spacing specified.
 2. Provide Schedule 40 pipe, minimum, unless conditions of detail and fabrication require extra-heavy pipe to comply with Specifications. Rails and posts shall have minimum outside diameter of 1.90 inches.
- D. Reinforcing Bars: Solid, circular profile, 24 inches long, 6061-T6 aluminum reinforcing bars with same outside diameter as inside diameter of post.
- E. Anchors and Fastenings:
 1. For anchors and fasteners, use Type 316 stainless steel; minimum 0.5-inch diameter.
 2. Provide minimum of four bolt fasteners per post where surface-mounted posts are shown. Components shall be in accordance with manufacturer's recommendations and as approved or accepted (as applicable) by the Engineer on submittals.
 3. Anchors: As specified in Section 05051, Anchor Bolts, Toggle Bolts, and Concrete Inserts.
- F. Castings:
 1. Provide high-strength aluminum alloy brackets, flanges, and fittings suitable for anodizing as specified.
 2. Aluminum alloy sand castings: ASTM B26/B26M.
- G. Connector Sleeves: Schedule 40, 5.0-inch long by 1.610-inch diameter.
- H. Sockets: Provide six-inch deep by 2.5-inch outside diameter aluminum sockets with 3.5-inch wide socket cover on bottom of each socket and on top and bottom of removable post sockets.
- I. Chain, Snaps, and Eye Bolts: Provide oblong 0.250-inch welded link, Type 316 stainless steel chain weighing 57 pounds per cubic foot, each link 1.25-inch by 7/16-inch. Provide Type 316 stainless steel eyebolts, 1/4-inch stainless steel threaded quick links and heavy-duty swivel snaps with spring loaded latch.
- J. Gates: For each gate in handrail or railing system, provide the following:
 1. Hinges: Two-self closing aluminum hinges.
 2. Latches and Stops: One latch and stop with rubber bumper and one-inch diameter plastic knobs.
- K. Custom Cover Flanges: 1/4-inch high by 4.0-inch diameter, aluminum.
- L. Adhesive: Two-part waterproof epoxy-type as recommended by handrail and railing systems manufacturer.

- M. Non-shrink Grout: Refer to Section 03600, Grout.
- N. Toeboards:
1. Provide extruded Alloy 6063-T5 or T52 aluminum alloy toeboards, unless railing is mounted on curbs or other construction of sufficient height and type to conform to OSHA 1910.23. Bars or plates are not acceptable.
 2. Unless otherwise specified, toeboards shall conform to requirements of OSHA 1910.23, Section (e).
- O. System Components and Miscellaneous Accessories: Provide complete selection of manufacturer's standard and custom aluminum handrail and railing systems components and miscellaneous accessories required. Show type and location of all such items on Shop Drawings and other submittals as applicable.

2.4 FABRICATION

- A. General: Unless otherwise shown or specified, provide typical non-welded construction details and fabrication techniques recommended in NAAMM/AMP Pipe Railing Manual and NAAMM/AMP AMP 501.
- B. Fabricate handrail and railing systems true to line and level, with accurate angles surfaces and straight edges. Fabricate corners without using fittings. Provide bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work. Form elbow bends and wall returns to uniform radius, free from buckles and twists, with smooth finished surfaces, or use prefabricated bends. Provide not less than four-inch outside radius.
- C. Provide chains across openings in railings where shown. Attach one end of each chain to an eyebolt in post and other end attached by means of swivel eye snap hook to similar eyebolt in opposite post.
- D. Remove burrs from exposed edges.
- E. Close aluminum pipe ends by using prefabricated fittings.
- F. Weep Holes:
1. Fabricate joints that will be exposed to weather to exclude water.
 2. Provide 15/64-inch diameter weep holes at lowest possible point on each post in handrail and railing systems.
 3. Provide pressure relief holes at closed ends of handrail and railing systems.
- G. Toeboards:
1. Provide manufacturer's standard toeboard, which accommodates movement caused by thermal change specified without warping or bowing toeboards.
 2. Provide manufacturer's standard toeboard, which accommodates storage for removable socket covers.
 3. Coordinate and cope toeboard as required to accommodate cover flanges at posts.
 4. Toeboards shall follow curvature of railing. Where railing is shown to have curved contours at corners, or other locations, toeboard shall likewise be curved to follow line of railing system.
- H. Reinforcing Bars: Provide reinforcing bar friction-fitted at each post in railing system. Extend reinforcing bars of tubes six inches into cast-in-place sleeves or other types of supporting brackets.
- I. Mechanically Fitted Component Pipe Handrail and Railing System:

1. Use non-welded pipe handrail and railing system with posts, top and intermediate rail(s), and flush joints.
2. Provide top and two intermediate horizontal rail(s), equally spaced.
3. Do not use blind rivets, pop rivets, or other exposed fastening devices in the Work. Fasteners used for side-mounting fascia flanges where shown or specified may be exposed in the Work. Provide internal threaded aluminum rivets, stainless steel through-bolts with lock nuts, stainless steel sheet metal screws with lock washers, and epoxy adhesive for fastening components of the Work.

2.5 FINISHES

A. General:

1. Prepare surfaces for finishing in accordance with recommendation of aluminum producer and the finisher or processor.
2. Adjust and control direction of mechanical finishes specified to achieve best overall visual effect in the Work.
3. Color and Texture Tolerance: Provide uniform color and continuous mechanical texture for aluminum components. The Engineer reserves the right to reject aluminum materials because of color or texture variations that are visually objectionable, but only where variation exceed range of variations established by manufacturer prior to fabrication, by means of range of Samples approved by the Engineer.
4. Anodize aluminum components.

B. Mechanically finish aluminum by wheel or belt polishing with aluminum oxide grit of 180 to 220 size, using peripheral wheel speed of 6,000 feet per minute; AA Designation - M32 Medium Satin Directional Texture.

1. Hand Rubbed Finish: Where required to complete the Work and provide uniform, continuous texture, provide hand-rubbed finish to match medium satin directional texture specified to even out and blend satin finishes produced by other means.

C. Provide non-etching chemical cleaning by immersing aluminum in inhibited chemical solution, as recommended by coating applicator, to remove lard oil, fats, mineral grease, and other contamination detrimental to providing specified finishes.

1. Clean and rinse with water between steps as recommended by aluminum manufacturer.

D. Exposed Aluminum Anodic Coating: Provide anodic coatings as specified that do not depend on dyes, organic or inorganic pigments, or impregnation processes to obtain color. Apply coatings using only the alloy, temperature, current density, and acid electrolytes to obtain specified colors in compliance with designation system and requirements of NAAMM/AMP Pipe Railing Manual and NAAMM/AMP AMP 501. Comply with the following:

1. Provide Architectural Class I high density anodic treatment by immersing the components in tank containing solution of 15 percent sulfuric acid at 70 degrees F with 12 amperes per square foot of direct current for minimum of sixty minutes; AA Designation A41 Clear.
2. Physical Properties:
 - a. Anodic Coating Thickness, ASTM B244: Minimum of 0.7-mils thick.
 - b. Anodic Coating Weight, ASTM B137: Minimum of 32 mg/sq. in.
 - c. Resistance to Staining, ASTM B136: No stain after five minutes dye solution exposure.
 - d. Salt Spray, ASTM B117: 30,000 hours exposure with no corrosion or shade change.
3. Seal finished anodized coatings using deionized boiling water to seal pores and prevent further absorption.

2.6 SOURCE QUALITY CONTROL

A. Allowable Tolerances:

1. Limit variation of cast in place inserts, sleeves and field drilled anchor and fastener holes to the following:
 - a. Spacing: Plus-or-minus 3/8-inch.
 - b. Alignment: Plus-or-minus 1/4-inch.
 - c. Plumbness: Plus-or-minus 1/8-inch.
2. Minimum Handrails and Railings Systems Plumb Criteria:
 - a. Limit variation of completed handrail and railing system alignment to 1/4-inch in 12.0 feet with posts set plumb to within 1/16-inch in 3.0 feet.
 - b. Align rails so variations from level for horizontal members and from parallel with rake of stairs and ramps for sloping members do not exceed 1/4-inch in 12.0 feet.
3. Provide “pencil-line” thin butt joints.

B. Factory Testing:

1. Perform load test on completed handrail and railing systems. Extent of handrail and railing systems to be factory-tested shall be as shown and specified.
2. Load test completed handrail and railing systems in accordance with requirements of ASTM E935. Provide written report to the Engineer identifying and documenting testing methods used, magnitude and location of loads superimposed, and results of such tests on actual completed handrail and railing systems, including all anchors and fasteners to be used in the Work. Testing setup shall simulate actual conditions of installation to be used in the Work.
3. Do not ship products from factory until the Engineer accepts load testing report.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine conditions under which Work is to be performed and notify the Engineer, in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with installation until unsatisfactory conditions are corrected.
- B. Verify to the Engineer gauge of aluminum pipe railing posts and rails brought to the Site by actual measurement of on-Site material in presence of the Engineer.

3.2 INSTALLATION

A. General:

1. Do not erect components that have become scarred, dented, chipped, discolored, otherwise damaged or defaced. Remove from Site railing and handrail system components that have holes, cuts, gouges, deep scratches, or dents of any kind. Repairs to correct such Work will not be accepted. Remove and replace with new material.
2. Comply with installation and anchorage recommendations of NAAMM/AMP Pipe Railing Manual and NAAMM/AMP AMP 501 in addition to requirements specified and approved or accepted (as applicable) submittals.

B. Fastening to In Place Construction:

1. Remove protective plastic immediately before installing.

2. Adjust handrails and railings prior to securing in place, to ensure proper matching at butting joints and correct alignment throughout their length. Plumb posts in each direction. Secure posts and rail ends to building or structure as follows:
 - a. Anchor posts in concrete by means of sockets set and anchored into concrete floor slab. Provide closure secured to bottom of sleeve. Before installing posts, remove debris and water from sleeves. Verify that reinforcing bars or tubes have been inserted into posts before installation. Do not install posts without reinforcing bar. For all non-removable handrail and railing systems sections, after posts have been inserted into sockets, fill annular space between posts and sockets solid with grout as specified in Section 03600, Grout. Crown the grout and slope grout to drain away from posts.
 - b. Anchor posts to stair stringers with stringer or support flanges, angle type or floor type as required by conditions, shop-connected to posts and bolted to steel supporting members. Flanges shall be as recommended by manufacturer. Verify that reinforcing bars have been inserted into posts before installation. Do not install posts without reinforcing bar.
 - c. Side-mount posts by fastening them securely in brackets attached to steel or concrete fascia as shown and in accordance with approved or accepted (as applicable) submittals.
 - d. Provide removable railing sections where shown. Removable railing system posts shall be provided with friction fitted reinforcing bar in each post. Provide sockets with socket covers stored in extruded toeboard. Provide aluminum pipe collars for all removable posts. Accurately locate sleeves to match post spacing.
 - e. Posts set in concrete shall be provided with an aluminum floor cover flange.
3. Use devices and fasteners recommended by handrail and railing systems manufacturer and as shown on approved or accepted (as applicable) submittals.

C. Cutting, Fitting and Placement:

1. Perform cutting, drilling and fitting required for installation. Set the Work accurately in location, alignment, and elevation, plumb, level, true, and free of rack, measured from established lines and levels.
2. Fit exposed connections accurately together to form tight hairline joints. Do not cut or abrade surfaces of units that have been finished after fabrication, and are intended for field connections.
3. Make permanent field splice connections using manufacturer's recommended epoxy adhesive and 5.0 inch minimum length connector sleeves. Tight press fit field splice connectors and install in accordance with manufacturer's written instructions. Follow epoxy manufacturer's recommendations for requirements of installation and conditions of use.
4. Make permanent field splice connections using stainless steel blind rivets and 5.0 inch minimum length connector sleeves. Tight press fit field splice connectors and install in accordance with manufacturer's written instruction. Install two blind rivets per joint on 180-degree centers.
5. Make splices as near as possible to posts, but not exceeding 12.0 inches from nearest post.
6. Field welding is not allowed. Make splices using pipe splice lock employing a single allen screw to lock joint.
7. Provide hinged gates as shown.
8. Provide chain sections as shown. Provide one chain length with fastening accessories for top and each intermediate rail.
9. Secure handrails to walls with wall brackets and end fittings as shown. Drill wall plate portion of the bracket to receive one bolt, unless otherwise shown for concealed anchorage. Locate brackets as shown or, if not shown, at no more than 5.0 feet on centers. Provide flush type wall return fittings with same projection shown for wall brackets. Secure wall brackets and wall return fittings to building or structure. Refer to Section 05051, Anchor Bolts, Toggle Bolts, and Concrete Inserts.
10. Securely fasten toeboards in place with not more than 1/4-inch clearance above floor level.
11. Drill one 15/64-inch diameter weep hole not more than 1/4-inch above top of location of solid reinforcing bar or tube in each post.

D. Fastening to Existing Construction:

1. Provide heavy-duty floor flange and anchorage devices and fasteners where necessary for securing handrail and railing systems components to existing construction; including stainless steel threaded fasteners for concrete and masonry inserts, toggle bolts, through bolts, lag bolts and other connectors as required. Refer to Section 05051, Anchor Bolts, Toggle Bolts, and Concrete Inserts.
 2. Use devices and fasteners recommended by handrail and railing systems manufacturer and as shown on approved or accepted (as applicable) submittals.
- E. Expansion Joints:
1. Provide slip joint with internal sleeve extending 2.0-inch minimum, beyond joint on each side.
 2. Construct expansion joints as for field splices, except fasten internal sleeve securely to one side of rail only.
 3. Locate joints within six inches of posts.
- F. Seismic Joints:
1. Discontinue handrails and railings on each side of seismic joints where handrails and railings cross over seismic joints in structure.
 2. Comply with details shown.
- G. Protection from Dissimilar Materials:
1. Coat aluminum surfaces in contact with dissimilar materials such as concrete, masonry, and steel, to provide barrier between surfaces utilizing neoprene membrane.
 2. Do not extend coating beyond contact surfaces. Remove coating where exposed-to-view in the finished Work.

3.3 CLEANING AND REPAIRING

- A. Cleaning: Installer shall clean exposed surfaces of handrail and railing systems after completing installation. Comply with recommendations of both handrail and railing system manufacturer and finish manufacturer. Do not use abrasives or unacceptable solvent cleaners. Test cleaning techniques on an unused section of railing before employing cleaning technique.
1. Remove stains, dirt, grease, and other substances by washing handrails and railings systems thoroughly using clean water and soap; rinse with clean water.
 2. Do not use acid solution, steel wool, or other harsh abrasives.
 3. If stain remains after washing, remove defective sections and replace with new material meeting requirements of this Section.
- B. Handrails and railings shall be free from dents, burrs, scratches, holes, and other blemishes. Replace damaged or otherwise defective Work with new material that conforms with this Section at no additional cost to OWNER.
- C. At Substantial Completion, replace adjacent work marred by the Work of this Section.

END OF SECTION 055205

DIVISION 05 – METALS
SECTION 055305 – ALUMINUM HANDRAILS AND RAILINGS
DPMC No. A1346-00

PART 1 GENERAL**1.1 SUMMARY**

A. Scope

1. The Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install aluminum grating and frames.
2. The Work includes:
 - a. Providing grating, frames, and appurtenances.
 - b. Providing openings in aluminum grating to accommodate the Work under this and other Sections, and attaching to aluminum grating all items such as sleeves, bands, studs, fasteners, and items required for which provision is not specifically included under other Sections.
 - c. Providing openings in and attachments to aluminum grating to accommodate work under other contracts, and assisting other contractors in building on or attaching to aluminum grating items such as bands, fasteners, and studs and all items required for which provision is not specifically included under other contracts.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before aluminum grating Work.
2. Notify other contractors in advance of installing aluminum grating to provide other contractors with sufficient time for installing items included in their contracts to be installed with or before aluminum grating Work.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. AA Aluminum Design Manual.
2. ASTM B210, Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes.
3. ASTM B221, Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
4. NAAMM MBG 531, Metal Bar Grating Manual.
5. NAAMM MBG 533, Welding Specifications for Fabrication of Steel, Aluminum and Stainless-Steel Bar Grating.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer: Shall have at least five years of experience manufacturing products substantially similar to those required and shall be able to submit documentation of at least five installations in satisfactory operation for at least five years each.

B. Component Supply and Compatibility:

1. Obtain all products and materials included in this Section regardless of component manufacturer from a single aluminum-grating manufacturer.

2. Aluminum grating manufacturer shall review and approve or prepare all Shop Drawings and other submittals for all products and materials furnished under this Section.
3. Components shall be suitable for the specified service conditions and be integrated into overall assembly by aluminum grating manufacturer.
4. Provide only one type of aluminum grating exclusively throughout the Project.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
 - a. Fabrication and erection of all Work. Include plans, elevations, and details of sections and connections. Show anchorage and accessory items.
 - b. Setting drawings and templates for location and installation of anchorage devices.
2. Product Data: Manufacturer's specifications, load tables, dimension diagrams, anchor details and installation instructions.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Shipping, Handling and Unloading:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices to be embedded in cast-in-place concrete in ample time to prevent delaying the Work.

B. Storage and Protection:

1. Protect materials from corrosion and deterioration.
2. Do not store materials in contact with concrete or other materials that might cause corrosion, staining, scratching, or damage materials or finish.

PART 2 PRODUCTS

2.1 SYSTEM PERFORMANCE

A. Aluminum Grating: Provide aluminum grating complying with the following:

1. Grating Design Loads: Uniform live load shall be as shown or indicated in the Contract Documents. Where live load is not shown or indicated, uniform live and concentrated loads shall be as indicated in the table below, whichever results in the greater design stresses.

Live Load	Concentrated Load
100 psf	500 lbs. per foot of grating width at center of span

2. Maximum Clear Span Deflection for Uniform Live Loads: 1/120 of span, but not more than 1/4-inch.
3. Maximum Fiber Stress: 12,000 psi.
4. Do not install aluminum grating in areas subject to vehicular traffic.
5. Minimum Size of Members:
 - a. Minimum size of bearing bars shall be within standard mill tolerance as indicated in load tables in NAAMM MBG 531 for applicable loading and deflection requirements.
 - b. Minimum dimensions of cross bars shall be as indicated in tables of Minimum Standard Cross Bars and Connecting Bars in NAAMM MBG 531.

6. Banding bar shall be 1/4-inch thick minimum. Top of banding bar shall be flush with top of grating, unless otherwise shown or indicated. Banding bar shall be 1/4-inch shorter than the bearing bar height.
 7. Comply with requirements of AA Aluminum Design Manual.
- B. Stair Treads: Provide stair treads complying with the following:
1. Stair Tread Design Loads: Concentrated live load shall be:
 - a. 300 pounds on front-most five inches of tread at center of tread of span up to 5.5 feet.
 - b. 300 pounds on front-most five inches of tread at the one-third points of tread of span greater than 5.5 feet.
 2. Maximum Clear Span Deflection for Concentrated Live Loads: 1/240 of span, but not more than 1/4-inch.
 3. Maximum Fiber Stress: 12,000 psi.
 4. Minimum Size of Members:
 - a. Minimum size of bearing bars shall be within standard mill tolerance as indicated in load tables in NAAMM MBG 531 for applicable loading and deflection requirements.
 - b. Minimum dimensions of cross bars shall be as indicated in tables of Minimum Standard Cross Bars and Connecting Bars in NAAMM MBG 531.
 5. Carrier plate shall be 1/4-inch thick minimum. Top of carrier plate shall be flush with top of tread, unless otherwise shown or indicated. Provide carrier plate with hole and slot for attachment to stringer.
 6. Comply with requirements of AA Aluminum Design Manual.

2.2 MANUFACTURERS

- A. Grating, Products and Manufacturers: Provide one of the following:
1. Swage-Locked I-Bar Grating, by IKG Industries.
 2. Swage-Locked I-Bar Grating, by AMICO.
 3. Fisholow I-Bar Grating, by Nucor.
 4. Or equal.
- B. Stair Treads, Products and Manufacturers: Provide one of the following:
1. I-Bar Treads, by IKG Industries.
 2. I-Bar Treads, by AMICO.
 3. Fisholow treads, by Nucor.
 4. Or equal.

2.3 MATERIALS

- A. Bearing Bars: Aluminum alloy 6061 T6 or alloy 6063 T6, complying with ASTM B221.
- B. Cross Bars or Bent Connecting Bars: Aluminum alloy 6061-T6 or alloy 6063-T6, complying with either ASTM B221 or ASTM B210.
- C. Frames: Aluminum alloy 6061-T6 or alloy 6063-T6, complying with ASTM B221.
- D. Stud anchors welded to steel supports and other fasteners shall be Type 316 stainless steel.

2.4 FABRICATION

- A. Use materials of minimum depth and thickness specified and required to comply with performance criteria in the Contract Documents.
- B. Provide grating as follows:
 - 1. Grating Type: Aluminum I-bar with swage-locked cross bars at right angles to bearing bars.
 - 2. Depth: One-inch minimum.
 - 3. Bearing Bars: Aluminum I-bar minimum of one-inch spaced at 1-3/16-inch on centers.
 - 4. Cross-Bars: Swage-locked to bearing bars at maximum spacing of four inches on centers.
 - 5. Surface: Grooved.
 - 6. Finish: Mill.
- C. Provide stair treads as follows:
 - 1. Tread Type: Aluminum I-bar with swage-locked cross bars at right angles to bearing bars.
 - 2. Depth: One-inch minimum.
 - 3. Bearing Bars: Aluminum I-bar minimum one-inch spaced at 1-3/16-inch on centers.
 - 4. Cross Bars: Swage-locked to bearing bars at maximum spacing of four inches on centers.
 - 5. Surface: Grooved.
 - 6. Nosing: Cast aluminum abrasive nosing.
 - 7. Finish: Mill.
- D. Provide cutouts in grating for passage of piping, electrical conduit, valve stems, columns, ducts, and similar work. Where more than two bearing bars are included in a cut out, provide banding bars of same dimensions as bearing bars around opening welded to grating component parts.
- E. Gratings shall be accurately fabricated, free from warps, twists, and other defects that would affect grating appearance and grating serviceability.
- F. Welding shall conform to requirements of NAAMM MBG 533. Welds shall be ground smooth at top surfaces and bearing surfaces.
- G. Openings in and edges of gratings sections shall be banded with banding bars. Weld bands to intersecting members.
- H. Size each section of grating to weigh not more than 100 pounds, unless otherwise indicated in the Contract Documents.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine conditions under which Work is to be performed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with installation until unsatisfactory conditions are corrected.
- B. Check all dimensions at the Site after piping and equipment are in place and determine exact locations of openings and cutouts.

3.2 INSTALLATION

A. Fastening to In-Place Construction:

1. Use anchorage devices and fasteners to secure aluminum grating to supporting members or prepared openings, as recommended by manufacturer.
2. Weld Type 316 stainless steel stud bolts to receive saddle clip or flange block anchors to supporting steel members. Drill for machine bolts when supports are aluminum.

B. Cutting, Fitting, and Placing:

1. Perform cutting, drilling and fitting required for installation. Set the Work accurately in location, alignment and elevation, plumb, level, true, and free of rack. Do not use wedges or shimming devices.
2. Where gratings are penetrated by piping, electrical conduit, ducts, structural members, or similar protrusions, cut openings neatly and accurately to size and attach banding bar as specified.
3. Divide panels into sections only to extent required for installation where aluminum grating is to be installed around previously installed piping, electrical conduit, ducts, structural members, or similar protrusions.

C. Aluminum gratings in concrete floors shall be removable and arranged in sizes to be readily lifted. Provide aluminum gratings in concrete with aluminum angle frames with mitered corners and welded joints. Grind exposed joints smooth. Frames shall have welded anchors set into concrete. Angle size shall match grating depth selected for flush fit.

D. Clearance at ends or between sections of grating shall be a maximum of 1/4-inch.

E. Tops of aluminum gratings shall be set flush with surrounding construction.

F. Aluminum gratings shall be set with full and uniform end bearing on frames to preclude rocking movement; do not use wedges or similar shimming devices.

G. Protection of Aluminum from Dissimilar Materials: Coat aluminum surfaces in contact with dissimilar materials such as concrete, masonry, steel, or other metals..

END OF SECTION 055305

DIVISION 07 – THERMAL AND MOISTURE PROTECTION
SECTION 078400 – FIRESTOPPING
DPMC No. A1346-00

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Provide firestop systems consisting of a material, or combination of materials installed to retain the integrity of fire resistance rated construction by maintaining an effective barrier against the spread of flame, smoke and/or hot gases through penetrations, fire resistive joints, and perimeter openings in accordance with the requirements of the Building Code for this project.
- B. Firestop systems shall be used in locations including, but not limited to, the following:
1. Penetrations through fire resistance rated floor and roof assemblies including both empty openings and openings containing penetrants.
 2. Penetrations through fire resistance rated wall assemblies including both empty openings and openings containing penetrants.
 3. Membrane penetrations in fire resistance rated wall assemblies where items penetrate one side of the barrier.
 4. Joints between fire resistance rated assemblies.
 5. Perimeter gaps between rated floors/roofs and an exterior wall assembly.
- C. Related Sections include, but are not limited to, the following:
1. Division 26 – Electrical

1.3 REFERENCES

- A. New Jersey Uniform Fire Prevention and Building Code
- B. National Fire Protection Association (NFPA)
1. NFPA 101 (Life Safety Code)
- C. American Society For Testing and Materials Standards (ASTM):
1. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials.
 2. ASTM E814: Standard Test Method for Fire Tests of Through-Penetration Firestops.
 3. ASTM E1966: Test Method for Resistance of Building Joint Systems.
 4. ASTM E1399: Test Method for Cyclic Movement and Measuring Minimum and Maximum Joint Width.
 5. ASTM E119: Methods of Fire Tests of Building Construction and Materials.
 6. ASTM E2174: Standard Practice for On-Site Inspection of Installed Fire Stops
 7. ASTM E2307: Standard Test Method for Determining the Fire Endurance of Perimeter Fire Barrier Systems Using the Intermediate-Scale, Multi Story Test Apparatus (ISMA)

8. ASTM E2393-04 Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers
- D. Underwriters Laboratories Inc. (UL):
1. UL Qualified Firestop Contractor Program.
 2. UL 263: Fire Tests of Building Construction and Materials.
 3. UL 723: Surface Burning Characteristics of Building Materials.
 4. UL 1479: Fire Tests of Through-Penetration Fire Stops.
 5. UL 2079: Tests for Fire Resistance of Building Joint Systems.
- E. UL Fire Resistance Directory -Volume 2:
1. Through-Penetration Firestop Devices (XHJI)
 2. Fire Resistive Ratings (BXUV)
 3. Through-Penetration Firestop Systems (XHEZ)
 4. Fill, Void, or Cavity Material (XHHW)
- F. Omega Point Laboratories (OPL)
1. Building Products, Materials & Assemblies – Volume II
- G. Factory Mutual Research (FM):
1. FM 4991: FM Approval Standard of Firestop Contractors – Class 4991

1.4 DEFINITIONS

- A. **Firestopping:** The use of a material or combination of materials in a fire-rated structure (wall or floor) where it has been breached, so as to restore the integrity of the fire rating on that wall or floor.
- B. **System:** The use of a specific firestop material or combination of materials in conjunction with a specific wall or floor construction type and a specific penetrant(s).
- C. **Barrier:** Any bearing or non-bearing wall or floor that has an hourly fire and smoke rating.
- D. **Through-penetration:** Any penetration of a fire-rated wall or floor that completely breaches the barrier.
- E. **Membrane-penetration:** Any penetration in a fire-rated wall or floor/roof-ceiling assembly that breaches only one side of the barrier.
- F. **Fire Resistive/Construction Joint:** Any gap, joint, or opening, whether static or dynamic, between two fire rated barriers including where the top of a wall meets a floor; wall edge to wall edge applications; floor edge to floor edge configurations; floor edge to wall.
- G. **Perimeter Barrier:** Any gap, joint, or opening, whether static or dynamic, between a fire rated floor assembly and an exterior wall assembly.
- H. **Approved Testing Agencies:** Not limited to: Underwriters Laboratory (UL), Factory Mutual (FM), Warnock Hersey, and Omega Point Laboratory (OPL).

1.5 PERFORMANCE REQUIREMENTS

- A. Penetrations: Provide through-penetration and membrane-penetration firestop systems that are produced and installed to resist the spread of fire, passage of smoke and other hot gases according to requirements indicated, to restore the original fire-resistance rating of assembly penetrated.
1. Provide and install complete penetration firestopping systems that have been tested and approved by nationally accepted testing agencies per ASTM E814 or UL 1479 fire tests in a configuration that is representative of field conditions.
 2. F-Rated Systems: Provide firestop systems with F-ratings indicated, as determined per ASTM E814 or UL 1479, but not less than one (1) hour or the fire resistance rating of the assembly being penetrated.
 3. T-Rated Systems: Provide firestop systems with T-ratings indicated, as well as F-ratings, as determined per ASTM E814 or UL 1479, where required by the Building Code.
 4. L- Rated Systems: Provide firestop systems with L- ratings less than 5cfm/sf.
 5. W-Rated systems: Provide firestop systems that are resistant to water. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 6. For penetrations involving non-metallic, CPVC, PVC, or plastic piping, tubing or conduit, provide firestop systems that are chemically compatible in accordance with Manufacturer requirements.
 7. For penetrations involving insulated piping, provide firestop systems not requiring removal of insulation.
 8. For penetrations involving fire or fire/smoke dampers, only firestop products approved by the damper manufacturer shall be installed in accordance with the damper installation instructions.
- B. Fire Resistive Joints: Provide joint systems with fire resistance assembly ratings indicated, as determined by UL 2079 (ASTM E1399 and E1966), but not less than the fire resistance assembly rating of the construction in which the joint occurs. Firestopping assemblies must be capable of withstanding anticipated movements for the installed field conditions.
1. For firestopping assemblies exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.
 2. For floor penetrations exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means, as specified by the Architect/Engineer.
 3. L- Rated Systems: Provide firestop systems with L- ratings less than 5cfm/sf.
- C. Firestopping products shall have flame spread ratings less than 25 and smoke-developed ratings less than 450, as determined per ASTM E 84. Note: Firestop products installed in plenum spaces shall have a smoke developed rating less than 50.
- D. Engineering Judgment (EJ): Where there is no specific third party tested and classified firestop system available for an installed condition, the Contractor shall obtain from the firestopping material manufacturer an Engineering Judgment (EJ) to be submitted to the Approving Authority, Design Professional and Authority Having Jurisdiction for approval prior to installation. The EJ shall follow International Firestop Council (IFC) guidelines.

1.6 SUBMITTALS

- A. Product Data: For each type of firestopping product selected. Manufacturers certification must verify that firestopping materials are free of asbestos, lead and contain volatile organic compounds (VOCs) within limits of the local jurisdiction.

- B. Design Listings: Submit system design listings, including illustrations, from a qualified testing and inspecting agency that is applicable to each firestop configuration.
- C. Installation Instructions: Submit the manufacturer's installation instruction for each firestop assembly.
- D. Where there is no specific third party tested and classified firestop system available for a particular configuration, the Contractor shall obtain from the firestopping material manufacturer an Engineering Judgment (EJ) for submittal.
- E. Material Safety Data Sheet (MSDS): Submit for each type of firestopping product selected.
- F. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Submit documents as per 1.7.
- G. A quality control manual approved by FM or UL (if applicable).
- H. Firestop Schedule: Submit schedule (see appendix A) itemizing the following:
 - 1. Manufacturer's product reference numbers and/or drawing numbers.
 - 2. Listing agency's design number.
 - 3. Penetrating Item Description/Limits: Material, size, insulated or uninsulated, and combustibility.
 - 4. Maximum allowable annular space or maximum size opening.
 - 5. Wall type construction.
 - 6. Floor type construction.
 - 7. Hourly Fire resistance rating of wall or floor.
 - 8. F rating.
 - 9. T, L, and W rating, if applicable.
- I. Firestop Application Log: A separate binder shall be prepared and kept on site for use by the Inspection Agency and the Authority Having Jurisdiction. The binder shall contain the following:
 - 1. The binder shall be a three (3) ring binder.
 - 2. Firestop Schedule (see appendix A)
 - 3. All approved firestopping assemblies including engineering judgments shall be provided and organized by trade.
 - 4. Copy of manufacturer's installation instruction for each firestop assembly.
 - 5. A matrix or table of contents listing each assembly shall be provided.
 - 6. The binder shall be updated as new firestop assemblies or EJ's are added.
 - 7. The binder shall be kept on-site at a location approved by the Owner.
 - 8. Qualifications or Certification of Installer

1.7 QUALITY ASSURANCE

- A. Provide firestopping system design listings from UL, FM, Warnock Hersey or OPL in accordance with the appropriate ASTM Standard(s) per article 1.5.
- B. Contractor Qualifications: An acceptable Firestop Contractor shall be:
 - 1. Licensed by State or Local Authority where applicable, or
 - 2. FM Research approved in accordance with FM Standard 4991, or
 - 3. UL Qualified Firestop Contractor, or
 - 4. Meet the following requirements
 - a. Installation personnel shall be trained by the approved firestop manufacturer.

- b. The installation firm shall be experienced in installing firestop systems and fire resistive joint systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance.
 - c. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified tested and listed system requirements.
 - d. Minimum of three (3) years experience and shown to have successfully completed not less than 5 comparable scale projects and provide references.
- C. Single Source Limitations: Obtain firestop systems for all conditions from a single manufacturer.
- D. Materials from different firestop manufacturers shall not be installed in the same firestop system or opening.
- E. Firestopping material shall be asbestos and lead free and shall not incorporate nor require the use of hazardous solvents.
- F. Firestopping sealants must be flexible, allowing for normal movement.
- G. Firestopping materials shall not shrink upon drying as evidenced by cracking or pulling back from contact surfaces such that a void is created.
- H. Firestopping materials shall be moisture resistant, and may not dissolve in water after curing.
- I. Materials used shall be in accordance with the manufacturer's written installation instructions.
- J. Identify installed firestop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of edge of the firestop systems so that labels will be visible to anyone seeking to remove penetrating items or firestop systems. Use mechanical fasteners for metal labels. For plastic labels, use self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and provide a label material that will result in partial destruction of label if removal is attempted. Include the following information on labels:
- 1. The words "Warning - Firestop System - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Firestop system designation of applicable testing and listing agency.
 - 4. Date of installation.
 - 5. Firestop system manufacturer's name.
 - 6. Installer's name.
 - 7. Inspector's name (if applicable)
- K. Inspection of penetrations through fire rated floor and wall assemblies shall be in accordance with ASTM E2174, Standard Practice for On-Site Inspection of Installed Fire Stops and ASTM E2393-04 Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers. The Owner may engage a qualified, independent inspection agency, or material testing agency to perform these inspections
- L. Field Mock-up Installations: Prior to installing firestopping, erect mock-up installations for each type firestop system indicated in the Firestop Schedule to verify selections made and to establish standard of quality and performance by which the firestopping work will be judged by the Owner or Owner's Representative. Obtain acceptance of mock-up installations by the Owner or Owner's Representative before start of firestopping installation. Provide at least 72 hours notice to Owner or Owner's Representative prior to inspection.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver firestopping products to Project site in original, unopened containers or packages with intact and legible manufacturer's labels identifying product and manufacturer, date of manufacture/expiration, lot number, listing agency's classification marking, and mixing instructions for multi-component materials.
- B. Store and handle materials per manufacturer's instructions to prevent deterioration or damage due to moisture, temperature changes, contaminants, or other causes.
- C. All firestop materials shall be installed prior to expiration date.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Install firestopping when ambient or substrate temperatures are within limits permitted by the manufacturer's written instructions. Do not install firestopping when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate per the manufacturers written instructions on the product's Material Safety Data Sheet.
- C. Verify the condition of the substrates before starting work.
- D. Care should be taken to ensure that firestopping materials are installed so as not to contaminate adjacent surfaces.

1.10 COORDINATION

- A. Coordinate areas prior to firestopping installation with the Owner, Construction Manager and/or all other Contractors.
- B. Coordinate construction of openings and penetrating items to ensure that firestopping assemblies are installed according to specified requirements. Opening shall not exceed maximum restrictions allowable for annular spacing per listing or acceptable Engineering Judgments.
- C. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- D. Do not conceal firestopping installations until the Owner's inspection agency or Authorities Having Jurisdiction have examined each installation.
- E. Schedule firestopping after installation of penetrants and joints but prior to concealing or obstructing access to areas requiring firestopping.
- F. Preinstallation Conference: This conference should be a joint meeting attended by the Owner's Representative and all prime contractors, respective firestopping sub-contractors and firestopping company field advisor to review project requirements. The agenda for the conference should include the following topics:
 - 1. Review scope of work.
 - 2. Review shop drawings and firestop application log.
 - 3. Review mock-up requirements.
 - 4. Discuss identification labels and locations.
 - 5. Review schedule, coordination and sequencing with all trades.
 - 6. Review any engineering judgments or other special requirements.

7. Function and frequency of inspections and testing labs.
8. Destructive testing shall be performed at mock up and at pre determined intervals according to ASTM E 2174 and ASTM E 2393-04 by the inspector and with the installing Contractor present. Inspector to test for in place installation conformance to tested and listed system or engineering judgment details. Non conformances will result in additional destructive testing, at the cost of the installer.

PART 2 PRODUCTS

2.1 FIRESTOPPING, GENERAL

- A. Firestopping products specified in system design listings by approved testing agencies may be used providing they conform to the construction type, penetrant type, annular space requirements and fire rating involved in each separate assembly.
- B. Manufacturer of firestopping products shall have been successfully producing and supplying these products for a period of not less than three years and be able to show evidence of at least ten projects where similar products have been installed and accepted.
- C. Accessories: Provide components for each firestop system that is needed to install fill materials and to comply with “Performance Requirements” Article. Use only components specified by the firestopping manufacturer and by the approved testing agencies for the firestop systems indicated. Accessories include, but are not limited to the following items:
 1. Permanent forming/damming/backing materials, including the following:
 - a. Slag wool fiber insulation.
 - b. Foams or sealants used to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Polyethylene/polyurethane backer rod.
 - e. Rigid polystyrene board.
 2. Temporary forming materials.
 3. Substrate primers.
 4. Steel sleeves
- D. All firestopping products and systems shall be designed and installed so that the basic sealing system will allow the full restoration of the thermal and fire resistance properties of the barrier being penetrated with minimal repair if penetrants are subsequently removed.

2.2 MIXING

- A. For those products requiring mixing before application, comply with firestopping manufacturer’s written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

2.3 MANUFACTURERS

- A. Subject to compliance with the requirements, provide products by one of the following or equivalent manufacturers:
 1. Grace Construction Products.

2. Nelson Firestop Products.
3. Hilti Firestop Products.
4. A/D Fire Protection Systems Inc.
5. RectorSeal Corporation (The).
6. Specified Technologies Inc.
7. 3M; Fire Protection Products Division.
8. Tremco; Sealant/Weatherproofing Division.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Verify that all pipes, conduits, cables, and/or other items which penetrate fire-rated construction have been permanently installed prior to installation of firestops.

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing firestop systems to comply with written recommendations of firestopping manufacturer and the following requirements:
 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of firestop systems.
 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestop systems. Remove loose particles remaining from cleaning operation.
 3. Remove laitance and form-release agents from concrete.

3.3 FIRESTOP SYSTEMS INSTALLATION

- A. General: Install firestop systems to comply with “Performance Requirements” article in Part 1 and firestopping manufacturer’s written installation instructions and published drawings for products and applications indicated.
- B. Installation of firestopping shall be performed by an applicator/installer qualified as described in article 1.7.
- C. Apply firestopping in accordance with approved testing agencies listed system designs or manufacturer’s EJ per the manufacturer’s installation instructions.
- D. Verify that environmental conditions are safe and suitable for installation of firestop products.
- E. Install forming/damming/backing materials and other accessories required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire resistance ratings required.
- F. Install joint forming/damming materials and other accessories required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths of installed

firestopping material relative to joint widths that allow optimum movement capability and achieve fire resistance ratings required.

- G. Install metal framing, curtain wall insulation, mechanical attachments, safing materials and firestop materials as applicable within the system design.
- H. Install fill materials for firestop systems by proven techniques to produce the following results:
 - 1. Fill voids, joints and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - 2. Apply materials so they fully contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.
 - 4. Tool non-sag firestop materials after their application and prior to the time skinning begins. Use tooling agents approved by the firestopping manufacturer.
- I. On vertical pipe penetrations, lift riser clamps to permit the installation of firestopping around the entire pipe penetration. For penetrations involving fire or fire/smoke dampers, only firestop products approved by the damper manufacturer shall be installed in accordance with the damper installation instructions.

3.4 FIELD QUALITY CONTROL

- A. Inspecting Agency: Authorities Having Jurisdiction, the Owner, or Owner's Representative shall be allowed to perform random destructive testing during inspection of firestop systems to verify compliance per listings or manufacturer's installation instructions. All areas of work must be accessible until inspection by the applicable Authorities Having Jurisdiction and inspection agencies. The contractor shall be responsible to repair all tested assemblies with no cost to the owner.
- B. Proceed with enclosing firestop systems with other construction only after inspections are complete.
- C. Where deficiencies are found, repair or replace firestop systems so they comply with requirements.

3.5 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings, as Work progresses by methods and with cleaning materials that are approved in writing by firestopping manufacturer(s) and that do not damage materials in which openings occur. Leave finished work in neat, clean condition with no evidence of spillovers or damage to adjacent surfaces.
- B. Provide final protection and maintain conditions during and after installation that ensure firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestop systems immediately and install new materials to produce firestop systems complying with specified requirements.

END OF SECTION 078400

DIVISION 09 – FINISHES
SECTION 099000 - PAINTING
DPMC No. A1346-00

PART 1 GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, tools, equipment, and incidentals as shown, specified, and required to furnish and apply paint systems.
 - a. CONTRACTOR is responsible for surface preparation and painting of all new and existing interior and exterior items and surfaces throughout the Project areas included under this and other Sections.
2. Extent of painting includes the Work specified below. Painting shown in schedules may not provide CONTRACTOR with complete indication of all painting Work. Refer to Article 2.2 of this Section where all surfaces of generic types specified are specified for preparation and painting according to their status, intended function, and location, using the painting system for that surface, function, and location as specified, unless specifically identified on the Drawings as a surface not to receive specified painting system.
 - a. All new and specifically identified existing surfaces and items except where the natural finish of the material is specified as a corrosion-resistant material not requiring paint; or is specifically indicated in the Contract Documents as a surface not to be painted. Where items or surfaces are not specifically mentioned, paint them the same as adjacent similar materials or areas.
 - b. Mechanical and process items to be painted include:
 - 1) Piping, pipe insulation, pipe hangers, and supports, including electrical conduit.
 - 2) Heat exchangers.
 - 3) Tanks.
 - 4) Ductwork and insulation.
 - 5) Motors, mechanical equipment, and supports.
 - 6) Accessory items.
 - c. Surface preparation and painting of all new and specifically identified existing items, both interior and exterior, and other surfaces, including items furnished by OWNER, are included in the Work, except as otherwise shown or specified.
 - d. Removal of all substances, top coats, primers and all intermediate coats of paint and other protective or decorative coatings on those items and surfaces to remain that are identified to receive a painting system under this Section, to provide surfaces acceptable for application of painting specified.
 - e. Approved stepped-down mock-ups for all painting systems showing all components of the surface preparation and paint system application before start of Work. Check all dry film thicknesses; demonstrate methods of surface preparation, and methods of application, and obtain ENGINEER's approval of colors and textures to be used in the Work.

B. Coordination:

1. Review installation, removal, and demolition procedures under other Sections and coordinate them with the Work specified in this Section.
2. Notify other contractors in advance of the surface preparation and painting Work included in this Section to provide them sufficient time for installation, removal, demolition and coordination of interrelated items that are included in their contracts and that must be installed, removed or demolished in coordination with the painting Work.

3. Coordinate painting of areas that will become inaccessible once equipment, laboratory furniture, lockers and similar fixed items have been installed.
 4. Coordinate primers with finish paint materials to provide primers that are compatible with finish paint materials. Review other Sections and other contracts where primed surfaces are provided, to ensure compatibility of total painting system for each surface. CONTRACTOR is responsible for coordinating compatibility of all shop primed and field painted items in other Sections and in general contract and other contracts.
 5. Furnish information to ENGINEER on characteristics of finish materials proposed for use and ensure compatibility with prime coats used. Provide barrier coats over incompatible primers or remove and repaint as required. Notify ENGINEER in writing of anticipated problems using specified painting systems with surfaces primed by others. Reprime equipment primed in factory and other factory-primed items that are damaged or scratched.
- C. Related Sections:
1. Section 036000, Grout.
- D. Work Not Included: The following Work is not included as painting Work, or are included under other Sections or in other contracts:
1. Shop Priming: Shop priming of structural metal, miscellaneous metal fabrications, other metal items and fabricated components such as shop-fabricated or factory-painted process equipment, plumbing equipment, heating and ventilating equipment, electrical equipment, and accessories shall conform to applicable requirements of this Section but are included under other Sections or in other contracts.
 2. Pre-finished Items:
 - a. Items furnished with such finishes as baked-on enamel, porcelain, and polyvinylidene fluoride shall only be touched up at Site by CONTRACTOR using manufacturer's recommended compatible field-applied touchup paint.
 - b. Items furnished with finishes such as chrome plating or anodizing.
 3. Concealed Surfaces: Non-metallic wall or ceiling surfaces in areas not exposed to view, and generally inaccessible areas, such as furred spaces, pipe chases, duct shafts, and elevator shafts.
 4. Concrete surfaces below elevation (--1--), unless otherwise shown or specified.
 5. Concrete floors, unless specifically shown as a surface to be painted.
 6. Face brick, glazed structural tile, and prefaced, ground-faced or split-faced concrete unit masonry.
 7. Exterior face of architectural precast concrete.
 8. Collector bearings, shafts and chains, wood flights, wood stop logs, and wood or fiberglass baffles.
 9. Corrosion-Resistant Metal Surfaces: Where the natural oxide of item forms a barrier to corrosion, whether factory- or Site-formed, including such materials as copper, bronze, muntz metal, terne metal, and stainless steel.
 10. Operating Parts and Labels:
 - a. Do not paint moving parts of operating units, mechanical and electrical parts such as valve and damper operators, linkages, sensing devices, interior of motors, and fan shafts.
 - b. Do not paint over labels required by governing authorities having jurisdiction at Site, or equipment identification, performance rating, nameplates, and nomenclature plates.
 - c. Cover moving parts and labels during the painting with protective masking. Remove all protective masking upon completion of Work. Remove all paint, coatings, and splatter that comes in contact with such labels.
 11. Structural and miscellaneous metals covered with concrete need not receive primers, intermediate, or finish coats of paint.
 12. Existing structures, equipment, and other existing surfaces and items unless otherwise shown or specified.

E. Description of Colors and Finishes:

1. Color Selection:
 - a. A maximum of 10 different colors will be selected by ENGINEER in addition to color coding of pipelines, valves, equipment, ducts, and electrical conduit.
 - b. ENGINEER reserves the right to select non-standard colors for paint systems specified within ability of paint manufacturer to produce such non-standard colors. Provide such colors at no additional expense to OWNER.
2. Color Coding of Pipelines, Valves, Equipment, and Ducts:
 - a. In general, color-coding of pipelines, valves, equipment and ducts shall comply with applicable standards of ANSI A13.1, ANSI Z535.1 and 40 CFR 1910.144. Provide color-coding for pipelines per Table 09900-B, Pipeline Color Table.
 - b. For equipment on roofs or exposed to view, such as on exterior building facades and in offices and lobbies, color shall be selected by ENGINEER.
3. Color Coding of Pipelines and Equipment:
 - a. Finish coats of paint for pipelines and equipment shall be coded in basic colors. Colors shall be brilliant, distinctive shades matching the following safety and pipeline colors per ANSI Z535.1, Recommended Standards for Water Works; Recommended Standards for Wastewater Facilities, color specifications for safety colors and other primary colors:

**TABLE 09900-A
TABLE OF STANDARD COLORS**

<u>Color</u>	<u>Designation*</u>
Aqua	Aqua Sky; 10GN
Black	Black; 35GR
Blue	True/Safety Blue; 11SF
Brown	Terra Cotta; 07RD
Charcoal	Deep Space; GR34
Dark Blue	Old Glory Blue; 78BL
Dark Brown	Medium Bronze; 85BR
Dark Gray	Blackthorn; GR31
Gray	Gray-ANSI 61; 33GR
Green	Spearmint/Safety Green; 09SF
Light Blue	Fontainebleau; 25BL
Light Brown	Twine; 68BR
Light Gray	Light Gray; 32GR
Light Green	Misty Jade; GB38
Olive	Clover; 110GN
Orange	Tangerine/Safety Orange; 04SF
Red	Candy Apple/Safety Red; 06SF
White	White; 11WH
Yellow	Lemon/Safety Yellow; 02SF

*Color designations are provided per Tnemec Company, Inc. paint color numbers and are provided as a standard of quality; equivalent colors matching these colors are acceptable. Provide with Shop Drawing submittal direct color comparisons of color numbers available from manufacturer submitted.

- b. General Color Code: Unless otherwise specified, use the following color code:

TABLE 09900-b
PIPELINE COLOR TABLE

<u>Color</u>	<u>Designation*</u>
<u>WATER</u>	
Air Conditioning Water	Blue
Backwash Water	Light Brown
Bearing Cooling Water	Blue
Building Heating Water	Blue/Red Bands
Chilled Water Return	Blue
Chilled Water Supply	Blue
Circulating Water	Blue
City Water	Blue
Clarified Water	Aqua
Cold Water	Blue
Condenser Water	Blue
Cooling Water	Blue
Dangerously Hot Water	Charcoal
Deionized Water	Blue
Digester Heating Water	Blue/Red Bands
Dilution Water	Blue
Distilled Water	Light Blue
Domestic Hot Water	Blue/Red Bands
Drinking Water	Light Blue
Effluent Water	Light Blue
Engine Jacket Water	Blue
Engine Cooling Water	Blue
Filtered Water	Dark Blue
Finished Water	Dark Blue
Fire Water	Red
Flushing Water	Blue
High Pressure Water	Blue
Hot Water Return	Blue/Red Bands
Hot Water Supply	Blue/Red Bands
Hydraulic Control Water	Blue
Ice Water	Blue
Make-Up Water	Blue
Non-Potable Water	Blue/Black Bands
Plant Water	Gray
Potable Water	Dark Blue
Pump Flushing Water	Gray
Raw Water	Olive and Green
Return Chilled Water Supply	Blue
River Water	Gray
Seal Water	Blue
Settled Water	Aqua
Sludge Heating Water	Blue/Red
Spray Water	Gray
Sprinkler Water	Red
Standpipe Water	Red
Treated Water	Blue
Unsafe Water	Red

Waste Water	Gray
Well Water	Blue
<u>STEAM</u>	
Exhaust Steam	Yellow
High Pressure Steam	Yellow
Low Pressure Steam	Yellow
Medium Pressure Steam	Yellow
<u>AIR AND GAS</u>	
Argon	Red
Acetylene	Red
Ammonia	Red
Blower Air	Green
Butane	Red
Carbon Dioxide	Red
Chlorine Gas	Yellow
City Gas	Red
Compressed Air	Dark Green
Defoamant	Red
Engine Air	Green
Exhaust Silencer Blowoff	Green
Freon	Red
Fuel Gas	Red
Furnace Stack Gas	Yellow
Helium	Red
High Pressure Air	Green
Hydrogen	Red
Inert Gas	Red
Instrument Air	Green
Intake Air	Green
Low Pressure Air	Green
Low Pressure Gas	Red
Mixed Gas	Red
Natural Gas	Red/Black Bands
Nitrogen	Red
Oxygen	Red
Ozone	Yellow/Orange Bands
Propane Gas	Red
Service Air	Green
Sludge Gas, H.P.	Red
Sludge Gas, L.P.	Red
Soot Blower Air	Green
Starting Air	Green
Vacuum	Green
Waste Gas	Red
Water Gas	Red
<u>FUELS AND LUBRICANTS</u>	
Blower Lube	White
Diesel Fuel Oil	Yellow
Engine Lube	White
Fuel Oil	Yellow

Fuel Oil Fill	Yellow
High Pressure Lube Oil	White
Hydraulic Fluid	White
Gasoline	Yellow
Grease	White
Kerosene	Yellow
Lube Oil	White
Lube Oil Fill	White
Waste Oil	White
<u>CHEMICALS</u>	
Acetone	Yellow
Acid	Yellow
Alum	Orange
Ammonia	White
Carbon	Black
Carbon Slurry	Black
Caustic	Yellow/Green Bands
Caustic Soda	Yellow
Chlorine Liquified	Yellow
Chlorine Solution	Yellow
Ferric Chloride	Yellow
Fluoride	Light Blue/Red Bands
Hydrogen Peroxide	Light Green
Lime	Light Green
Lime Slurry	Light Green
Liquid Polymer "A"	Yellow
Liquid Polymer "B"	Yellow
Phosphate	Lt. Green/Red Bands
Polymer Feed	Orange/Green Bands
Polyelectrolyte Solution	Yellow
Potassium Permanganate	Violet
Soda Ash	Lt. Green/Orange Bands
Sodium Hypochlorite	Yellow
Sulfur Dioxide	Lt. Green/Yellow Bands (Water Treatment Plant)
Sulfur Dioxide	Yellow/Red Bands (Wastewater Treatment Plant)
Sulfuric Acid	Yellow/Red Bands
<u>PROCESS</u>	
Ash Conveying Air	Black
Ash Water	Black
Centrate	Gray
Clarifier Drains	Gray
Combined Sludge	Brown
Concentration Tank Drains	Brown
Concentration Tank Vent	Brown
Digested Sludge	Brown
Digester Tank Drains	Brown
Digester Tank Overflow	Brown
Disinfectant	Gray
Excess Activated Sludge	Brown

Filtrate	Gray
Frit	Black
Floor Drains	Gray
Fly Ash	Black
Gravity Thickener Overflow	Brown
Grit	Black
Modified Sludge	Brown
Mixed Liquor	Brown
Mixed Sludge	Brown
Primary Sludge	Brown
Raw Sludge	Brown/Black Bands
Recirculated Digester Sludge	Brown/Yellow Bands
Return Activated Sludge	Brown
Scavenger Waste	Brown
Scrubber Drains	Gray
Scum	Black
Settling Tank Drains	Gray
Secondary Sludge	Brown
Sewage	Dark Gray
Sewage Sampling Line	Dark Gray
Skimmings	Black
Sludge	Dark Brown
Sludge Drawoff	Brown/Orange Bands
Sludge Recirculation Discharge	Brown
Sludge Supernatant	Black
Soda Ash	Black
Storage Tank Overflow	Brown
Storage Tank Drains	Gray
Storm Drains	Gray
Sump Drains	Gray
Thermal Cond. Thickener Overflow	Black
Thickener Effluent Line	Gray
Thickened Sludge	Brown
Thickener Tank Drains	Brown
Waste Activated Sludge	Brown
Waste Backwash	Light Brown
Wet Ash	Black

VENTS

Concentration Tank Vent	Brown
Digester Tank Vent	Brown
High and Low Temperature	Yellow
Thickener Tank Vent	Brown

- c. Color of final coats shall match as closely as possible, without custom blending, color tabulated for specific pipeline service.
4. After approval by ENGINEER of colors and Shop Drawings and prior to commencing painting Work, ENGINEER will furnish color schedules for surfaces to be painted.

F. Abbreviations and Symbols:

1. Abbreviations and symbols used in painting systems are explained in Article 2.2 of this Section and provide information on generic composition of required materials, manufacturers, number of

coats and dry mil film thickness per coat (DMFTPC), and coverage for determining required number of gallons for the Work.

1.2 REFERENCES

A. Referenced Standards: Standards referenced in this Section are:

1. ANSI A13.1, Scheme for Identification of Piping Systems.
2. ANSI Z535.1, Safety Color Code.
3. ANSI/NSF Standard 60, Drinking Water Treatment Chemicals - Health Effects.
4. ANSI/NSF Standard 61, Drinking Water System Components – Health Effects.
5. ASTM D16, Terminology for Paint, Related Coatings, Materials and Applications.
6. ASTM D2200, Pictorial Surface Preparation Standards for Painting Steel Surfaces.
7. ASTM D4258, Practice for Surface Cleaning Concrete for Coating.
8. ASTM D4259, Practice for Abrading Concrete.
9. ASTM D4262, Testing Method for pH of Chemically Cleaned or Etched Concrete Surfaces.
10. ASTM D4263, Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
11. ASTM D4285, Test Method for Indicating Oil or Water in Compressed Air.
12. ASTM D4417, Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel.
13. ASTM D4541, Test Methods for Pull-Off Strength of Coatings Using Portable Adhesion-Testers.
14. ASTM E329, Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
15. AWWA C652, Disinfection of Water-Storage Facilities.
16. AWWA D102, Coating Steel Water-Storage Tanks.
17. Green Seal, Inc. Paint, (GS-11).
18. Great Lakes Upper Mississippi River Board of Public Health and Environmental Managers (GLUMRB), Recommended Standards for Water Works.
19. GLUMRB, Recommended Standards for Wastewater Facilities.
20. National Association of Piping Fabricators, NAPF 500-03, Surface Preparation Standard For Ductile Iron Pipe and Fittings in Exposed Locations Receiving Special External Coatings And/or Special Internal Linings.
21. Ozone Transport Commission, (OTC), OTC Model Rule for Architectural and Industrial Maintenance Coatings.
22. SSPC PA 2, Measurement of Dry Coating Thickness with Magnetic Gages.
23. SSPC SP 1, Solvent Cleaning.
24. SSPC SP 3, Power Tool Cleaning.
25. SSPC SP 6, Commercial Blast Cleaning.
26. SSPC SP 10, Near-White Blast Cleaning.
27. SSPC SP 11, Power Tool Cleaning To Bare Metal.
28. SSPC VIS 1, Visual Standard for Abrasive Blast Cleaned Steel.
29. SSPC VIS 2, Method of Evaluating Degree of Rusting/Painted Steel Surfaces.
30. SSPC Volume 2, Systems and Specifications.
31. U.S. Green Building Council, “LEED Reference Guide,” Version 3.0, Credit 4.2.

1.3 DEFINITIONS

A. Standard coating terms defined in ASTM D16 apply to this Section, including:

1. Paint: Pretreatment and all painting system materials, such as primer, emulsion, enamel, organic/inorganic polymer coating, stain sealer and filler, and other applied materials whether used as prime, filler, intermediate, or finish coats.
2. Exposed: All items not covered with cement plaster, concrete, or fireproofing. Items covered with these materials shall be provided with specified primer only, except where specified as a

surface not to be painted. Exposed-to-view surfaces include areas visible after permanent or built in fixtures, convactor covers, ceiling tile, covers for finned tube radiation, grilles, and similar covering products are in areas scheduled to be painted.

3. LEED Compliant: As defined by the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED), means interior field-applied coatings that shall have a maximum volatile organic compound (VOC) and chemical content as listed in Green Seal, Inc. Paints (GS-11).
4. Low VOC: All interior and exterior field-applied coatings that have maximum VOC content as listed in OTC Model Rule for Architectural and Industrial Maintenance Coatings.
5. OTC: Ozone Transport Commission, which recommends standard VOC content levels in several Northeastern and Mid-Atlantic states.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications:

1. Engage a single applicator that regularly performs installation of paint materials, with documented skill and successful experience in installing types of products required and that agrees to employ only trained, skilled tradesmen who have successful experience in installing types of products specified.
2. Submit name and qualifications to ENGINEER along with following information for at least three successful, completed projects:
 - a. Names and telephone numbers of owner and design professional responsible for project.
 - b. Approximate contract cost of paint products.
 - c. Amount of area painted.
3. Submit to ENGINEER proof of acceptability of applicator by manufacturer.

B. Testing Agency Qualifications: Provide an independent testing agency for testing specified in this Section. Testing agency shall be selected by OWNER and paid for by CONTRACTOR. When requested, submit documentation demonstrating to satisfaction of ENGINEER, that testing agency has experience and capability to satisfactorily conduct testing required without delaying the Work, in accordance with ASTM E329.

C. Source Quality Control:

1. Obtain materials from manufacturers that will provide services of a qualified manufacturer's representative at Site at commencement of painting Work, to advise on products, mock-ups, installation, and finishing techniques and, at completion of Work, to advise ENGINEER on acceptability of completed Work and during the course of the Work as may be requested by ENGINEER.
2. Certify long-term compatibility of all coatings with surfaces.
3. Do not submit products that decrease number of coats, surface preparation, or generic type and formulation of coatings specified. Products exceeding VOC limits and chemical content specified will not be approved.
4. ENGINEER may review manufacturers' recommendations concerning methods of installation and number of coats of paint for each painting system. CONTRACTOR shall prepare construction costs based on painting systems, number of coats, coverage's and installation methods specified.
5. Submit "or equal" products, when proposed, with direct comparison to products specified, including information on durability, adhesion, color and gloss retention, percent solids, VOC's grams per liter, and recoatability after curing.
6. "Or equal" manufacturers shall furnish same color selection as manufacturers specified, including intense chroma and custom pigmented colors in all painting systems.
7. Color Pigments: Provide pure, non-fading, applicable types to suit surfaces and services to be painted. Comply with:

- a. Lead and Chromate: Lead and chromate content shall not exceed amount permitted by authorities having jurisdiction.
 - b. Areas subject to hydrogen sulfide fume exposure will be identified by ENGINEER. Through CONTRACTOR, paint manufacturer shall notify ENGINEER of colors that are not suitable for long-term color retention in such areas.
 - c. Manufacturer shall identify colors that meet the requirements of authorities having jurisdiction at Site for use in locations subject to contact with potable water or water being prepared for use as potable water.
 - d. Comply with paint manufacturer's recommendations on preventing coating contact with levels of carbon dioxide and carbon monoxide that may cause yellowing during application and initial stages of curing of paint.
8. Obtain each product from one manufacturer. Multiple manufacturing sources for the same system component are unacceptable.
 9. Certify product shelf life history for each product source for materials manufactured by the same manufacturer, but purchased and stored at different locations or obtained from different sources.
 10. Constantly store materials to be used for painting Work between 60 degrees F and 90 degrees F, and per paint manufacturer's written recommendations, for not more than six months. Certify to ENGINEER that painting materials have been manufactured within six months of installation and have not, nor will be, subjected to freezing temperatures.

D. Regulatory Requirements:

1. Painting systems for surfaces in contact with potable water, or water being treated for potable use, shall not impart any taste or odor to the water or result in any organic or inorganic content in excess of the maximum allowable contaminant level established by authorities having jurisdiction at Site. Such painting systems shall be approved by the regulatory agency. Revise painting systems specified herein to provide manufacturer's regulatory agency approved painting system(s) where required.
2. Comply with VOC content limits of OTC Model Rule for Architectural and Industrial Maintenance Coatings:
 - a. Industrial Maintenance Coatings: 340 grams per liter.
 - b. Interior and Exterior Non-Flat Coatings: 250 grams per liter.
3. Comply with the following:
 - a. 29 CFR 1910.144, Safety Color Code for Marking Physical Hazards.
 - b. 40 CFR, Subpart D-2001, National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - c. Resource Conservation and Recovery Act of 1976 (RCRA).
 - d. SW-846, Toxic Characteristic Leaching Procedure (TCLP).
4. Comply with authorities having jurisdiction at Site for blast cleaning, confined space entry, and disposition of spent abrasive and debris.

E. Stepped-down Mock-ups:

1. Demonstrate installation of specified painting systems on actual wall surfaces and building components at locations selected by ENGINEER.
2. Provide 4-foot by 8-foot stepped-down sample area for each painting system. Prior to application of painting system, but after ENGINEER's approval of the components of each painting system, apply a 4-foot wide sample of each operation and application step required by this Section and specified manufacturer's written application recommendations. Show each application step as a 2-foot long section that shall remain exposed to demonstrate work performed in that step. Continue application procedures until topcoat is provided. Topcoat shall be a minimum of two feet long. When completed, finished mock-up for each paint system shall reveal each step and each coat of paint required for paint system with 2-foot wide strips revealing Work performed to prepare surface and apply each coat. Lengthen overall mock-up as required to completely

demonstrate each painting system. Use tinted shades differing from coat to coat for each component of each painting system.

3. ENGINEER may approve or disapprove each component of each painting system on an individual component basis.
4. Painting Work that does not meet standard approved on sample areas shall be removed and replaced.
5. Painting Work advanced without approved mock-ups shall stop, and mock-ups prepared for approval by ENGINEER.

F. Pre-painting Conference:

1. Prior to installing painting systems, arrange a meeting at Site with painting applicator and its foreman, paint manufacturer's technical representative, installers of other work in and around painting that must follow painting Work, ENGINEER, and other representatives directly concerned with performance of painting Work. Record discussions of conference and decisions and agreements and disagreements and furnish a copy of record to each party attending. Review foreseeable methods and procedures relating to painting Work including:
 - a. Review Project requirements including Contract Documents, approved Shop Drawings, pending and approved Change Orders, requests for information that submitted by CONTRACTOR to ENGINEER, and other pertinent documents.
 - b. Review required samples and submittals, both completed and to be completed.
 - c. Review status of surfaces including drying, surface preparations, and similar considerations.
 - d. Review availability of materials, tradesmen, equipment, and facilities required for progress, to avoid delays, and to protect Work from damage.
 - e. Review required inspection, testing, certifying, and quality control procedures.
 - f. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions. Supplemental heating sources required to for working in low-temperature conditions, shall be operating and acceptable to paint applicator and ENGINEER.
 - g. Review methods for complying with regulations of authorities having jurisdiction at Site, such as compliance with environmental protection, health, safety, fire, and similar regulations.
 - h. Review laws and procedures covering removal and disposal of blast debris.
2. Reconvene meeting at earliest opportunity if additional information must be developed to conclude the required topics of the meeting.
3. Record revisions or changes agreed upon, reasons therefore, and parties agreeing or disagreeing with them.

1.5 SUBMITTALS

A. Action Submittals:

1. Shop Drawings: Submit the following:
 - a. Copies of manufacturer's technical information and test performance data, including paint analysis, VOC and chemical component content in comparison to maximum allowed by the Contact Documents, and application instructions for each product proposed for use.
 - b. Submit proof of acceptability of proposed application techniques by paint manufacturer selected.
 - c. Copies of CONTRACTOR's proposed protection procedures in each area of the Work explaining methods of protecting adjacent surfaces from splatter, for confining application procedures in a manner that allows other work adjacent to surface preparation and painting Work to proceed safely and without interruption, and for maintaining acceptable application, curing, and environmental conditions during and after painting systems application.

- d. List each material and cross-reference to the specific painting system and application, including a list of site-specific surfaces to which painting system will be applied. Identify by manufacturer's catalog number and general classification. State number of gallons of each product being purchased for delivery to Site and square foot area calculated to be covered by each painting system specified based on theoretical loss of 20 percent. Where actual area to be covered by paint system exceeds area submitted to ENGINEER for that system, proof of additional material purchase shall be provided to ENGINEER. Calculated coverage shall be as specified for each component of each painting system specified. This requirement does not take precedence over CONTRACTOR's responsibility to provide dry film thickness required for each component of each painting system.
 - e. Identify maximum exposure times allowable for each paint system component before next coat of paint can be applied. Submit proposed methods for preparing surfaces for subsequent coats if maximum exposure times are exceeded.
 - f. Information on curing times and environmental conditions that affect curing time of each paint system component and proposed methods for accommodating variations in curing time. Identify this information for each painting system in the Work.
 - g. Specification for spray equipment with cross-reference to paint manufacturer's recommended equipment requirements.
2. Samples: Submit the following:
 - a. Copies of manufacturer's complete color charts for each coating system.
 - b. Mock-ups specified for the Site.

B. Informational Submittals:

1. Certificates: Submit the following:
 - a. Certificate from paint manufacturer stating that materials meet or exceed Contract Documents requirements.
 - b. Evidence of shelf life history for all products verifying compliance with the requirements of the Contract Documents.
 - c. CONTRACTOR shall provide notarized statement verifying that all painting systems are compatible with surfaces specified. All painting systems components shall be reviewed by an authorized technical representative of paint manufacturer for use as a compatible system. Verify that all painting systems are acceptable for exposures specified and that paint manufacturer is in agreement that selected systems are proper, compatible, and are not in conflict with paint manufacturer's recommended specifications. Show by copy of transmittal form that a copy of letter has been transmitted to paint applicator.
2. Test Reports: Submit the following:
 - a. Certified laboratory test reports for required performance and analysis testing in compliance with ASTM E329.
 - b. Adhesion testing plan and procedures.
 - c. Results of adhesion testing on existing surfaces containing paints or other coatings to be topcoated with paint systems specified. Prior to adhesion testing, submit a testing plan establishing methods, procedures and number of tests in each area where existing coatings are to remain and become substrate for painting Work. Based on results of adhesion testing, recommend methods, procedures, and painting system modifications, if necessary, for proceeding with Work.
 - d. Locations of and test methods for soil sampling before beginning Work and after Substantial Completion.
 - e. Proposed methods for testing, handling, and disposal of waste generated during Work.
 - f. Results of alkalinity and moisture content tests performed in accordance with ASTM D4262 and ASTM D4263.
 - g. Results of tests of film thickness, holidays, and imperfections.
3. Manufacturer's Instructions: Provide paint manufacturer's storage, handling, and application instructions prior to commencing painting Work at Site.

4. Manufacturer's Site Reports: Provide report of paint manufacturer's representative for each visit to Site by paint manufacturer's representative.
 5. Special Procedure Submittals: Submit the following:
 - a. Proposed protection procedures for each area of Work, explaining methods of protecting adjacent surfaces from splatter, for confining application procedures in a manner that allows other work adjacent to surface preparation and painting Work to proceed safely and without interruption.
 - b. Site-specific health and safety plan.
 - c. Procedures for maintaining acceptable application, curing and environmental conditions during and after painting systems application.
 - d. Procedures for providing adequate lighting, ventilation, and personal protection equipment relative to painting Work.
 6. Qualifications: Submit qualifications data specified in Article 1.4 of this Section for the following:
 - a. Applicator.
 - b. Testing laboratory
- C. Closeout Submittals:
1. Maintenance Manual: Upon completion of the painting Work, furnish ENGINEER five copies of detailed maintenance manual including the following information:
 - a. Complete and updated product catalog of paint manufacturer's currently available products including complete technical information on each product. Identify product names and numbers of each product used in the painting Work.
 - b. Name, address, e-mail address and telephone number of manufacturer, local distributor, applicator and technical representative.
 - c. Detailed procedures for routine maintenance and cleaning.
 - d. Detailed procedures for light repairs such as dents, scratches and staining.
 2. Statement of Application: Upon completion of the painting Work, submit a notarized statement to ENGINEER signed by CONTRACTOR and painting applicator stating that Work complies with requirements of the Contract Documents and that application methods, equipment, and environmental conditions were proper and adequate for conditions of installation and use.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Product Delivery Requirements: Deliver products to Site in original, new, and unopened packages and containers, accurately and legibly and accurately labeled with the following:
1. Container contents, including name and generic description of product.
 2. Manufacturer's stock number and date of manufacture.
 3. Manufacturer's name.
 4. Contents by volume, for major pigment and vehicle constituents.
 5. Grams per liter of volatile organic compounds.
 6. Thinning instructions, where recommended.
 7. Application instructions.
 8. Color name and number.
- B. Product Storage Requirements:
1. Store acceptable materials at Site.
 2. Store in an environmentally controlled location as recommended in paint manufacturer's written product information. Keep area clean and accessible. Prevent freezing of products.
 3. Store products that are not in actual use in tightly covered containers.
 4. Comply with health and fire regulations of authorities having jurisdiction at Site.

C. Product Handling Requirements:

1. Handle products in a manner that minimizes the potential for contamination, or incorrect product catalyzation.
2. Do not open containers or mix components until necessary preparatory work has been completed and approved by ENGINEER and painting Work will start immediately.
3. Maintain containers used in storing, mixing, and applying paint in a clean condition, free of foreign materials and residue.

1.7 SITE CONDITIONS

A. Site Facilities:

1. Supplemental heat sources, as required to maintain both ambient and surface temperatures within range recommended by paint manufacturer for paint system application, are not available at Site.
2. Provision of supplemental heat energy sources, power, equipment, and operating, maintenance and temperature monitoring personnel is responsibility of CONTRACTOR.
3. Do not use heat sources that emit carbon dioxide or carbon monoxide into areas being painted. Properly locate and vent such heat sources to exterior such that paint systems are unaffected by exhaust.

B. Existing Conditions:

1. Existing surfaces to receive painting Work shall be surface-prepared to meet requirements of painting systems specified. Prior to commencing painting Work, perform adhesion tests on existing surfaces to be painted. Perform testing per ASTM D4541 or other method acceptable to ENGINEER. Number and location of tests shall be sufficient to determine condition of existing coatings and suitability of existing coatings to remain to provide acceptable substrate for new coatings. Submit testing plan prior to testing and provide ENGINEER a copy of adhesion test results.
2. Provide abrasive blasting, scraping, or other abrading or surface film removal, or preparatory techniques accepted by ENGINEER.
3. Before commencing painting in an area, surfaces to be painted and floors shall be cleaned of dust using commercial vacuum cleaning equipment equipped with high-efficiency particulate air (HEPA) filters and dust containment systems.

C. Environmental Requirements:

1. Apply water base paints when the temperature of surfaces to be painted and ambient air temperatures are between 55 degrees F and 90 degrees F, unless otherwise permitted by paint manufacturer's published instructions.
2. Surfaces to be painted shall be at least 5 degrees F above dew point temperature and be dry to the touch. Apply paint only when temperature of surfaces to be painted, paint products, and ambient air temperatures are between 65 degrees F and 95 degrees F, unless otherwise permitted by paint manufacturer's published instructions.
3. Apply paint system within shortest possible time consistent with manufacturer's recommended curing instructions for each coat. If chemical, salt, or other contamination contacts paint film between coats, remove contamination per SSPC SP 1 and restore surface before applying paint.
4. Do not paint tanks or pipelines containing fluid without specific permission of ENGINEER and only under conditions where "sweating" of outside surface of vessel being painted is not likely to occur within 24 hours of paint application.
5. Do not apply epoxy paints if ambient temperature is expected to go below 50 degrees F within twelve hours of application. Follow manufacturer's instructions when manufacturer's published recommendations require a higher minimum ambient temperature.

6. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent. Do not apply paint to damp or wet surfaces or when surfaces will reach dew point due to falling or rising temperatures and humidity conditions during course of paint application, unless otherwise permitted by paint manufacturer's published instructions.
7. Do not paint unacceptably hot or cold surfaces until such surfaces can be maintained within temperature and dew point ranges acceptable to paint manufacturer. Arrange for surfaces to be brought within acceptable temperature and dew point ranges as part of painting Work.
8. Moisture content of surfaces shall be verified to ENGINEER as acceptable prior to commencement of painting using methods recommended by paint manufacturer.
9. Painting may be continued during inclement weather only if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer for application and drying.
10. Provide adequate illumination and ventilation where painting operations are in progress.

D. Protection:

1. Cover or otherwise protect finished work of other trades and surfaces not being painted concurrently, or not to be painted.
2. During surface preparation and painting, facility shall remain in operation. Use procedures that prevent contamination of process or cause or require facility shutdown.
3. Coordinate and schedule surface preparation and painting to avoid exposing personnel to hazards associated with painting Work. Provide required personnel safety equipment per requirements of authorities having jurisdiction at Site.
4. Submit protection procedures to be employed. Do not begin surface preparation and painting Work until ENGINEER accepts protection techniques proposed by CONTRACTOR.
5. When working with flammable materials, provide fire extinguishers and post temporary signs warning against smoking and open flame.

E. Testing:

1. Obtain and test eight soil samples from each Site, at locations within twenty feet of the tank and spaced equally around tank circumference. Four samples shall be taken and analyzed at Substantial Completion is achieved and all surface preparation and paint application operations are completed.
2. Test at a laboratory residue from sand blasting to determine whether blast residue can be landfilled as required by disposal facility.
3. Test at a laboratory sediment in tank prior to disposing of sediment to determine suitability of sediment for landfilling. Test for TCLP and RCRA characteristics. Perform additional tests as required by disposal facility.
4. Perform additional testing of waste materials and existing paint required under Federal, state, or local regulations not specifically addressed in this Section.

1.8 MAINTENANCE

- A. Extra Materials: Furnish, tag, and store an additional one percent by volume of all coatings and colors installed. Provide a minimum of one gallon of each coating and color. Store in unopened containers as specified until turned over to OWNER.

PART 2 PRODUCTS**2.1 PAINTING SYSTEM MANUFACTURERS**

- A. Products and Manufacturers: Where referenced under painting systems provide products manufactured by the following:
1. Akzo Nobel (AN)
 2. PPG Ameron.(PPGA)
 3. Andek (ANK)
 4. Tnemec Company, Inc. (TCI).
 5. Benjamin Moore & Company (BMC).
 6. Zolatone. (ZOL)
 7. Duron Inc. (DI)
 8. Master Coatings Technologies (MCT).

2.2 PAINTING SYSTEMS

- A. New and Existing Cast In Place Concrete Walls (except walls within height of chemical containment wall areas), Columns, Underside of Roof Slabs and Beams, Architectural Precast Concrete; Moderate Corrosion and Abrasion- Resistant, Non Submerged, Interior:
1. Surface Preparation: Refer to Paragraphs 1.5.A.2, 3.2.A., 3.2.B.3., 3.2.B.5., 3.2.B.6., and 3.2.B.7 of this Section.
 2. Filler, Surfacer and Patching Compound:
 - a. Generic Components:
 - 1) Minimum 100 percent solids, epoxy filler; 0 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Devoe Devfil 145 (AN)*; Amercoat 114A(PPGA)*;One coat, hand troweled-in-place up to two inches deep for patching and applied 1/16-inch thick continuously over all surfaces specified to receive this painting system, 20 square feet per gallon (excluding patched areas); and provided in sufficient additional quantity to bring all surfaces to a smooth, uniform continuously coated plane, of thickness specified.
*Prepare and fill all concrete holes and cracks with grout specified in Section 03600, Grout.
 3. Primer/Intermediate:
 - a. Generic Components:
 - 1) Minimum 42 percent solids, waterborne acrylic epoxy; 240 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Devoe TruGlaze WB 4406 (AN); 98-1 AquaPon (PPGA): Two coats, 5.0 dry mils, per coat.
 4. Finish: Gloss:
 - a. Generic Components:
 - 1) Minimum 42 percent solids, waterborne acrylic or water-based epoxy; 285 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Devoe TruGlaze WB 4408 (AN); 98-1 AquaPon (PPGA): One coat, 2.0 to 3.0 dry mils.
- B. New and Existing Cast In Place Concrete Walls (except walls within the height of chemical containment wall areas), Columns, Underside of Roof Slabs and Beams, Architectural Precast Concrete; Non Submerged, Interior:
1. Surface Preparation: Refer to Paragraphs 1.5.A.2., 3.2.A., 3.2.B.3., 3.2.B.5., 3.2.B.6. and 3.2.B.7.

2. Filler, Surfacer and Patching Compound:
 - a. Generic Components:
 - 1) Minimum 100 percent solids, epoxy filler; 0 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Series Devco Devfil 145 (AN)*; Amercoat 114A(PPGA)*: One coat, hand troweled-in-place up to two inches deep for patching and applied 1/16-inch thick continuously over all surfaces specified to receive this painting system, 20 square feet per gallon (excluding patched areas); and provided in sufficient additional quantity to bring all surfaces to a smooth, uniform continuously coated plane, of thickness specified.
*Prepare and fill all concrete holes and cracks with grout specified in Section 03600, Grout.
 3. Primer/Intermediate:
 - a. Generic Components:
 - 1) Minimum 80 percent volume solids, low-odor, high-build, two-component polyamine or polyamido-amine catalyzed-epoxy primer; 28 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Devco BAR Rust 233H (AN); Amercoat 133 (PPGA):
 - a) Horizontal Surfaces: One coat, 6.0 to 12.0 dry mils.
 - b) Vertical Surfaces: One coat, 4.0 to 6.0 dry mils.
 4. Finish: Gloss:
 - a. Generic Components:
 - 1) Minimum 80 percent volume solids, high-build, chemical-resistant, high-gloss, modified, polyamine or polyamido-amine catalyzed- epoxy finish; 180 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Devco TruGlaze WB 4408 (AN); Amerlock 2 (PPGA):
 - a) Two coats, 3.0 to 6.0 dry mils, per coat.
 - b) Two coats, 2.0 to 4.0 dry mils, per coat.
- C. New and Existing Cast In Place Concrete Floors, Walls (Including Walls Within the Height of Chemical Containment Wall Areas, Starting 3.0 Above the Floor), Columns, Underside of Roof Slabs and Beams, Architectural Precast Concrete; In Secondary Containment Areas; Highly Corrosion and Abrasion Resistant, Non Submerged, Interior:
1. Surface Preparation: Refer to Paragraphs 1.5.A.2, 3.2.A., 3.2.B.3., 3.2.B.5., 3.2.B.6. and 3.2.B.7.
 2. Filler, Surfacer and Patching Compound:
 - a. Generic Components:
 - 1) Minimum 100 percent solids, epoxy filler, 0 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Ceilcote 80M Primer w/SI Powder (AN)*; Amercoat 114A (PPGA) *: One coat, hand troweled-in-place up to two inches deep for patching and applied 1/16-inch thick continuously over all surfaces specified to receive this painting system, 20 square feet per gallon (excluding patched areas); and provided in sufficient additional quantity to bring all surfaces to a smooth, uniform continuously coated plane, of thickness specified.
*Prepare and fill all concrete holes and cracks with grout specified in Section 03600, Grout.
 3. Primer:
 - a. Generic Components:
 - 1) Minimum 90 percent solids, fiber reinforced Novolac epoxy or two-part epoxy; 160 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Ceilcote Flakeline 662 (AN); Amercoat 253 (PPGA)**: Two coats, 15.0 to 20.0 dry mils, per coat.
**Use cloth for laminate

4. Finish: Gloss:
 - a. Generic Components:
 - 1) Minimum 100 percent solids, polyamine Novolac epoxy; 98 grams per liter, VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Ceilcote Flakeline 2000 (AN); Amercoat 253 (PPGA): One coat, 6.0 to 10.0 dry mils.
- D. New and Existing Cast In Place Concrete Walls (Except Walls Within the Height of Chemical Containment Wall Areas), Columns, Underside of Roof Slabs and Beams, Architectural Precast Concrete; LEED-compliant, Non Submerged, Interior:
1. Surface Preparation: Refer to Paragraphs 1.5.A.2., 3.2.A., 3.2.B.3., 3.2.B.5., 3.2.B.6. and 3.2.B.7.
 2. Filler, Surfacer and Patching Compound:
 - a. Generic Components:
 - 1) Minimum 38 percent solids, vinyl acrylic block filler; 61 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) ICI Prep and Prime Block Filler 3010 (AN); Latex Block Filler M88 (BMC): One coat 7.0 to 14.5 dry mils.
 3. Primer:
 - a. Generic Components:
 - 1) Minimum 30 percent solids, 100 percent acrylic; 50 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Devoe Devflex 4020 PF (AN); Eco Spec Interior Latex Primer Sealer 231 (BMC): One coat, 0.8 dry mils.
 4. Finish: Semi-Gloss:
 - a. Generic Components:
 - 1) Minimum 36 percent solids, 100 percent acrylic latex, gloss; 50 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) ICI Dulux Lifemaster 2000-9200 (AN); Pristine Eco Spec Latex Enamel, 224 (BMC): Two coats, 1.4 dry mils, per coat.
- E. New and Existing Cast-In-Place Concrete Associated Within All Primary Settling Tanks and Influent Channels; Non-submerged, Intermittently Submerged and Submerged, Interior and Exterior:
1. Provide painting system components specified for all cast-in-place concrete surfaces within area of the primary clarifiers and influent channels, beginning at elevation (--1--) and extending to top of primary clarifier horizontal walkway surface, including troughs, walls, beams, columns, undersides of walkways, and other locations required.
 2. Surface Preparation: Refer to Paragraphs 1.5.A.2., 3.2.A., 3.2.B.3., 3.2.B.5., 3.2.B.6. and 3.2.B.7.
 3. Filler, Surfacer and Patching Compound:
 - a. Generic Components:
 - 1) Minimum 100 percent solids, epoxy filler; 40 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Devoe Devfil 145 (AN)*; Series 218 MortarClad and Series 219 MortarCast (TCI): Patch and fill to original surface.
*Prepare and fill all concrete holes and cracks with grout specified in Section 03600, Grout.
 4. Intermediate Filler, Surfacer and Patching Compound:
 - a. Generic Components:
 - 1) Minimum 100 percent solids, aliphatic amine or polyamine epoxy mortar; 95 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Ceilcote 505U (AN); Series 434 Perma-Shield H2S (TCI): 1/8-inch thick.

5. Finish: Gloss:
 - a. Generic Components:
 - 1) Minimum 100 percent solids, modified polyamine epoxy; 119 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Ceilcote 664 Ceilguard (AN); Series 435 Perma-Glaze (TCI): One coat, 10.0 to 15.0 dry mils.

- F. New and Existing Cast-In-Place Concrete associated with All Potable Water Tanks, Reservoirs, and Channels at Ambient Temperature and of Greater Than (--1--) Gallon Capacity; Certified by NSF International in accordance with ANSI/NSF Standard 61; Moderate VOC Content; Intermittently Submerged and Submerged, Interior and Exterior:
 1. Provide painting system components specified for all cast-in-place concrete surfaces within area of the (--1--) beginning at elevation (--2--) and extending to top of (--1--), including troughs, walls, beams, columns, undersides of walkways, and other locations required.
 2. Surface Preparation: Refer to Paragraphs 1.5.A.2., 3.2.A., 3.2.B.3., 3.2.B.5., 3.2.B.6. and 3.2.B.7.
 3. Filler, Surfacer and Patching Compound:
 - a. Generic Components:
 - 1) Minimum 100 percent solids, modified amine epoxy; 8 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) International Intergard 822 (AN)*; Amercoat 114A (PPGA)*: One coat, 1/16-inch thick.
*Prepare and fill all concrete holes and cracks with grout specified in Section 03600, Grout.
 4. Primer/Intermediate/Finish: Interior:
 - a. Generic Components:
 - 1) Minimum 67 percent solids, polyamindo-amine epoxy or cyloaliphatic amine epoxy; 290 grams per liter VOC.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) International Interseal 670HS (AN); 95-172 AquaPon (PPGA): Two coats, 5.0 to 8.0 dry mils.
 5. Primer/ Finish; Matt; Exterior:
 - a. Generic Components:
 - 1) Minimum 42 percent volume solids, flexible, high-build, single-component, modified waterborne acrylate coating or water-based acrylic-epoxy that can fill and bridge minor hairline cracks; 240 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Perma-Crete 4-50 Series (PPGA); Polaguard Fibrelastic (ANK): Two coats, 6.0 to 8.0 dry mils, per coat.

- G. New and Existing Cast-In-Place Concrete associated with all Potable Water Tanks, Reservoirs, and Channels at Ambient Temperature and of Greater Than (--1--) Gallon Capacity; Certified by NSF International in accordance with ANSI/NSF Standard 61; Low VOC Content; Intermittently Submerged and Submerged, Interior and Exterior:
 1. Provide painting system components specified for all cast-in-place concrete surfaces within area of (--1--) beginning at elevation (--2--) and extending to top of (--1--), including troughs, walls, beams, columns, undersides of walkways, and other locations shown and required.
 2. Surface Preparation: Refer to Paragraphs 1.5.A.2., 3.2.A., 3.2.B.3., 3.2.B.5., 3.2.B.6. and 3.2.B.7.
 3. Filler, Surfacer and Patching Compound:
 - a. Generic Components:
 - 1) Minimum 100 percent solids, modified amine epoxy; 8 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) International Intergard 822 (AN)*; Amercoat 114A (PPGA)*: One coat, 1/16-inch thick.

*Prepare and fill all concrete holes and cracks with grout specified in Section 03600, Grout.

4. Primer: Interior:
 - a. Generic Components:
 - 1) Minimum 44 percent volume solids, flexible, high-build, single-component, modified waterborne acrylate or water-based epoxy, 151 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) 95-172 AquaPon LT; Polaguard Fibrelastic (ANK): One coat, 6.0 to 8.0 dry mils.
 5. Finish: Semi-Gloss; Interior:
 - a. Generic Components:
 - 1) Minimum 67 percent solids, polyamidoamine epoxy; 8 grams per liter VOC.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) International Interseal 670HS (AN); 95-172 AquaPon LT (PPGA): One coat, 5.0 to 8.0 dry mils.
 6. Primer/Finish; Matt; Exterior:
 - a. Generic Components:
 - 1) Minimum 49 percent volume solids, flexible, high-build, single-component, modified waterborne acrylate or water-based epoxy, 151 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Polaguard Fibrelastic (ANK); Series 156 Enviro-Crete; (TCI): One coat, 6.0 to 8.0 dry mils.
- H. New and Existing Concrete Unit Masonry Walls; Moderate Corrosion and Abrasion Resistant, Non-submerged, Interior:
1. Surface Preparation: Refer to Paragraphs 1.5.A.2., 3.2.A., 3.2.B.1., 3.2.B.2. and 3.2.B.8.
 2. Filler, Surfacer and Patching Compound:
 - a. Generic Components:
 - 1) Minimum 68 percent volume solids, high-build, three-component, waterborne cementitious acrylic block filler; 75 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) International Intercryl 3200 (AN); 95-217 or 16-90 Block Filler (PPGA): One coat, 10 to 14 dry mils.
 3. Intermediate/Finish:
 - a. Generic Components:
 - 1) Minimum 80 percent volume solids, high-build, chemical-resistant, high-gloss, modified, polyamine or polyamido-amine catalyzed epoxy finish; 180 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Devoe TruGlaze 4508 (AN); 97-145 Pitt Guard (PPGA):
 - a) Horizontal Surfaces: Two coats, 6.0 to 12.0 dry mils, per coat.
 - b) Vertical Surfaces: Two coats, 4.0 to 8.0 dry mils, per coat.
- I. New and Existing Concrete Unit Masonry Walls: LEED-Compliant, Non-Submerged, Interior:
1. Surface Preparation: Refer to Paragraphs 1.5.A.2., 3.2.A., 3.2.B.1., 3.2.B.2. and 3.2.B.8.
 2. Primer and Filler:
 - a. Generic Components:
 - 1) Minimum 38 percent solids, vinyl acrylic block filler; 61 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Prep and ICI Prime Block Filler 3010-1200 (AN); Latex Block Filler M88 (BMC): One coat, 7.0 to 14.5 dry mils.
 3. Primer:
 - a. Generic Components:

- 1) Minimum 30 percent solids, 100 percent acrylic; 91 grams per liter VOC, maximum.
- b. Products and Manufacturers: Provide one of the following:
 - 1) Devco Devflex 4020 PF (AN); Eco Spec Interior Latex Primer Sealer 231 (BMC): One coat, 0.8 dry mils.
- 4. Finish: Semi-Gloss:
 - a. Generic Components:
 - 1) Minimum 34 percent solids, 100 percent acrylic latex, flat; 50 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) ICI Dulux Lifemaster 2000-9200 (AN); Pristine Eco Spec Latex Enamel, 224 (BMC); Harmony Low Odor Interior Latex Semi-Gloss (SWC): Two coats, 1.4 dry mils.
- J. New and Existing Exterior Cast-In-Place Concrete, Including Water Storage Tanks, Concrete Unit Masonry, and Wood, Smooth Finish; Above-Grade, Exterior:
 - 1. Surface Preparation: Refer to Paragraphs 1.5.A.2., 3.2.A., 3.2.B.1., 3.2.B.2., 3.2.B.3., 3.2.B.5., 3.2.B.6., 3.2.B.7., 3.2.B.8. and 3.2.I.
 - 2. Cast-In-Place Concrete and Unit Masonry Primer:
 - a. Generic Components:
 - 1) Minimum 49 percent volume solids, flexible, high-build, single-component, modified waterborne acrylate coating that can fill and bridge minor hairline cracks; 96 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) 16.90 AquaPon (PPGA); Polyguard Fiberlastic (ANK): One coat, 6.0 to 8.0 dry mils.
 - 3. Wood Primer:
 - a. Generic Components:
 - 1) Minimum 17 percent volume solids, two-component, waterborne polyamide epoxy or cross-linked, water-based epoxy; 170 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) International Intercryl 320 (AN); Series 151 Elasto-Grip (TCI): One coat, 0.7 to 1.5 dry mils.
 - 4. Finish: Matt:
 - a. Generic Components:
 - 1) Minimum 36 percent volume solids, flexible, high-build, single-component, modified waterborne acrylate, acrylic epoxy, or waterborne acrylic coating that can fill and bridge minor hairline cracks; 138 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Series 90-474 AquaPon (PPGA); Polyguard Fiberlastic (ANK): One coat, 6.0 to 8.0 dry mils.
- K. New and Existing Exterior Cast-In-Place Concrete, Including Water Storage Tanks, Concrete Unit Masonry and Wood; Sand Finish, Above-Grade, Exterior:
 - 1. Surface Preparation: Refer to Paragraphs 1.5.A.2., 3.2.A., 3.2.B.1., 3.2.B.2., 3.2.B.3., 3.2.B.5., 3.2.B.6., 3.2.B.7., 3.2.B.8., and 3.2.I.
 - 2. Cast-In-Place Concrete and Unit Masonry Primer:
 - a. Generic Components:
 - 1) Minimum 55.5 percent volume solids, flexible, high-build, single-component, modified waterborne, sand textured, acrylate coating that can fill and bridge minor hairline cracks and that is recommended; 45 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) PermaCrete 4-50 Series (PPGA)*; Polaguard Fibrelastic w/sand (ANK)*: One coat, 6.0 to 9.0 dry mils.

*Prepare and fill all concrete holes and cracks with grout specified in Section 03600, Grout.

3. Wood Primer:
 - a. Generic Components:
 - 1) Minimum 17 percent volume solids, two-component, waterborne polyamide epoxy or cross-linked, water-based epoxy; 170 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) International Intercryl 320 (AN); Series 151 Elasto-Grip (TCI): One coat, 0.7 to 1.5 dry mils.
 4. Finish: Sand:
 - a. Generic Components:
 - 1) Minimum 36 percent volume solids, flexible, high-build, single-component, modified waterborne, sand textured, acrylate coating that can fill and bridge minor hairline cracks and that is recommended; 54 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) PermaCrete 4-50 Series (PPGA); Polaguard Fibrelastic w/sand (ANK): One coat, 6.0 to 9.0 dry mils.
- L. New and Existing Ferrous Metals, Structural Steel (With or Without Sprayed Fireproofing), Miscellaneous Ferrous Metals, Exterior Surfaces of Valves, Exterior Surfaces of Ferrous Piping, and Exterior Surfaces of All Ferrous Metal (Both Exposed and to be Later Covered With Insulation); Non submerged, Interior:
1. Surface Preparation: Refer to Paragraphs 1.5.A.2., 3.2.A., 3.2.C.1., 3.2.C.2.
 2. Shop Primer:
 - a. Generic Components:
 - 1) Minimum 67 percent volume solids, build, two-component, cycloaliphatic amine-catalyzed epoxy or polyamido-amine epoxy coating; 250 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) International Interseal 670HS (AN); 97-946A PittGuard (PPGA): One coat, 4.0 to 6.0 dry mils.
 3. Field Primer and Touch-Up:
 - a. Generic Components:
 - 1) Minimum 100 percent volume solids, high-build, two-component, polyamide-catalyzed epoxy; 8 grams per gallon VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) International Interseal 670HS (AN); 97-946 PittGuard (PPGA): One coat, 8.0 to 12.0 dry mils.
 4. Finish: High-Gloss:
 - a. Generic Components:
 - 1) Minimum 80 percent volume solids, high-build, chemical-resistant, high-gloss, modified, polyamine- or polyamidoamine-catalyzed epoxy finish; 25 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Devor TruGlaze 4508 (AN); 97-145 PittGuard (PPGA):
 - a) Horizontal Surfaces: One coat, 6.0 to 12.0 dry mils.
 - b) Vertical Surfaces: One coat, 4.0 to 8.0 dry mils.
- M. New and Existing Ferrous Metals, Structural Steel (With or Without Sprayed Fireproofing), Miscellaneous Ferrous Metals, Exterior Surfaces of Valves, Exterior Surfaces of Ferrous Piping, and Exterior Surfaces of All Ferrous Metal (Both Exposed and to be Later Covered With Insulation); Non submerged, Interior:
1. Surface Preparation: Refer to Paragraphs 1.5.A.2., 3.2.A., 3.2.C.1., 3.2.C.2.

2. Shop Primer/Field Primer and Touch-Up:
 - a. Generic Components:
 - 1) Minimum 67 percent volume solids, build, two-component, polyamido-amine epoxy coating; 250 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) International Interseal 670HS (AN); 97-145 PittGuard (PPGA): Two coats, 4.0 to 6.0 dry mils, per coat.
 3. Finish: Gloss:
 - a. Generic Components:
 - 1) Same as specified above for this system, shop primer/field primer and touch-up.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) International Interseal 670HS (AN); 97-145 PittGuard (PPGA):
 - a) Horizontal Surfaces: Two coats, 3.0 to 6.0 dry mils, per coat.
 - b) Vertical Surfaces: Two coats, 2.0 to 4.0 dry mils, per coat.
- N. New and Existing Ferrous Metals, Structural Steel (Not Protected by Sprayed Fireproofing), Miscellaneous Ferrous Metals, Exterior Surfaces of Valves, Exterior Surfaces of Ferrous Piping and Exterior Surfaces of all Ferrous Piping (Both Exposed and to be Later Covered With Insulation); LEED-Compliant; Non submerged, Interior:
1. Surface Preparation: Refer to Paragraphs 1.5.A.2., 3.2.A., 3.2.C.1., 3.2.C.2.
 2. Shop Primer:
 - a. Generic Components:
 - 1) Minimum 40 percent volume solids, build, two-component, cycloaliphatic amine-catalyzed epoxy coating; 250 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) International Interseal 670HS (AN); 97-946 PittGuard (PPGA): One coat, 4.0 to 6.0 dry mils.
 3. Field Primer and Touch-Up:
 - a. Generic Components:
 - 1) Minimum 39 percent solids, acrylic; 110 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Devco Devflex 4020 PF (AN); 90-712 PittGuard (PPGA): One coat, 3.5 dry mils.
 4. Finish: Semi-Gloss:
 - a. Generic Components:
 - 1) Minimum 36 percent solids, 100 percent acrylic latex, gloss; 50 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) ICI Dulux Lifemaster 2000-9200 (AN); Pristine Eco Spec Latex Enamel 224 (BMC): Two coats, 1.4 dry mils, per coat.
- O. New and Existing Ferrous Metals, Non-Ferrous Metals and Exterior Surfaces of Piping; Submerged or Intermittently Submerged, including up to 4.0 above liquid surface; Interior and Exterior:
1. Surface Preparation: Refer to Paragraphs 1.5.A.2., 3.2.A., 3.2.C.1., 3.2.C.2., and 3.2.E.
 2. Factory Primer:
 - a. Generic Components:
 - 1) Minimum 67 percent solids, two-component, cycloaliphatic amine-catalyzed epoxy or polyamido-amine epoxy; 334 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) International Interseal 670HS (AN); 97-946 PittGuard (PPGA): One coat, 4.0 dry mils.
 3. Shop Prime/Touch-Up/Finish, Satin:
 - a. Generic Components:

- 1) Minimum 67 percent solids, two-component, cycloaliphatic amine- catalyzed epoxy or polyamido-amine epoxy; 334 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) International Interseal 670HS (AN); 97-946 PittGuard (PPGA): One coat, 4.0 dry mils.
- P. New and Existing Ferrous Metals, Interior Surfaces of Potable Water Storage Reservoirs at Ambient Temperatures and of Greater Than (--1--) Gallon Capacity, Galvanized Metals and Non-Ferrous Metals and Exterior Surfaces of Piping; Submerged and Intermittently Submerged, including up to 4.0 feet above liquid surface; Certified per ANSI/NSF Standard 61; Moderate VOC Content, Interior:
1. Surface Preparation: Refer to Paragraphs 1.5.A.2, 3.2.A., 3.2.C.1., 3.2.C.2., 3.2.D. and 3.2.E.
 2. Primer*/Finish** (asterisk notes provided below):
 - a. Generic Components:
 - 1) Minimum 68 percent solids, polyamidoamine epoxy or cycloaliphatic amine epoxy; 250 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) International Interseal 670HS (AN); 95-172 AquaPon LT (PPGA): Three coats, 5.0 to 8.0 dry mils, per coat.
*To comply with ANSI/NSF 61 forced-cure requirements, CONTRACTOR shall provide surface temperatures of 75 degree F for 24 hours after applying prime coat.
**To comply with ANSI/NSF 61 forced-cure requirements, CONTRACTOR shall immediately raise temperature of surface to 75 degree F for a minimum of two hours and for a maximum of four hours followed by increasing temperature of substrate to 150 degree F for 24 hours followed by 24 hours at temperature of 75 degree F after application of finish coat.
- Q. New and Existing Ferrous Metals, Interior Surfaces of Potable Water Storage Reservoirs, (--1--), at Ambient Temperatures and of Greater Than (--2--) Gallon Capacity, Galvanized Metals and Non-Ferrous Metals and Exterior Surfaces of Piping; Submerged and Intermittently Submerged, including up to 4.0 feet above liquid surface; Certified per ANSI/NSF Standard 61; Low VOC Content, Interior:
1. Surface Preparation: Refer to Paragraphs 1.5.A.2., 3.2.A., 3.2.C.1., 3.2.C.2., 3.2.D. and 3.2.E.
 2. Prime/Finish: Semi-Gloss:
 - a. Generic Components:
 - 1) Minimum 100 percent solids, modified polyamine epoxy or flake-filled epoxy; 8 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) International Interline 925 (AN); Amercoat 133 (PPGA): Two coats, 8.0 to 10.0 dry mils, per coat.
- R. New and Existing Ferrous Metals, Non Ferrous Metals, and Galvanized Metals, including Water Storage Tanks; Low VOC Content, Non Submerged, Exterior:
1. Surface Preparation: Refer to Paragraphs 1.5.A.2., 3.2.A., 3.2.C.1., 3.2.C.2., 3.2.D., 3.2.E., and 3.2.F.
 2. Ferrous Metal Primer:
 - a. Generic Components:
 - 1) Minimum 67 percent volume solids, build, two-component, cycloaliphatic amine-catalyzed epoxy coating; 250 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) International Interseal 670HS (AN); Amerlock 2 (PPGA): One coat, 4.0 to 6.0 dry mils.
 3. Ferrous Metal Touch-Up:
 - a. Generic Components:
 - 1) For Low-temperature Curing Conditions: Minimum 80 percent solids, modified polyamido-amine or polyamine epoxy; 296 grams per liter VOC, maximum.

- 2) For Warm-temperature Curing Conditions: Minimum 80 percent volume solids, modified polyamido-amine or polyamine epoxy; 296 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) For Low-temperature Curing Conditions: International Interseal 670HS w/LTC (AN); Amerlock 2 (PPGA): One coat, 10.0 dry mils.
 - 2) For Warm-temperature Curing Conditions: International Interseal 670HS (AN); Amerlock 400 (PPGA): One coat, 6.0 dry mils.
 - 4. Galvanized and Non-Ferrous Primer.
 - a. Generic Components:
 - 1) Refer to Paragraph 2.2.R.2.a.1), above.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Refer to Paragraph 2.2.R.2.b.1), above.
 - 5. Intermediate – Ferrous Metals Only:
 - a. Generic Components:
 - 1) Refer to Paragraph 2.2.R.3.a.1), above.
 - 2) Refer to Paragraph 2.2.R.3.a.1), above.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Refer to Paragraph 2.2.R.3.a.1), above.
 - 2) Refer to Paragraph 2.2.R.3.b.1), above.
 - 6. Finish: Gloss:
 - a. Generic Components:
 - 1) Minimum 49 percent volume solids, two-component, waterborne acrylic polyurethane or aliphatic acrylic polyurethane coating; 247 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) International Interthane 990HS (AN); 95-812 PittThane (PPGA): Two coats, 2.0 to 3.0 dry mils.
- S. New and Existing Ferrous Metals, Non Ferrous Metals, and Galvanized Metals, including Water Storage Tanks; Non Submerged, Exterior:
- 1. Surface Preparation: Refer to Paragraphs 1.5.A.2., 3.2.A., 3.2.C.1., 3.2.C.2., 3.2.D., 3.2.E. and 3.2.F.
 - 2. Ferrous Metal Shop Primer:
 - a. Generic Components:
 - 1) Minimum 67 percent solids, polyamidoamine epoxy; 296 grams per liter, VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) International Interseal 670HS (AN); 97-946 PittGuard (PPGA): One coat, 4.0 to 6.0 dry mils.
 - 3. Galvanized and Non-Ferrous Shop Primer:
 - a. Generic Components:
 - 1) Refer to Paragraph 2.2.S.2.a.1), above.
 - b. Product and Manufacturer: Provide one of the following:
 - 1) Refer to Paragraph 2.2.S.2.b.1), above.
 - 4. Intermediate (Ferrous Metals Only):
 - a. Generic Components:
 - 1) For Low-temperature Curing Conditions: Minimum 75 percent solids, cycloaliphatic amine or polyamine epoxy; 296 grams per liter VOC, maximum.
 - 2) For Warm-temperature Curing Conditions: Minimum 75 percent volume solids, cycloaliphatic amine or polyamine epoxy; 296 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) For Low-temperature Curing Conditions: International Interseal 670HS w/LTC (AN); Amerlock 2 (PPGA): One coat, 10.0 dry mils.

- 2) For Warm-temperature Curing Conditions: International Interseal 670HS (AN); 97-946 PittGuard (PPGA): One coat, 6.0 dry mils.
 5. Finish: Semi-Gloss:
 - a. Generic Components:
 - 1) Minimum 65 percent solids, aliphatic acrylic polyurethane; 340 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) International Interthane 870HS (AN); 95-8800 PittThane (PPGA): Two coats, 2.0 dry mils, per coat, 310 square feet per gallon.
- T. New and Existing Galvanized Metal, Non Ferrous Metal, and Fiberglass; Non-submerged, Interior:
1. Surface Preparation: Refer to Paragraphs 1.5.A.2., 3.2.A., 3.2.D., 3.2.E. and 3.2.F.
 2. Primer:
 - a. Generic Components:
 - 1) Minimum, 39 percent volume solids single-component, self-cross linking acrylic primer-sealer, 140 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Devoe 4020 PF (AN); 90-712 Pitt-Tech (PPGA): One coat, 2.0 to 4.0 dry mils.
 3. Finish: Satin:
 - a. Generic Components:
 - 1) Minimum, 41 percent volume solids, single component, self-cross linking acrylic; 208 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Devoe Devflex 4212 Eggshell (AN); 90-474 Pitt-Tech (PPGA): One coat, 2.0 to 4.0 dry mils.
- U. New and Existing Galvanized Metal, Non Ferrous Metal, and Fiberglass; LEED-compliant; Non-submerged, Interior:
1. Surface Preparation: Refer to Paragraphs 1.5.A.2., 3.2.A., 3.2.D., 3.2.E. and 3.2.F.
 2. Primer:
 - a. Generic Components:
 - 1) Minimum 43.5 percent volume solids single-component, self-cross linking acrylic primer-sealer; 140 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Dulux Devflex 4020 PF (AN); 90-712 Pitt-Tech (PPGA): One coat, 3.5 dry mils.
 3. Finish: Semi Gloss:
 - a. Generic Components:
 - 1) Minimum 3.6 percent volume solids, 100 percent acrylic latex; 50 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) ICI Dulux Lifemaster 2000-9200 (AN); 90-374 Pitt-Tech (PPGA):
 - 2) Two coats, 1.4 dry mils, per coat.
- V. New and Existing, Fiberglass; Non Submerged, Exterior:
1. Surface Preparation: Refer to Paragraphs 1.5.A.2., 3.2.A., and 3.2.F.
 2. Primer:
 - a. Generic Components:
 - 1) Minimum 17 percent solids, waterborne modified polyamide epoxy, 170 grams per liter, VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) 98-46 AquaPon (PPGA); Series 151 Elasto-Grip FC (TCI): One coat, 1.5 dry mils.
 3. Finish: Gloss:

- a. Generic Components:
 - 1) Minimum 49 percent solids, two-component, aliphatic acrylic, polyurethane coating; 247 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) 95-812 AquaPon (PPGA); Series 1080 Endura-Shield (TCI): Two coats, 2.0 to 3.0 dry mils, per coat.
- W. New and Existing Steel Surfaces Exposed to Maximum Temperatures of 250 degrees F (Continuous); Interior and Exterior:
- 1. Surface Preparation: Refer to Paragraphs 1.5.A.2., 3.2.A., 3.2.C.1., 3.2.C.2.
 - 2. Primer:
 - a. Generic Components:
 - 1) Minimum 95 percent volume solids, high-build, two-component, polyamido-amine or polyamine epoxy; 49 grams per gallon VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) International Interzone 954 (AN); Amercoat 133 (PPGA)**: One coat, 12.0 dry mils. **High Gloss.
 - 3. Finish: Semi-Gloss:
 - a. Generic Components:
 - 1) Refer to Paragraph 2.2.W.2.a.1), above.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) International Interzone 954 (AN); Amercoat 133 (PPGA)**: One coat, 12.0 dry mils. **High Gloss, not S/G
- X. New and Existing Aluminum in Contact with Dissimilar Materials:
- 1. Surface Preparation: Refer to Paragraphs 1.5.A.2., 3.2.A. and 3.2.D.
 - 2. Primer/Finish:
 - a. Generic Components:
 - 1) Minimum 100 percent volume solids, high-build, two-component, polyamido-amine or polyamine epoxy; 49 grams per gallon VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) International Interzone 954 (AN); Amercoat 133 (PPGA): Two coats, 8.0 to 15.0 dry mils, per coat.
- Y. New and Existing Pipe and Duct Insulation, Cloth, Paper and Canvas Jacketed; Non-submerged, Interior:
- 1. Surface Preparation: Refer to Paragraphs 1.5.A.2., 3.2.A. and 3.2.G.
 - 2. Primer:
 - a. Generic Components:
 - 1) Minimum 38 percent volume solids single-component, self-cross linking acrylic primer-sealer; 159 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Devoe Devflex 4020 PF (AN); 90-712 Pitt-Tech (PPGA): One coat, 2.0 to 4.0 dry mils.
 - 3. Finish: Satin:
 - a. Generic Components:
 - 1) Minimum 37 percent volume solids, single component, self-cross linking acrylic; 226 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Devoe Devflex 4212 P (AN); 90-474 Pitt-Tech (PPGA): One coat, 2.0 to 4.0 dry mils.
- Z. New and Existing PVC and CPVC Piping and Fiberglass Insulation Covering; Non-submerged, Interior:

1. Surface Preparation: Refer to Paragraphs 1.5.A.2., 3.2.A. and 3.2.F.
 2. Primer:
 - a. Generic Components:
 - 1) Minimum 37 percent volume solids single-component, self-cross linking acrylic primer-sealer; 226 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Devoe Devflex 4020 PF (AN); 90-712 Pitt-Tech (PPGA): One coat, 2.0 to 4.0 dry mils.
 3. Finish: Satin:
 - a. Generic Components:
 - 1) Minimum 37 percent volume solids, single component, self-cross linking acrylic; 226 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Devoe Devflex 4212 P (AN); 90-474 Pitt-Tech (PPGA): One coat, 2.0 to 4.0 dry mils.
- AA. New and Existing Exterior Surfaces of Steel Pipe; Buried Exterior:
1. Surface Preparation: Refer to Paragraphs 1.5.A.2., 3.2.A., 3.2.C.1., and 3.2.E.
 2. Primer/Finish:
 - a. Generic Components:
 - 1) Minimum 75 percent volume solids, build, coal tar polyamide or polyamine epoxy coating; 330 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) International Interzone 954 (AN)*; Amercoat 78HB (PPGA): Two coats, 9.0 dry mils, per coat.
- BB. New and Existing Exterior Surfaces of Ductile Iron Pipe; Buried Exterior:
1. Refer to Section 15061, Ductile Iron Pipe.
- CC. New and Existing Gypsum Wallboard, Plaster and Wood; Interior:
1. Surface Preparation: Refer to Paragraphs 1.5.A.2., 3.2.A. and 3.2.H.
 2. Gypsum Wallboard, Plaster, and Wood Primer:
 - a. Generic Components:
 - 1) Minimum 17 percent solids, 100 percent waterborne modified polyamine epoxy or cross-linked water-based acrylic-epoxy; 170 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Devoe TruGlaze WB 4406 SG (AN); 98-46 AquaPon Primer (PPGA): One coat, 0.7 to 1.5 dry mils.
 3. Gypsum Wallboard, Plaster, and Wood Finish:
 - a. Generic Components:
 - 1) Minimum 44 percent solids, waterborne acrylic epoxy or water-based epoxy; 250 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Devoe TruGlaze WB 4406 SG (AN); 98-1 AquaPon Finish (PPGA): Two coats, 4.0 to 6.0 dry mils, per coat.
- DD. New and Existing Gypsum Wallboard, Plaster and Wood, LEED-compliant; Interior:
1. Surface Preparation: Refer to Paragraphs 1.5.A.2., 3.2.A. and 3.2.H.
 2. Primer:
 - a. Generic Components:
 - 1) Minimum 30 percent solids, 100 percent acrylic, primer-sealer; 50 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:

- 1) ICI Prep & Prime 2000 – 9116 (AN); Pristine Eco Spec, Latex, 231 (BMC): One coat, 0.8 dry mils.
 3. Finish: Flat:
 - a. Generic Components:
 - 1) Minimum 34 percent solids, 100 percent acrylic latex; 50 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) ICI Dulux Lifemaster 2000-9100 (AN); Pristine Eco Spec Latex 219 (BMC): Two coats, 1.2 dry mils, per coat.
 4. Finish: Semi-Gloss:
 - a. Generic Components:
 - 1) Minimum 34 percent solids, 100 percent acrylic latex, semi-gloss; 50 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) ICI Dulux Lifemaster 2000-9200 (ICI); Pristine Eco Spec Latex Enamel; 224 (BMC): Two coats, 1.4. dry mils, per coat.
- EE. New and Existing Gypsum Wallboard, Plaster and Wood, Low VOC; Decorative Finish; Interior:
1. Surface Preparation: Refer to Paragraphs 1.5.A.2., 3.2.A. and 3.2.H.
 2. Primer:
 - a. Generic Components:
 - 1) Minimum 50 percent solids, 100 percent acrylic, primer-sealer; 72 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) SP97 Multi Purpose Waterbase Primer (MCT); Interior Acrylic Latex Primer (DI); one coat, 100 to 125 square feet per gallon.
 3. Finish: Flat:
 - a. Generic Components:
 - 1) Minimum 34 percent solids, 100 percent acrylic latex; 60 grams per liter VOC, maximum.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Zolatone Polomyx All-Acrylic (ZOL); Vera-Flec 3000 (DI); Two coats, 125 to 175 square feet per gallon.

2.3 CALKING AND SEALANTS

- A. Refer to Section 07920, Calking and Sealants.

2.4 INSTRUMENTS

- A. Instruments:
 1. Provide one new dry film thickness gauge for checking film thickness, one holiday detector to detect holidays or holes in the coating, and one set of visual standards to check surface preparation. Calibrate dry film thickness gauge at Site using Bureau of Standards standard shim blocks. After performing testing, furnish instruments and standards to OWNER.
 2. Provide one new dry film thickness gauge for checking film thickness, one holiday detector to detect holidays or holes in the coating, and one set of visual standards to check surface preparation. Calibrate dry film thickness gauge at Site using Bureau of Standards standard shim blocks.
 3. OWNER will provide instruments and perform testing for checking film thickness and other tests on coatings.

4. Products and Manufacturers: Provide the following:
 - a. Film Thickness Testers: Model FM III manufactured by Mikrotest, or equal.
 - b. Holiday detector shall be Model M 1 as manufactured by Tinker & Razor, or equal.
 - c. Visual Standards: ASTM D2200, Swedish Standards, SSPC VIS 1.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine areas and conditions under which painting Work is to be performed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of Work. Do not proceed with Work until unsatisfactory conditions have been corrected in a manner acceptable to ENGINEER.
- B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film capable of performing in accordance with claims made in paint manufacturer's product literature for surfaces and conditions encountered.
- C. Do not paint over existing paint where there is no assurance that existing paint will provide an acceptable surface for long-term adherence and durability of painting systems specified or where paint manufacturer requires removal of all existing paint to recommend use of specified painting system.

3.2 SURFACE PREPARATION

- A. General:
 1. Test for moisture content of surfaces before commencement of painting Work. Test for moisture in concrete in compliance with ASTM D4263. Report results to ENGINEER before commencing Work.
 2. Prepare existing surfaces to be painted as specified for new surfaces. Submit substitute methods of preparing existing surfaces, when proposed, with Shop Drawing submittal. ENGINEER's acceptance of substitute surface preparation methods does not relieve CONTRACTOR of performance required under the Contract Documents. To provide surfaces acceptable for application of painting system specified:
 - a. Clean and roughen surfaces of existing paint and other decorative or protective toppings on surfaces to remain that are to receive a painting system under this Section.
 - b. Where existing surfaces to be painted have corrosion, peeling paint, or unacceptably adhering coatings, remove all topcoats, primers, and intermediate coats of paint, and other protective or decorative coatings.
 3. Perform preparation and cleaning procedures as specified herein and in strict accordance with paint manufacturer's approved instructions for each surface and atmospheric condition.
 4. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items already in place that do not require field painting, or provide effective surface-applied protection prior to surface preparation and painting.
 5. Remove as necessary items that must be field-painted where adjacent surfaces cannot be completely protected from splatter or overspray. Following completion of painting of each space or area, the removed items shall be reinstalled by workers skilled in the trades involved.
 6. Clean surfaces to be painted before applying painting system components. Remove oil and grease with clean cloths and cleaning solvents prior to mechanical cleaning.
 7. Prepare surfaces that were improperly shop-painted and abraded or rusted shop-painted surfaces as specified.
- B. Cast In Place Concrete, Precast Concrete and Masonry Surfaces:

1. Prepare surfaces of concrete unit masonry to be painted by removing all efflorescence, chalk, dust, dirt, grease, oils, and other contamination using soap and water. Surfaces shall be clean and dry at time of paint system application.
2. Concrete unit masonry that cannot be adequately cleaned using soap and water shall be acid etched with a commercial solution of 15 percent muriatic acid.
3. Prepare and clean cast-in-place concrete and precast concrete surfaces per ASTM D4259 to provide a uniform and continuous anchor profile of approximately one mil. Provide mechanical abrading and abrasive blasting per ASTM D4259. Use 40 to 80-mesh abrasive and clean, dry, compressed air. Compressed air cleanliness shall be per ASTM D4285. Pressure at blasting nozzle shall not exceed 80 pounds per square inch. Do not concentrate blast on surface; instead, move at a fairly rapid rate to provide a surface free of laitants and contaminants. Provide post-surface preparation cleaning per ASTM D4258 to remove loose material. Surface preparation shall open all surface air holes by removing laitance shoulders surrounding air holes. Vacuum surfaces to remove dust and sand, and wash with potable water.
4. Where paint system is for chemical containment barrier protection, repair cracks and expansion joints in concrete and provide 2-inch radius cove base fillets at equipment pads and containment walls as part of complete chemical containment paint system Work. Use materials and techniques recommended by manufacturers of the paint and concrete repair products.
5. Remove from cast-in-place concrete fins, projections, and other surface irregularities that would protrude above level of finished intermediate fillers and surfacers. Remove by chipping and scarification by mechanical abrasion.
6. Using specified filler and surfacer, patch cast-in-place concrete and precast concrete surfaces as required to completely fill surface air holes and honeycombing. Level all protrusions, grind filler and surfacing compounds smooth, and level with adjacent surfaces.
7. Perform tests per ASTM D4262 and ASTM D4263 to verify alkalinity and moisture content of surfaces to be painted, and report findings to ENGINEER. If, in ENGINEER's opinion, surfaces are sufficiently alkaline to cause blistering and burning of paint, correct the condition before applying paint. Provide suitable testing materials for alkalinity and moisture tests. Do not paint surfaces where the moisture content exceeds eight percent.
8. Where a concrete unit masonry block filler is specified, spot patch holes and cracks with a putty knife using specified block filler. Apply to large surfaces by airless spray and backroll uniformly using a roller with a synthetic nap cover. Follow with a rubber squeegee to provide a smooth finish.

C. Ferrous Metals:

1. Ferrous Metals Except Ductile and Cast Iron:
 - a. Comply with paint manufacturer's recommendations for type and size of abrasive to provide a surface profile that meets manufacturer's painting system requirements for type, function, and location of surface. Verify that paint manufacturer-recommended profiles have been achieved on prepared surfaces. Report profiles to ENGINEER using Test Method C of ASTM D4417.
 - b. Clean non submerged ferrous surfaces including structural steel and miscellaneous metal to be shop-primed, of all oil, grease, dirt, mill scale, and other contamination by commercial blast cleaning complying with SSPC SP 6 at time of paint system application, using SSPC VIS 1 as a standard of comparison.
 - c. Clean submerged ferrous surfaces including structural steel and miscellaneous metal to be shop-primed of all oil, grease, dirt, mill scale, and other contamination by near white blasting complying with SSPC SP 10 at time of painting system application, using SSPC VIS 1 as a standard of comparison.
 - d. Clean non-submerged, ferrous surfaces that have not been shop coated of all oil, grease, dirt, loose mill scale, and other contamination by commercial blasting complying with SSPC SP 6 at the time of painting system application, using SSPC VIS 1 as a standard of comparison.

- e. Clean submerged ferrous surfaces that have not been shop coated or that have been improperly shop-coated of all oil, grease, dirt, mill scale, and other contamination by near-white blasting complying with SSPC SP 10 at time of painting system application, using SSPC VIS 1 as a standard of comparison.
 - f. Touch up shop applied prime coats that have damaged or have bare areas with primer recommended by paint manufacturer after commercial blasting complying with SSPC SP 6 at the time of painting system application, using SSPC VIS 1 as a standard of comparison, to provide a surface profile of not less than one mil.
 - g. Power tool-clean per SSPC SP 3 to remove welding splatter and slag.
 - h. Remove all rust and contamination on existing ferrous metals to sound surfaces by power tool-cleaning complying with SSPC SP 11 to provide a surface profile of not less than one mil.
 - i. Cleaning: Clean tank to remove sediment and coarse debris, including aluminum or magnesium anode rods, from tank floor and other horizontal surfaces. Sediment and debris shall be removed and disposed of in accordance with local, state, and federal regulations.
2. Ductile and Cast Iron:
- a. Comply with paint manufacturer's recommendations and NAPF 500-03 for type and size of abrasive to provide a surface profile meeting paint manufacturer's requirements for type, function and location of surface. Verify that paint manufacturer-recommended profiles are achieved on prepared surfaces.
 - b. Clean submerged and non-submerged ductile and cast iron surfaces to be shop-primed of all oil, grease, dirt, mill scale, and other contamination by solvent cleaning and abrasive blasting complying with NAPF 500-03-01, NAPF 500-03-04, and NAPF 500-03-05 at time of paint system application.
 - c. Clean submerged ductile and cast iron that have not been shop coated or that have been improperly shop-coated of all oil, grease, dirt, mill scale, and other contamination by solvent cleaning and abrasive blasting complying with NAPF 500-03-01, NAPF 500-03-04, and NAPF 500-03-05 at time of paint system application.
 - d. Touch up shop applied prime coats that are damaged or have bare areas with primer recommended by paint manufacturer, after power tooling complying with NAPF 500-03 at the time of painting system application.
 - e. Remove all contamination on existing ductile and cast iron to sound surfaces by power tool cleaning complying with NAPF 500-03-03.
- D. Non Ferrous Metal Surfaces: Prepare non-ferrous metal surfaces for painting by light whip blasting or by lightly sanding with 60- to 80-mesh sandpaper.
- E. Galvanized (Zinc-Coated) Surfaces: Prepare galvanized surfaces for painting by lightly sanding with 60- to 80-mesh sandpaper or by light whip blasting.
- F. PVC and CPVC Piping and Fiberglass: Lightly sand and clean surfaces to be painted. Fiberglass surfaces shall be prepared by solvent washing to remove wax and other contaminants, before abrading surfaces with 60- to 80-mesh sandpaper to provide an anchor pattern with scratches no further apart than 1/16-inch.
- G. Covering on Pipe Insulation:
1. Remove all oil and surface contaminants as recommended by paint and insulation cover manufacturer for surface and application required.
 2. Do not cut or damage insulation and covering.

H. Gypsum Wallboard, and Plaster:

1. Patch, sand, and seal rough spots before applying prime coat. Remove all dust and other contaminants prior to painting.
2. Touch-up suction spots and hot spots with primer before applying finish coats.

I. Wood:

1. Clean wood surfaces to be painted of all dirt, oil, or other foreign substances using scrapers, mineral spirits, and sandpaper, as required. Use sandpaper to smooth finished surfaces exposed to view and dust off.
2. Prime, stain, or seal wood required to be painted at Site immediately upon delivery to Site. Prime edges, ends, faces, undersides, and backsides of such wood, including cabinets, counters, cases, paneling and similar items.
3. Backprime paneling or interior partitions only where masonry, plaster, or other wet-wall construction occurs on backside.
4. Seal tops, bottoms, and cut outs of wood doors with a heavy coat of sealer as recommended by door manufacturer immediately upon delivery to Site.
5. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying priming coat.
6. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler as recommended by manufacturers of paint and filler, sandpaper smooth when dried and dust off.

3.3 PROTECTION OF PROPERTY AND STRUCTURES

- A. Protect property and structures adjacent to the Work from waste residues resulting from cleaning, surface preparation and paint application.
- B. Use shrouding, vacuum blasting, or other approved methods for cleaning and surface preparation of exterior surfaces.
- C. During blast cleaning and surface preparation of interior and exterior surfaces, control discharge of dust and grit, using shrouding, negative-pressure containment/dust collection systems, or other means to protect adjacent property and structures and prevent dust/grit from escaping. Similarly control removal and temporary storage of residues to protect adjacent property and structures.
- D. For painting of exterior surfaces, use rollers, shrouding or other approved methods as required to protect adjacent property and structures from wind-blown paint residues.
- E. Submit proposed procedures for cleaning, surface preparation and paint application describing methods for protecting adjacent property and structures from residues. Do not proceed with cleaning, surface preparation or painting until proposed procedures are approved by ENGINEER.

3.4 MATERIALS PREPARATION

A. General:

1. Mix and prepare paint products in strict accordance with paint manufacturer's product literature.
2. Do not mix painting materials produced by different manufacturers, unless otherwise permitted by paint manufacturer's instructions.
3. Where thinners are required, they shall be produced by paint system manufacturer unless otherwise permitted by paint manufacturer's product literature and submitted to and accepted by ENGINEER with Shop Drawings.

B. Tinting:

1. Where multiple coats of the same material are to be provided, tint each undercoat a lighter shade to facilitate identification of each coat of paint.
2. Tint undercoats to match color of finish coat of paint, but provide sufficient difference in shade of undercoats to distinguish each separate coat. Provide a code number to identify material tinted by manufacturer.

C. Mixing:

1. For products requiring constant agitation, use methods in compliance with manufacturer's product literature to prevent settling during paint application.
2. Mix in containers placed in suitably sized non ferrous or oxide resistant metal pans to protect floors from slashes or spills that could stain the floor or react with subsequent finish floor material.
3. Mix and apply paint in containers bearing accurate product name of material being mixed or applied.
4. Stir products before application to produce a mixture of uniform density and as required during the application. Do not stir into the product film that forms on surface; instead, remove film and, if necessary, strain product before using.
5. Strain products requiring such mixing procedures. After adjusting mixer speed to break up lumps and after components are thoroughly blended, strain through 35 to 50-mesh screen before application.

3.5 APPLICATION

A. General:

1. Apply paint systems by brush, roller, or airless spray per manufacturer's recommendations and in compliance with Paint Application Specifications No. 1 in SSPC Volume 2, where applicable. Use brushes best suited for type of paint applied. Use rollers of carpet, velvet back, or high pile sheeps wool as recommended by paint manufacturer for product and texture required. Use air spray and airless spray equipment recommended by paint manufacturer for specific painting systems specified. Submit a list of application methods proposed, listing paint systems and location.
2. Paint dry film thicknesses required are the same regardless of the application method. Do not apply succeeding coats until previous coat has completely dried.
3. Apply additional coats when undercoats, stains, or other conditions show through final coat of paint, until paint film is uniform finish, color, and appearance, particularly for intense chroma primary colors. Ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a film thickness equivalent to that of flat surfaces.
4. Surfaces of items not normally exposed-to-view do not require the same color as other components of system of which they are part, but require the same painting system specified for exposed surfaces of system.
5. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non specular black paint before final installation of registers or grilles.
6. Paint backs of access panels and removable or hinged covers to match exposed surfaces.
7. Paint aluminum parts in contact with dissimilar materials with specified paint system.
8. Paint tops, bottoms, and side edges of doors the same as exterior surfaces.
9. Omit field-applied primer on metal surfaces that have been primed in the shop. Touch up paint shop-primed coats and pre-finished items only when approved by ENGINEER using compatible primers and manufacturer's recommended compatible field-applied finishes.
10. Welds shall be stripe-coated with intermediate or finish coat of paint after application of prime coat.
11. Paint steel water storage tanks per AWWA D102.

- B. Minimum/Maximum Paint Film Thickness:
1. Apply each product at not less than, nor more than, manufacturer's recommended spreading rate, and provide total dry film thickness as specified.
 2. Apply additional coats of paint if required to obtain specified total dry film thickness.
 3. Maximum dry film thickness shall not exceed 100 percent of minimum dry film thickness, except where more stringent limitations are recommended by paint manufacturer for a specific product.
- C. Scheduling Surface Preparation and Painting:
1. As soon as practical after preparation, apply first coat material to surfaces that have been cleaned, pretreated, or otherwise prepared for painting. Apply first-coat material before subsequent surface deterioration due to atmospheric conditions existing at time of surface preparation and painting. Surfaces that have started to rust before first-coat application is complete shall be brought back to required standard by abrasive blasting.
 2. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure and application of another coat of paint does not cause lifting or loss of adhesion to undercoat.
 3. Scarify primers and other painting system components by brush-blasting if paint has been exposed for lengths of time or under conditions beyond manufacturer's written recommendations for painting systems required, intended use, or method of application proposed for subsequent coats of paint.
 4. Schedule cleaning and painting so that dust and other contaminants from cleaning process do not fall on wet, newly painted surfaces.
- D. Prime Coats: Recoat primed and sealed walls and ceilings where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn through or other defects caused by insufficient sealing.
- E. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage.
- F. Brush Application:
1. Brush out and work all brush coats onto surfaces in an even film. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections are unacceptable. Neatly draw all glass and color break lines.
 2. Brush-apply primer or first coats, unless otherwise permitted to use mechanical applicators.
- G. Mechanical Applicators:
1. Use mechanical methods for paint application when permitted by governing ordinances, manufacturer, and approved by ENGINEER.
 2. Limit roller applications, if approved by ENGINEER, to interior wall finishes for second and third coats. Apply each roller coat to provide the equivalent hiding as brush applied coats.
 3. Where spray application is used, apply each coat to provide equivalent hiding of brush applied coats. Do not double back with spray equipment for purpose of building up film thickness of multiple coats in one pass.
- H. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint Work not in compliance with specified requirements as required by ENGINEER.

3.6 FIELD QUALITY CONTROL

- A. ENGINEER may invoke the following material testing procedure at any time for a maximum of five times during field painting Work:
1. CONTRACTOR shall engage service of an independent testing laboratory to sample paints used, as designated by ENGINEER. Samples of products delivered to Site shall be obtained, identified, sealed, and certified as to being products actually applied to surfaces in each area, in presence of CONTRACTOR.
 2. A testing laboratory selected by OWNER and paid for by CONTRACTOR shall perform appropriate tests for any or all of the following:
 - a. Abrasion resistance.
 - b. Apparent reflectivity.
 - c. Flexibility.
 - d. Washability.
 - e. Absorption.
 - f. Accelerated weathering.
 - g. Dry opacity.
 - h. Accelerated yellowness.
 - i. Recoating.
 - j. Skinning.
 - k. Color retention.
 - l. Alkali resistance.
 - m. Quantitative materials analysis.
 3. If test results show that products being used do not comply with specified requirements, CONTRACTOR may be directed to stop painting Work and remove non complying paint, and shall prepare and repaint surfaces coated with rejected paint with material complying with the Contract Documents.
- B. Notify ENGINEER after completing each coat of paint. After inspection and checking of film thickness, holidays, and imperfections, and after acceptance by ENGINEER, proceed with succeeding coat. Provide testing instruments specified in Article 2.4 of this Section for testing by CONTRACTOR. Testing instruments shall become property of OWNER.
- C. Notify ENGINEER after completing each coat of paint. After inspection and checking of film thickness, holidays, and imperfections, and after acceptance by ENGINEER, proceed with succeeding coat. Perform testing using testing instruments specified in Article 2.4 of this Section.
- D. Notify ENGINEER after completing each coat of paint. After inspection and checking of film thickness, holidays, and imperfections by OWNER, and after acceptance by ENGINEER, proceed with succeeding coat.
1. ENGINEER will witness all testing and shall be notified of scheduled testing at least twenty-four hours in advance.
 2. Apply additional coats, if required, to produce specified film thickness and to correct holidays and to completely fill all surface air holes.
- E. For magnetic substrates, measure thickness of dry film nonmagnetic coatings following recommendations of SSPC PA-2. These procedures supplement manufacturers' approved instructions for manual operation of measurement gauges and do not replace such instructions.
- F. Record time, location, number of coats, dry film thickness, holidays, and other imperfections and submit testing results to ENGINEER.

3.7 MISCELLANEOUS TANK REHABILITATION

- A. Sealant Replacement: Remove all existing sealant material between tank bottom and concrete ring wall foundation. Thoroughly wet space between bottom of tank and top of wall and provide 1-inch thick cane fiber filler. Seal entire outer edge of tank bottom to ring wall with a 1/2-inch width of two-compartment polysulfide compound. Refer to Section 07920, Calking and Sealants.
- B. Provide new rubber gaskets and Type 316 stainless steel nuts and bolts for access hatches (two roof and two ground-level shell hatches). Remove and dispose of old nuts, bolts, and gaskets. New gasketing system shall prevent leakage from tank through access hatch.
- C. Seal existing cathodic protection system manhole covers to tank roof using an NSF 61-approved sealant product. Covers and sealant shall prevent entrance of water into tank.

3.8 DISINFECTION

- A. Disinfection shall conform to applicable requirements of AWWA C652, except as modified below.
- B. After tank painting is complete and interior surfaces thoroughly dried, remove all visible dirt and contaminating materials. Disinfect interior of tank by spraying all surfaces, including underside of roof and roof support members, with a chlorine solution measuring at least 200 mg/L chlorine. Chlorine solution shall remain in contact with surfaces for at least thirty minutes. Provide a sterile environment inside tank. After spray-disinfection, flush tank contents to drain by spraying disinfected surfaces with potable water for at least ten minutes, then fill tank to result in overflow for another ten minutes, after which samples for bacteriological testing will be obtained by CONTRACTOR. CONTRACTOR shall provide proper disinfection until successful bacteriological testing results are achieved.
- C. Water for initial disinfection and filling will be furnished by OWNER. CONTRACTOR shall provide pumps, hoses, and other temporary equipment required to fill tank. CONTRACTOR shall furnish chlorine.
- D. First set of bacteriological testing will be paid for by OWNER.
- E. If tank must be emptied, re-disinfected, flushed, and refilled to obtain satisfactory bacteriological samples, or because of extensive leakage, CONTRACTOR shall pay for additional chlorine, re-testing, and water at the utility owner's standard rates.
- F. Water VOC Concentration Testing:
 - 1. After tank has filled and allowed to stand for twenty-four hours, OWNER will provide one set of water samples for testing for total volatile organic compounds per EPA Method 524.2 and bacteriological levels to confirm acceptability of water with applicable drinking water standards.
 - 2. If a sample does not meet applicable requirements, CONTRACTOR shall drain tank and allow the paint system to further cure. CONTRACTOR shall pay costs for additional refilling, testing, and disposal of water necessary to achieve compliance with applicable drinking water standards.

3.9 PROTECTION OF NEW FINISHES

- A. Provide signs that read, "Wet Paint" as required to protect newly painted finishes. Remove temporary wrappings provided for protection of the Work and work of other contractors after completion of painting.

3.10 ADJUSTING AND CLEANING

- A. Correct damages to work of other trades through cleaning, repairing or replacing, and repainting, as acceptable to ENGINEER.
- B. During progress of Work, remove from Site all discarded paint materials, rubbish, cans, and rags at end of each workday.
- C. Upon completion of painting, clean paint spattered surfaces. Remove spattered paint by proper methods of washing and scraping, while avoiding scratching or otherwise damaging finished surfaces.
- D. At completion of work of other trades, touch up and restore damaged or defaced painted surfaces as determined by ENGINEER.

3.11 SCHEDULES

- A. The schedules listed below, following the “End of Section” designation, are a part of this Specification section.
 - 1. Table 09900-C, Painting Schedule.

END OF SECTION 099000

DIVISION 26 – ELECTRICAL
SECTION 260500 – COMMON WORK RESULTS FOR ELECTRICAL
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for basic electrical studies and reports, material handling, and other basic electrical materials and methods.

B. Comply with the requirements and provisions of the following:

1. Division 01 – General Requirements

C. Related Division and Sections:

1. Section 024119.49 – Minor Electrical Demolition
2. Division 03 - Concrete
3. Section 260503 – Equipment Wiring Connections
4. Section 260519 – Low-Voltage Electrical Power Conductors and Cables
5. Section 260526 – Grounding and Bonding for Electrical Systems
6. Section 260529 – Hangers and Supports Systems for Electrical Systems
7. Section 260533.13 – Conduit for Electrical Systems
8. Section 260533 – Boxes for Electrical Systems
9. Section 260548 – Vibration and Seismic Control for Electrical Systems
10. Section 260553 – Identification for Electrical Systems
11. Section 260563 – Acceptance Testing of Electrical Systems
12. Section 262200 – Low Voltage Transformers
13. Section 262726 – Wiring Devices
14. Section 260550 – Basic Electrical Materials and Methods
15. Section 271013 – Copper Communications Cabling
16. Section 337119 – Underground Ducts and Manholes
17. Section 262510 – Portable Generator Tap box

1.2 REFERENCES

A. America National Standards Institute (ANSI):

1. ANSI Z535.4, Product Safety Signs and Labels.

B. American Society of Mechanical Engineers (ASME):

1. ANSI/ASME Y14.2M, Line Conventions and Lettering.
2. ANSI/ASME Y14.24M, Types and Applications of Engineering Drawings.
3. ANSI/ASME Y14.34M, Associated Lists.
4. ANSI/ASME Y14.35M, Revision of Engineering Drawings and Associated Documents.
5. ANSI/ASME Y14.100, Engineering Drawing Practices.

- C. Institute of Electrical and Electronic Engineers (IEEE):
1. ANSI/IEEE 18, Standard for Shunt Power Capacitors.
 2. ANSI/IEEE 141, Recommended Practice for Electric Power Distribution for Industrial Plants - Red Book.
 3. ANSI/IEEE 242, Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems - IEEE Buff Book.
 4. ANSI/IEEE 399, Recommended Practice for Power Systems Analysis - Brown Book.
 5. ANSI/IEEE 519, Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems.
 6. IEEE 1036, Guide for Application of Shunt Power Capacitors.
 7. ANSI/IEEE 1584, Guide for Arc-Flash Hazard Calculations.
 8. ANSI/IEEE C37.10, Guide for Diagnostics and Failure Investigation of Power Circuit Breakers.
 9. ANSI/IEEE C37.13, Low-Voltage AC Power Circuit Breakers Used in Enclosures.
 10. ANSI/IEEE C57.12.00, General Requirements for Liquid-Immersed Distribution, Power and Regulating Transformers.
 11. ANSI/IEEE C57.12.59, Standard for Dry-Type Transformer Through-Fault Current Duration
- D. InterNational Electrical Testing Association, Inc. (NETA):
1. ANSI/NETA ETT Standard for Certification of Electrical Testing Technicians.
- E. National Electric Manufacturer's Association (NEMA).
1. ANSI/NEMA MG 1, Motors and Generators.
 2. NEMA ICS 6, Industrial Control and Systems: Enclosures.
- F. National Electrical Contractors Association (NECA)
1. ANSI/NECA 100 Symbols for Electrical Construction Drawings.
- G. National Fire Protection Association (NFPA):
1. NFPA 70, National Electrical Code (NEC).
 2. NFPA 70E, Standard for Electrical Safety Requirements for Employee Workplaces.
- H. The Society for Protective Coatings (SSPC):
1. SSPC-SP 2, Hand Tool Cleaning.

1.3 SUBMITTALS

- A. Submit the following information for approval in accordance with the requirements of Section 01 33 00, Submittal Procedures:
1. Product Data:
 - a. Submit Product Data, including catalog cuts, for all products provided for the electrical work of this Contract and as specified in other Sections.
 - 1) Clearly indicate the specific products proposed for the project by use of arrow, circle or underline. Indicate usage of each product on each submittal.
 2. Shop Drawings:
 - a. Submit Shop Drawings for the electrical work of this Contract as specified in other Sections.
 3. Quality Assurance/Control Submittals:

- a. Certificates:
 - 1) Testing agency quality verification that all products meet requirements or manufacturer disclaimer statements.
 - b. Qualification Statements:
 - 1) Testing agency qualifications.
4. Closeout Submittals:
- a. Operation and Maintenance Manuals.

1.4 SUBSTITUTIONS, BASIS OF DESIGN, AND ACCEPTABLE MANUFACTURERS

- A. All substitutions to identified materials or equipment shall comply with the applicable requirements of Division 01. In any case of conflict between such requirements of Division 01 and this paragraph, the more stringent requirements shall govern.
- B. Whenever an item of material or equipment is identified by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function and quality required. Unless the identification or description contains or is followed by words reading that no like, equivalent or “or-equal” item or no substitution is permitted, material or equipment of other Suppliers may be proposed.
- C. Where substitutions to identified items are permitted, any proposed substitution or alternate must fully comply with the following in order to be considered by the Engineer:
1. Be of a reputable manufacturer,
 2. Be fully compliant with the requirements of this Section and the Drawings,
 3. Be fully compatible with all interfacing items and work, and with the installation environment,
 4. Be appropriate (as determined by the Engineer) for the proposed application, and
 5. Be equivalent (as determined by the Engineer) in character, performance, and quality to any identified Basis of Design.
- D. Where a specific manufacturer or product is identified as the Basis of Design or listed first in a list of acceptable manufacturers, the overall project design is based on the identified manufacturer or product. If the Contractor elects to substitute a manufacturer or product which differs from the identified Basis of Design, the Contractor shall bear all efforts and costs of any design changes necessary in order to achieve finished work which is equal in character, performance, and quality to the original design depicted in the Contract Documents. Such changes shall include, but not necessarily be limited to: changes to ratings and/or features of other equipment, changes to material sizes and/or types, new material and/or equipment, and changes to structural and/or architectural features (including room sizes). Approval by the Engineer of a proposed substitute item shall not relieve the Contractor of this responsibility.
- E. The listing of specific manufacturers is solely intended to identify reputable manufacturers who are known to provide quality products of the general type specified. Such listing is in no way intended to imply that the identified manufacturers product(s) have been verified to satisfy the specified requirements, or to be equivalent to any identified Basis of Design manufacturer. Nor does such a listing imply acceptance of products which do not meet the specified requirements, ratings, features, dimensions, and functions as indicated.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Testing Agency Qualifications:

- a. Use a NETA accredited testing agency, or approved equal, that is accredited for the region in which the Contract work is performed.
- b. Submit the testing agency's qualifications to the Engineer for approval.

B. Regulatory Requirements:

1. Perform all electrical work in conformance with the requirements of NFPA 70, the National Electrical Code.

C. Certifications:

1. Submit evidence with all Product Data that the products represented meet testing agency quality verification requirements, including agency listing and labeling requirements.
 - a. Such evidence may consist of either a printed mark on the data or a separate listing card.
 - b. Submit a written statement from those product manufacturers that do not provide evidence of the quality of their products that indicates why an item does not have quality assurance verification.
 - 1) Such statements provided in lieu of quality assurance verification are subject to the acceptance of the Owner and the Engineer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials and equipment to the work site in accordance with the requirements of Division 01.

1. Deliver materials and equipment in a clean condition.
 - a. Provide packaging that plugs, caps, or otherwise seals openings both during shipping and temporary storage.
2. Provide equipment needed for unloading operations, and have such equipment on the work site to perform unloading work when the material and equipment is delivered.
 - a. If possible, clearly identify pick-points or lift-points on electrical equipment crating and packaging.
 - b. In the absence pick-points or lift-points on equipment crating and packaging, identify pick-points or lift-points on the equipment itself.

B. Handle materials and equipment in accordance with the requirements of Division 01.

1. Handle materials and equipment in accordance with manufacturer's written instructions.
2. When unloading materials and equipment, provide special lifting harnesses or apparatus as required by manufacturers.

C. Store electrical materials and equipment, whether on-site or off-site, in accordance with Division 01 and the following:

1. Follow the manufacturer's written instructions for storing the items.
2. Store electrical equipment and products under cover.

- a. Except for electrical conduit, store electrical equipment and products in heated warehouses or enclosed buildings with auxiliary heat and that provide protection from the weather on all sides.

1.7 SYSTEM STARTUP

- A. Energize the following items in the presence of the Engineer:
 1. Process instrumentation.
 2. Equipment rated over 300 Volts.
 3. Equipment rated over 1-horsepower.
- B. Startup the following items in the presence of the Engineer:
 1. Instrumentation.

1.8 MAINTENANCE

- A. Operation and Maintenance Manuals:
 1. Prepare Operation and Maintenance Manuals in conformance with the requirements of Section 017823, other Contract requirements, and as follows:
 - a. Organize Operation and Maintenance Manuals by Specification Section and equipment number as designated on the Contract Drawings.
 - b. Include suppliers, supplier addresses, and supplier telephone numbers for the equipment and products furnished.
 2. 60 days prior to the request for final payment, prepare and submit two copies of the proposed Operation and Maintenance Manuals to the Engineer for approval.
 3. Upon approval of the proposed Operation and Maintenance Manuals, submit six corrected copies as follows:
 - a. Submit one set to the Engineer.
 - b. Place one set in the spare parts and fuse cabinet in the new electrical service building
 - c. Deliver the remaining four copies to the Owner.
 4. Insert final record drawings in each set of Operation and Maintenance Manuals at Project Closeout.

PART 2 PRODUCTS

2.1 MATERIALS & EQUIPMENT

- A. Provide materials and equipment as specified elsewhere in these Specifications.

2.2 SHOP FINISHING

- A. For electrical equipment, factory-apply paint and coating systems that at a minimum meet the requirements of the NEMA ICS 6 corrosion-resistance test and the additional requirements specified in individual Specification Sections.

2.3 CONCRETE WORK

- A. Provide concrete work that complies with the requirements of Division 03.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Field-Applied Finishes:

1. Except for factory-finished items that have been completely finished with factory-applied primer and final finish coatings, finish installed electrical materials, equipment, apparatus, and items in the field in accordance with the requirements of Section 09 90 00.
 - a. Apply paint material matching the composition of the factory-applied products.
 - 1) Obtain factory-supplied paint for this work whenever available.
 - b. Comply with the paint manufacturer's instructions for mixing, thinning, surface preparation, application, spreading rate, drying time, and environmental limitations concerning application of the paint.
 - c. Apply paint in such a manner so that the finished appearance will match as nearly as possible the factory finish.
 - 1) Poorly applied paint may be required to be repaired and re-applied by the Contractor in accordance with Article 3.02 at no additional cost to the Owner.
2. Coordinate the painting of large areas with the Engineer to minimize the duration of exposure of other workers to toxic paint fumes.

3.2 REPAIR/RESTORATION

- A. If the factory finish of factory-finished items is damaged for any reason, refinish the item.
 1. If an item that has several surfaces has damage on one surface, refinish the entire damaged surface.
 - a. Surface Preparation:
 - 1) Outside the damaged area, lightly sand the entire surface and perform additional sanding to profile the damaged paint edge.
 - 2) Prepare the surfaces of damaged areas in accordance with SSPC-SP 2.

3.3 FIELD QUALITY CONTROL

- A. Perform electrical testing as detailed in Section 260563 and in each Specification Section.
- B. Have electrical work inspected as required by the local Authority Having Jurisdiction (AHJ).
 1. Submit a copy of the certification of inspection with the final project closeout documents, and post the original in the electrical room on-site protected by a metal frame with a protective plate glass cover.
- C. The quality of finishing and refinishing work is subject to approval by the Engineer.

3.4 MANUFACTURERS' FIELD SERVICES

- A. Provide the services of a qualified field engineer and necessary tools and equipment to test, calibrate, and adjust the protective relays and circuit breaker trip devices as recommended in the Final Project Report of the power system study.

3.5 RECORDING OF CONDUCTOR LENGTHS

- A. Measure and record the lengths of all feeder and branch circuit conductor as follows:
 - 1. Low voltage (600V and less) circuits
 - a. Feeders to panelboards, switchboards, switchgear, motor control centers, transformers, and similar distribution equipment.
 - b. Branch circuits rated 40A or more.
 - c. Branch circuits to motors rated 20hp or more.
- B. Measure lengths of conductors by pulling a conduit measuring tape into the raceway prior to installing the conductors. Remove the tape from the raceway prior to, or during, installation of the conductors. Use a tape which is marked in maximum 1-foot increments.
- C. Record the measured length of raceway at the time of measuring. Measure and record the conductor lengths between the ends of the raceway and the conductor terminations as a separate notation when the conductors are installed.
- D. Submit recorded lengths in a typewritten spreadsheet format, with five separate columns:
 - 1. Circuit identification
 - 2. Measured raceway length
 - 3. Measured length from end of raceways to conductor terminations at first end
 - 4. Measured length from end of raceways to conductor terminations at second end
 - 5. Total length

END OF SECTION 260500

**DIVISION 26 – ELECTRICAL
SECTION 260503 – EQUIPMENT WIRING CONNECTIONS
DPMC NO. A1346-00**

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: The work specified in this Section consists of services and work of an administrative nature as well as general requirements concerning certain products and operations, all common to the entire Division 26 Sections.
- B. Comply with the requirements and provisions of the following:
 - 1. Division 00 – Procurement and Contracting Requirements
 - 2. Division 01 – General Requirements
 - 3. Section 260500 – Common Work Results for Electrical
- C. Related Sections:
 - 1. Other Divisions, as applicable.

1.2 ELECTRICAL INTERFACE

- A. This Section of the Specifications is provided for clarification of the responsibilities of this Contract with regard to the connection of equipment provided under other Divisions of this Contract.
- B. Unless specifically indicated otherwise, the electrical components or equipment, which are furnished as part of other Contracts, will be installed, including final connections, as work of those Contracts.
- C. Power and field-required control interconnection wiring and conduits, including final connections of such to the electrical components of the equipment and controls, as specified within this Division of the Contract or as indicated on the Drawings, shall be performed as work of Division 26 - Electrical.
- D. Equipment control panels and/or enclosures furnished and installed under other Contracts for this project, including integral unit mounted control panels, will be provided complete with all internal wiring required by the supplier(s). This Section of the Contract shall be responsible for connecting only the indicated power wiring to these assemblies unless specifically noted otherwise.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Basic electrical materials required for the work to be included in this Section are as specified in other Sections of these Specifications and as shown on the Drawings.

2.2 COORDINATION

A. Electrical Equipment:

1. Unless otherwise indicated, this Contractor will provide the required safety disconnect devices, motor starters, control relays, control stations, and all other electrical appurtenances, as indicated on the Drawings, for the connection and operation of all electrical equipment included in this project.

B. Mechanical Equipment:

1. Unless otherwise indicated, mechanical equipment control panel(s) will be provided as part of the work of other Contracts.
2. Coordinate the installation of all field wiring with the respective Contract furnishing the equipment and with the approved shop drawings for the item being connected.
3. Electrical Contractor will provide only power to respective control panel.
4. Approved shop drawings indicating the required wiring connections will be provided by the respective Contract responsible for furnishing the equipment.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Electrical materials being installed for the connection of equipment shall be installed as specified in the applicable sections of these Specifications, and as indicated on the Drawings.

3.2 EQUIPMENT WIRING

- A. General: Refer to the Drawings for the electrical field wiring required for this Contract.

B. Electrical and Mechanical Equipment Installation:

1. Provide required wiring to items of equipment as indicated on the Drawings.
2. Provide interconnection wiring between control panels, control devices, motor starters and branch circuit panelboards, as indicated on the Drawings, and as required for an operational system.
3. Approved Shop Drawings indicating the required wiring connections will be provided by the respective Division responsible for furnishing the equipment.
4. Specific instrumentation and control wiring requirements are given in Appendix A of this Section. Refer to the Electrical Drawings for additional wiring requirements and criteria, and refer to the Instrumentation Drawings for supporting information.

C. Conduit Installation for Roof-Mounted Equipment if applicable:

1. Roof penetrations shall be made prior to application of roofing materials.
2. Coordinate the time of roof penetration of conduits with the roof work of the General Construction Work to permit simultaneous roof restoration work.
3. Run wiring to roof mounted equipment and interconnecting wiring between roof mounted and interior equipment through wiring channels in roof curbs when such are provided for the roof mounted equipment installed under other Contracts.

4. Conduit flashing and roof restoration work involved with conduits passing through the roof (if any) to roof mounted equipment of other Contracts shall be performed as work of the other Contracts.

END OF SECTION 260503

DIVISION 26 – ELECTRICAL
SECTION 260519 – LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
DPMC NO. A1346-00

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for furnishing, installing, connecting, energizing, testing, cleaning, and protecting low voltage cable, shielded cable, and accessories.

B. Comply with the requirements and provisions of the following:

1. Division 00 – Procurement and Contracting Requirements
2. Division 01 – General Requirements
3. Section 260500 – Common Work Results for Electrical

C. Related Sections:

1. Section 260500 – Common Work Results for Electrical
2. Section 260526 – Grounding and Bonding for Electrical Systems
3. Section 260553 – Identification for Electrical Systems
4. Section 260563 – Acceptance Testing of Electrical Systems
5. Section 260533.13 – Conduit for Electrical Systems
6. Section 260533 – Raceway and Boxes for Electrical Systems

1.2 REFERENCES

A. American Society for Testing Materials (ASTM):

1. ASTM B 8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.

B. Institute of Electrical and Electronic Engineers (IEEE):

1. IEEE 383 - Standard for Qualifying Class 1E Electric Cables and Field Splices for Nuclear Power Generating Stations.
2. IEEE 1202 - Standard for Flame-Propagation Testing of Wire and Cables.

C. National Electrical Manufacturer's Association (NEMA):

1. NEMA WC 26/EEMAC 201 - Binational Wire and Cable Packaging Standard.
2. ANSI/NEMA WC 57 - Standard for Control, Thermocouple Extension, and Instrumentation Cables.

D. National Fire Protection Association (NFPA):

1. NFPA 70 - National Electrical Code (NEC).

- E. Underwriter's Laboratories, Inc. (UL):
 - 1. UL 13 - Standard for Power-Limited Circuit Cables.
 - 2. UL 1277 - Standard for Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.
 - 3. UL 1569 - Standard for Metal-Clad Cables.
 - 4. UL 1581 - Reference Standard for Electrical Wires, Cables, and Flexible Cords.
 - 5. UL 1685 - Standard for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables.
 - 6. UL 2250 - Standard for Instrumentation Tray Cable.
- F. Insulated Cable Engineers Association (ICEA):
 - 1. ICEA T-29-520 - Vertical Cable Tray Flame Test @ 210,000 BTU.

1.3 DESIGN REQUIREMENTS

- A. Conductors in Raceway and Conduit Systems:
 - 1. Provide conduit systems for installing the wiring that is outside of equipment.
 - 2. Except for raceway or conduit for control wires or where otherwise indicated on the Contract Drawings, design raceway and conduit systems so that the maximum number of low-voltage current carrying conductors (per NFPA 70, Article 310) in each raceway or conduit does not exceed three, plus a ground.
- B. Cable Tension Design Requirements:
 - 1. Design conduit runs so that the tension limits set by the wire and cable manufacturers will not be exceeded.
 - a. Provide additional pulling points as required to limit the tension to acceptable levels.
 - 2. Generate and submit tension cable pulling calculations for all underground power runs.
 - a. Include pull loads, tension, and safety factors for all cables with the calculations.
- C. Product Data and Catalog Cuts:
 - 1. Submit low-voltage ground, power, and control wiring product data as listed below for the products provided as the Work of this Section; and clearly indicate the usage of each product on the data submitted.
 - a. Wires and cables.
 - b. Lugs.
 - c. Connectors.
 - d. Tapes.
 - e. Pulling lubricant.
 - f. Tools used to crimp connectors.
- D. Use of Trade Names:
 - 1. The use of trade names within the Contract Documents is intended to establish the basis of design and to illustrate the constructability and level of quality required.
 - a. The use of trade names is not intended to exclude other manufacturers whose products are equivalent to those named, subject to compliance with Contract requirements.

1.4 SUBMITTALS

- A. Submit the following information to the Engineer for approval in accordance with the requirements of Section 260500 “Common Work Results for Electrical”:
1. Product Data:
 - a. Wires and cables.
 - b. Lugs
 - c. Connectors.
 - d. Tape.
 - e. Pulling lubricant.
 2. Samples:
 - a. Wire samples.
 3. Quality Assurance/Control Submittals:
 - a. Design Data.
 - 1) Tension cable pulling calculations for all underground power runs.
 - b. Certificates.
 - 1) Testing agency/quality verification.
 - c. Manufacturer’s Instructions.
 - 1) Cable manufacturer’s recommendations.
 - d. Qualification Statements.
 - 1) Documented experience of the installing firm.
 - 2) Qualifications of the licensed electricians supervising the Work.

1.5 QUALITY ASSURANCE

- A. Qualifications:
1. Installer Qualifications:
 - a. To install the Work of this Section, employ the services of a firm specializing in installing wire, cable, and accessories, and that has a minimum of 3 years experience doing so.
 - 1) Submit the documented experience of the firm installing the wire, cable, and accessories.
 - b. To supervise installation of the Work of this Section, employ licensed electricians.
 - 1) Submit the qualifications of the licensed electricians supervising the Work of this Section.
- B. Regulatory Requirements:
1. Perform the Work of this Section in accordance with the requirements specified in NFPA 70, and to all other applicable state, local, and national governing codes and regulatory requirements.
- C. Certifications:
1. Provide products that are listed and labeled by Underwriters Laboratory, approved by Factory Mutual, or certified as meeting the standards of UL by the Electrical Testing Laboratory (ETL) for the location installed in, and the application intended, unless products meeting the requirements of these testing laboratories are not available or unless standards do not exist for the products.
 - a. Provide copper conductors listed and labeled by UL for all wiring.

2. Submit evidence of testing agency/quality verification, listing, and labeling for each product with the submitted product data either by providing a printed mark on the data or by attaching a separate listing card.
 - a. For items without such evidence, submit a written statement from the product manufacturer that indicates why it does not have quality assurance verification.

D. Field Samples:

1. Submit one 36-inch long sample of each type of wire to be used.

1.6 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling, and Unloading:

1. Imprint insulated conductors with the date of manufacture, the wire type, and the manufacturer.
2. Package wire and cable in conformance with the requirements of NEMA WC 26/EEMAC 201.
3. Protect items from damage during delivery, handling, and installation.
 - a. Comply with the cable manufacturer's recommendations for inspection, handling, storage, temperature conditioning, bending and training limits, pulling limits, and calculation parameters for installing cable.
 - b. Submit the cable manufacturer's recommendations for inspection, handling, storage, temperature conditioning, bending and training limits, pulling limits, and calculation parameters for installing cable

B. Acceptance at Site:

1. Wire and cable manufactured more than 12 months before delivery to the Site is unacceptable for use under this Contract, and will be rejected.

C. Storage and Protection:

1. Store products indoors on blocking or pallets.
2. Protect items from damage during storage.

1.7 PROJECT ENVIRONMENTAL REQUIREMENTS

- A. Install armored instrumentation cable only when the temperature is above -40 degrees Celsius.

PART 2 PRODUCTS

2.1 LOW VOLTAGE CONDUCTORS

A. Conductor Design Requirements:

1. Provide conductors of the proper size and ampacity ratings based on Article 310 of NFPA 70.
 - a. Provide copper conductors that have 98 percent conductivity.
 - b. Unless otherwise indicated on the Contract Drawings, at a minimum provide conductors of the following American Wire Gauge (AWG) sizes:
 - 1) For power and branch feeder circuits: 12 AWG.

- a) For power and branch feeders, provide solid or stranded copper low-voltage conductors for sizes up to and including 10 AWG, provide stranded copper low-voltage conductors for 8 AWG and larger sizes.
- 2) For control circuits: 14 AWG.
- 3) For alarm and status circuits: 14 AWG.
- 4) For single conductor instrument wiring: 14 AWG.
- 5) For multiple conductor instrument wiring: 16 AWG.

B. Insulation Design Requirements:

1. Provide low voltage ground, power, and control wiring having the proper insulation types as follows:
 - a. Type XHHW-2
2. Color Coding of Wires
 - a. Insulation shall be colored black and wrapped with colored tape per Tables 26 05 19-1 below.

C. Manufacturers

1. Acceptable Manufacturers:
 - a. Southwire
 - b. Continental Wire & Cable Company
 - c. General Cable
 - d. Okonite Co.
 - e. General Cable
 - f. CME Wire & Cable Inc.
 - g. Or Approved Equal

2.2 MATERIALS

A. Variable Frequency Drive Cable

1. Provide cable which meets the following:
 - a. 3 conductor with 3 ground conductors and overall metallic shield
 - b. Rated minimum 1000V
 - c. Conductors shall Class B stranded copper per ASTM B-3 and B-8.
 - d. Ground conductors shall consist of three Class B stranded copper conductors, arranged symmetrically in the cable assembly.
 - e. Insulation shall be XLPE and/or EPR, rated 90 degrees C.
 - f. The cable assembly shall have conductors cabled in concentric layers with three grounding wires, interstices are filled with suitable non-hygroscopic fillers, as required. A binder tape of synthetic material shall assemble the core in an essentially round configuration.
 - g. Shield shall be 5 mil un-coated copper tape, helically applied over the conductor assembly with 50% nominal overlap.
 - h. Overall cable jacket constructed of a polyvinyl chloride (PVC) jacket, 90 degrees C temperature rating.
 - i. UL listed for direct burial, for cable tray use, and as sunlight resistant.
 - j. Cable shall be suitable for use indoors or outdoors, in any raceway, underground duct or cable tray, or direct buried.
 - k. UL Listed TC-ER

2. Acceptable Manufacturers:
 - a. Southwire Type TC VFD Power Cable (Basis of Design)
 - b. Continental Wire & Cable Company
 - c. General Cable
 - d. Okonite Co.
 - e. General Cable
 - f. CME Wire & Cable Inc.
 - g. Or Approved Equal

B. Shielded Instrumentation Cable (2/C Cable):

1. Provide 100 percent shielded, two-conductor, 16 AWG twisted pair cable.
 - a. Provide 600V rated NFPA 70 (NEC) Type TC cable.
 - 1) Sunlight resistant
 - 2) Suitable for installation in wet locations
 - 3) Temperature Ratings
 - a) -30 to +75 degree Celsius wet
 - b) -30 to +90 degree Celsius dry
 - 4) Flame Test
 - a) UL 1277 or 1685
 - b) C (UL) FT4
 - c) IEEE 1202
 - 5) Non-plenum
 - b. Conductors:
 - 1) Provide stranded (7 or 19 strand) tin-coated copper conductors.
 - c. Shielding:
 - 1) Provide aluminum-polyester foil shielding that incorporates a 16 AWG stranded tinned copper drain wire.
 - d. Insulation:
 - 1) Provide color coded insulation rated for 600 volts and consisting of either PVC/Nylon or EPR.
 - 2) Provide an overall sunlight resistant PVC or CPE outer jacket.
2. Acceptable Manufacturers:
 - a. Belden, Inc., Part Number 9342 or 1118R
 - b. Houston Wire and Cable
 - c. Alpha Wire
 - d. West Penn
 - e. Or Approved Equal

2.3 ACCESSORIES

A. Cable Pulling Lubrication and Lubricant:

1. Lubricant shall provide reduced tension on all types of cable jackets, dry to a thin lubricating film that retains its lubricity for an extended period and won't cement in the cables.
2. The cable pulling lubricant shall produce a low coefficient of friction on a wide variety of cable jacket materials. The lubricant shall be UL listed. It shall be easy to handle and adhere well to the cable. Where appropriate, it shall also be tested and approved for use with CSPE (chlorosulfonated polyethylene) fire-retardant cable jackets where these materials are utilized.

3. The lubricant shall be UL or CSA Listed and Labeled and shall pass the IEEE 1210, Standard Tests for Determining Compatibility of Cable-Pulling Lubricants with Wire and Cable. It shall pass physical compatibility tests on LLDPE, XLPE, CPE, and PVC cable jacket or sheath materials. It shall not stress crack polyethylene per ASTM Standard 1693. There shall be no significant changes in the conductive properties of XLPE and EPR semi-conducting compounds when the lubricant's effect on volume resistivity is tested according to IEEE Standard 1210.
4. Lubricant to be specification-grade type that does not promote flame propagation when used with fire-retardant cables and systems, is harmless to humans, environmentally safe, and compatible with all common cable jacket materials
5. The lubricant shall contain no waxes, greases, silicones, or polyalkylene glycol oils or waxes. The lubricant shall have less than a 6.0% solids residue after drying for 24 hours at 105°C.
6. Where CPE insulated wire and/or cable is rated for Low Smoke / Zero Halogen type, only Polywater Type LZ shall be utilized.
7. Specific lubricants for fiber-optic and other special cable installations shall be determined by the cable / lubricant manufacturers and the Contractor shall provide submittal information, including MSDS documentation and other information verifying suitability of products and general specification compliance as outlined herein.
8. Acceptable Manufacturers:
 - a. PolyWater - DynaBlue
 - b. 3M - Type WL
 - c. Greenlee - Type GEL
 - d. Poly-Gel
 - e. Or Approved Equal

B. Tapes:

1. Arc Proofing Tape:
 - a. Provide fire retardant arc proofing tape, such as Scotch® 77 Fire Retardant Electric Arc Proofing Tape, that is capable of protecting cables from fault arc generated heat and flames and of protecting adjacent wrapped cables and accessories exposed to fault arcs until limiting devices can interrupt the faulted circuit.
2. Vinyl Insulating Tape:
 - a. Provide UL-listed flexible polyvinyl chloride (PVC) backed insulating tape with a pressure sensitive adhesive, such as black Scotch® 33+ Vinyl Electrical Tape, that is resistant to abrasion, acids, alkalis, and copper corrosion; resistant to, hot, cold and wet weather; and resistant to damage from UV sunlight exposure.
3. Rubber Splicing Tape:
 - a. Provide highly conformable, linerless, self-bonding, ethylene rubber (EPR), high-voltage (through 69 kV) insulating tape formulated to provide excellent thermal dissipation of splice heat, and designed to insulate splices and terminate cables whose overload temperatures can reach 130 degrees Celsius, such as Scotch® 130C Linerless Rubber Splicing Tape.
4. Manufacturers:
 - a. 3M, Scotch
 - b. Plymouth
 - c. Permacel
 - d. Tesa
 - e. Or Approved Equal

C. Tubing:

1. Heat Shrinkable Tubing:

- a. Provide flexible, flame retardant, polyolefin heat shrinkable thin wall tubing that has good resistance to common fluids and solvents, and has a high dielectric strength.
 2. Waterproof Splice Kits:
 - a. Provide heat shrinkable thin wall polyolefin electrical cable splice kits.
 3. Manufacturers:
 - a. Tyco Electronics, CGPT
 - b. 3M
 - c. Gardner Bender
 - d. Thomas & Betts Corp.
 - e. Or Approved Equal
- D. Wire and Cable Connections:
1. Grounding Connectors:
 - a. Provide grounding connectors conforming to the requirements of Section 26 05 26.
 2. Connectors for Service Wires and Cables, and for Wires and Cables Larger Than Number 6:
 - a. Mechanical compression connectors:
 - 1) Provide mechanical compression connectors that are capable of connecting single or multiple conductors, and of being installed with one wrench.
 - a) Type: Compact, two-hole mechanical compression connectors having two clamping bolts.
 - (1) Connector Body: Provide a high copper bronze or brass alloy body.
 - (2) Bolts: Provide brass or bronze bolts; plated steel screws are unacceptable.
 - (3) Fasteners: Provide silicon-bronze fasteners for bolting connectors to connections.
 - b. Crimped Compression Connectors:
 - 1) Provide two-hole crimped compression type connectors fabricated from high conductivity, seamless, electrolytic wrought copper, electrolytically tin-plated, and color coded to match the dies.
 - 2) Provide crimped compression type connectors with adequate area to conduct the electrical current.
 - 3) To crimp connectors, provide crimping tools from the same manufacturer that manufactured the connectors.
 3. Control Wiring Connections:
 - a. For control wiring connections at terminal boards, provide crimped nylon-insulated ring terminals.
 - b. For control wiring splices, provide nylon insulated butt splices with insulation grips.
 - c. For joining more than two control wires, provide junction boxes with terminal boards.
 4. Instrumentation Cable Connectors:
 - a. For connecting instrumentation cable and the equipment being furnished under this Contract, provide companion type connectors.
 - 1) For equipment controllers/enclosures that are furnished under other Sections of this Contract, furnish the connectors for connecting cable to the equipment with the equipment.
 - 2) Terminate the wiring as required for proper operation.
 - b. Manufacturers:
 - 1) Thomas & Betts Corp.
 - 2) AMP Inc.
 - 3) Ilsco Corp.
 - 4) Ideal Industries, Inc.

- 5) Or Approved Equal
5. Connectors for Other Conductors:
 - a. Any of the applicable types listed for larger wire may be provided.
 - b. Screw Terminal Connections:
 - 1) For making terminal connections of stranded copper wire to screw terminals, provide nylon insulated crimped compression terminals with copper barrel on the wire.
 - 2) For making terminal connections of solid copper wire to screw terminals, provide screw lock connectors.
 - c. Wire Nuts:
 - 1) For making splices of copper wire, provide pre-insulated, UL-listed, solderless connectors of the spring-lock or compression type that can be installed by hand or using tools.
 - 2) For site lighting, wire nuts used in underground or below grade locations is prohibited. There only permitted use for site lighting is within a pole base.
 - d. Manufacturers:
 - 1) 3M
 - 2) Thomas & Betts Corp.
 - 3) Tyco Electronics, AMP Inc.
 - 4) Ilsco Corp.
 - 5) FCI-Burndy Products
 - 6) Or Approved Equal

PART 3 EXECUTION

3.1 INSTALLERS

- A. Install the work of this Section only under the supervision of licensed electricians.

3.2 EXAMINATION

- A. Inspect all conduits, junction boxes, electrical vaults, and handholes to verify that they are clean, that they do not have burrs, that conduits are properly aligned, and that they are complete.
 1. Ensure that on all conduits without threaded hubs, two locknuts are installed.
 2. Ensure that in all conduits with wires larger than No. 10, bushings are installed.
 3. Ensure that grounding bushings and fittings are installed at all places specified in Section 26 05 26.
 4. Verify that proper sized boxes are installed.
- B. Verify that boxes and conduit fittings conform to the bending requirements specified in Article 314 of NFPA 70 (NEC).

3.3 PREPARATION

- A. Verify that pulling calculations have been made and are available for long conduit runs and pulls as indicated in this Section.

- B. Do not begin installing wiring until other work which might cause damage to the wires, cables, or conduits has been completed.
 - 1. Correct deficiencies in conduits, junction boxes, electrical vaults, and handholes that have been discovered by the inspection required in Paragraph 3.02.A.
- C. Prepare conduits to receive wire and cable.
 - 1. Swab the conduits with a nylon brush and steel mandrel.
 - 2. Pre-lubricate the conduits for which the pulling tension calculations are based on a coefficient of friction less than that of a dry conduit.
- D. Verify that a means of controlling the pulling tension on the wire or cable is installed on the mechanical assist devices furnished for pulling cable.
- E. Take the necessary precautions to prevent water, dirt, or other foreign material from accumulating in the conduits during the execution of wiring work.

3.4 INSTALLATION

- A. Low Voltage Ground, Power, and Control Wiring:
 - 1. Install Type CL2P, FPLP, or CMP cable as required by the application in accordance with the requirements of NFPA 70 (NEC).
 - a. For exposed low voltage wiring, use plenum cable.
 - b. For low voltage wiring concealed from view, only install wiring in the accessible locations permitted by the Contract Drawings.
 - 2. Neutral Conductors:
 - a. For each single-phase and each multi-phase feeder, provide separate neutrals.
 - b. For branch circuits, except at three-phase wye-connected panelboards, provide separate neutral conductors.
 - 1) For the three-phase wye-connected panelboards, provide common neutrals from 3 adjacent single-pole circuit breakers or from the poles of the same multi-pole circuit breaker.
 - c. Except for feeders with a small unbalanced and single-phase load, size each neutral the same as the largest phase conductor.
 - 1) For feeders with a small unbalanced and single-phase load, size the feeders to the largest of the following:
 - a) The size of any three-phase load connected to the neutral, which contains lighting, computer power outlets, instrumentation, or other electric loads.
 - b) The size required for 125 percent of the maximum unbalanced load.
 - 3. Equipment Ground Conductors:
 - a. Provide a green equipment ground conductor with all runs.
 - 1) Provide the equipment ground conductor wire type as specified in Section 26 05 26.
- B. Pulling Cable:
 - 1. Establish a feed-in point at the manhole, handhole, or building located at the highest elevation of the run, and pull cables down grade using flexible cable feeds to convey the cables into the duct runs through the feed-in point opening.
 - a. Furnish quadrant blocks located properly along the cable run.

- b. Limit cable pulling tensions to the maximum pulling tensions recommended by the cable manufacturer.
 - 1) Measure the cable pulling tension on all runs pulled with mechanical assistance and for all cable runs where calculations are required to be submitted by using a dynameter.
 - 2) Remove cables subjected to excessive bending and tension and that are cracked or have damaged or nicked outer jackets from the Site, and replace these cables with new undamaged cables.
 - a) If pulling tension is exceeding during pulling, remove the affected cables and mark them as not to be reused.
 - c. Lubricate cables with lubricants during pulling.
- C. Installing Cables in Manholes:
1. Install cable along the manhole wall that provides the longest route and the maximum spare cable length.
 2. Form cables so they closely parallel the walls, and do not interfere with duct entrances.
 3. Support cable on brackets and insulators spaced at a maximum of 2 feet apart.
 4. Use pulling lubricants approved by the cable manufacturer.
- D. Terminating Cable:
1. Terminate cable using materials and methods indicated or specified herein, or in accordance with the written instructions of the cable manufacturer or termination kit manufacturer.
 - a. For equipment connections, provide split bolt or compression type connectors, mechanical compression connectors, or crimped compression type connectors as specified and approved by the equipment manufacturer; for all other types of connections provide connectors of one of the types specified:
 2. Protect insulated power and lighting cable terminations from accidental contact, deterioration of coverings, and moisture by using proper terminating devices and materials.
 3. Ground the shield of VFD cables at both ends in accordance with the cable manufacturer's recommendations.
- E. Splicing Wire and Cable:
1. All new conductors shall be continuous from end to end without splices, except where indicated on the drawings or with the special written permission of the Engineer on a case-by-case basis where the Contractor can demonstrate that installation without splices is not practical.
 2. If permitted as noted above, splice cables in accessible locations.
 3. Below-Grade Splices:
 - a. In underground systems, locate splices above the 100 year flood level.
 - b. Make below-grade splices using a compression connector on the conductor.
 - c. Insulate and waterproof below-grade splices by methods suitable for continuous submersion in water using either of the methods that follow:
 - 1) Gravity Pour Method:
 - a) Provide an approved commercial waterproof splice kit with the necessary materials and equipment, including a mold suitable for the cables to be spliced.
 - (1) When the mold is in place around the joined conductors, prepare and pour the resin mix into the mold.

- 2) Cast-Type Splice Insulation:
 - a) Provide an approved commercial waterproof splice kit with the necessary materials and equipment, including a thermosetting epoxy resin insulating material applied by a gravity pour method or by a pressure injection method.
 - b) Fix cables in place until the splicing materials have completely set.
4. Within outlet or junction boxes, make wire and cable splices that conform to the requirements of NFPA 70 (NEC).
 - a. Install these outlet or junction boxes in accessible locations.

F. Wiring Identification:

1. Color code all feeder wires and cables as indicated in Table 260519-1.

Table 260519-1 Feeder Wire and Cable Color Coding			
Phase	480Y/277V 3Φ	208Y/120V 3Φ	120/240V 1Φ
A	Brown	Black	Black
B	Orange	Red	Red
C	Yellow	Blue	-
Neutral	Gray or White with Yellow Tracer	White	White
Electrical Ground Conductor	Green	Green	Green

2. Identify all power wiring by circuit and panelboard, switchboard, and motor control center numbers.
 3. Identify all control wiring with wire numbers.
 4. Provide additional electrical identification of cabling and wiring as specified in Section 260553 “Electrical Identification”.
- G. Refer to Section 260500 “Common Work Results for Electrical” for requirements for measuring and recording of conductor lengths.

3.5 FIELD QUALITY CONTROL

A. Site Tests:

1. Prior to energizing wire and cable, field test the wire and cable as specified in Section 260563 “Acceptance Electrical Testing”.

B. Inspection:

1. Record the actual installed elevations and locations of grounding cables and rods, both concealed and exposed, on the record drawings specified in Section 017839 “Project Record Documents”.
 - a. Verify that the control wiring wire numbers correspond to the numbers indicated in the record drawings.

END OF SECTION 260519

DIVISION 26 – ELECTRICAL
SECTION 260526 – GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
DPMC NO. A1346-00

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for connecting, energizing, testing, cleaning, and protecting grounding and bonding systems.

B. Comply with the requirements and provisions of the following:

1. Division 00 – Procurement and Contracting Requirements
2. Division 01 – General Requirements
3. Section 260500 – Common Work Results for Electrical

C. Related Sections:

1. Section 013300 – Submittal Procedures.
2. Section 017823 - Operation and Maintenance Data.
3. Section 260500 – Common Work Results for Electrical.
4. Section 260563 – Acceptance Testing of Electrical Systems.
5. Section 260519 – Low-Voltage Electrical Power Conductors and Cables
6. Section 260533.13 – Conduit for Electrical Systems
7. Division 31 - Earthwork

1.2 REFERENCES

A. American Public Works Association (APWA):

1. APWA Public Works Management Practices Manual.

B. American Society for Testing Materials (ASTM):

1. ASTM B 1; Standard Specification for Hard-Drawn Copper Wire.
2. ASTM B 3; Standard Specification for Soft-Drawn Copper Wire.
3. ASTM B 8; Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
4. ASTM C 653; Standard Guide for Determination of the Thermal Resistance of Low-Density Blanket-Type Mineral Fiber Insulation.
5. ASTM D 5; Standard Test Method for Penetration of Bituminous Materials.
6. ASTM D 149; Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies.
7. ASTM D 257; Standard Test Methods for D-C Resistance or Conductance of Insulating Materials.
8. ASTM D 570; Standard Test Method for Water Absorption of Plastics.

- C. InterNational Electrical Testing Association, Inc. (NETA):
 - 1. ANSI/NETA ETT Standard for Certification of Electrical Testing Technicians.
- D. National Fire Protection Association (NFPA):
 - 1. NFPA 70, National Electrical Code (NEC).
- E. National Electrical Manufacturing Association (NEMA):
 - 1. NEMA TC-2; Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
 - 2. NEMA TC-3; Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing.
 - 3. NEMA TC-14; Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.
 - 4. NEMA WC-7; Cross-Linked-Thermosetting-Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
- F. Underwriter's Laboratories, Inc. (UL):
 - 1. UL 467, Standard for Grounding and Bonding Equipment.
 - 2. UL 486A-486B, Wire Connectors.
 - 3. UL 486C, Standard for Splicing Wire Connections.
 - 4. UL 486D, Standard for Insulated Wire Connector Systems for Underground Use or in Damp or Wet Locations.
 - 5. UL 486E, Standard for Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors.

1.3 DESIGN REQUIREMENTS

- A. Design the electrical system installation to conform to Article 300 of NFPA 70, Wiring Methods, and to other applicable articles of NFPA 70 governing methods of wiring.
- B. Ground the conduit systems, metal enclosures, equipment frames, motors, and receptacles in accordance with Article 250 of NFPA 70, Grounding.
 - 1. Ground all metallic conduits, wiring channels, and armored cables continuously from outlet to outlet, and from outlets to cabinets, junction boxes, or pull boxes.
 - a. Bond each run of raceways to form a continuous path for ground faults from end to end.
 - b. When liquid tight flexible metal conduit sizes larger than 1-inch or flexible metal conduit are installed, provide external bond wires.
 - 2. Grounding Bushings:
 - a. Provide all 1-inch or larger metallic conduits with grounding bushings unless they enter metallic enclosures via integral threaded hubs.
 - b. Provide grounding bushings for conduits entering the bottom of freestanding equipment.
 - c. Bond wire from every grounding bushing to the equipment ground stud or ground bus in the enclosure.
 - d. Bond the grounding bushings to ground studs or ground buses in the enclosures.
 - 3. Provide insulated, internal equipment ground wire in all conduits.
 - a. Bond the internal wire to all pullboxes, junction boxes, equipment enclosures, and other enclosures as required by NFPA 70.

C. Equipment Grounds:

1. Design all feeders and branch circuits to include an equipment grounding conductor consisting of a copper wire within a raceway or cable and sized as specified herein.
 - a. Where conductors are run in parallel in multiple raceways, run the equipment grounding conductor in parallel to the related conductors.
 - b. Size each of the parallel equipment grounding conductors on the basis of the ampere rating of the circuit overcurrent protecting device.
2. Ground enclosing cases, mounting frames, rack mounted components, rack struts, switches, breakers, control panels, motors, and other electrical or electrically operated equipment by providing an equipment grounding conductor with phase conductors from an established equipment ground source.

D. Ground Wire Sizes:

1. The minimum size for bonding jumpers, equipment ground conductors, grounding electrode conductors, and ground grid conductors is as follows:
 - a. Under 600 volts:
 - 1) Provide #12 AWG, minimum.
 - 2) Control power circuits, Provide #14 AWG, minimum.
 - b. Over 600 volts:
 - 1) For transformers, provide #2 AWG ground wire, minimum.
 - 2) For motors, provide #4 AWG ground wire, minimum.
2. When the ground wire size is not specified or indicated on the Contract Drawings, provide wire sized in accordance with the requirements of NFPA 70.

E. Within 60 days of the Contract award, submit the following:

1. The Submittals required by Section 260500.
 - a. Include Product Data and Catalog Cuts for all products provided, and describe the usage of each product.
2. Shop Drawings for the ground well grid installation in unpaved areas.
3. Shop Drawings for the ground well grid installation in paved areas.
4. Shop Drawings for the ground bus installation.

F. Project Record Documents:

1. Prepare and submit record drawings showing the actual installed elevations and locations of grounding cables and rods for both concealed and exposed work provided under this Contract.

G. Project Closeout:

1. Submit Operation and Maintenance Manuals that include the record drawings and all Product Data in accordance with Section 017823.

1.4 SUBMITTALS

- A. Submit the following information for approval in accordance with the requirements of Section 26 05 00:
 1. Product Data:
 - a. Manufacturer's product data

2. Shop Drawings:
 - a. Ground well grid installation in unpaved areas.
 - b. Ground well grid installation in paved areas.
 - c. Ground bus installation.
3. Quality Assurance/Quality Control Submittals:
 - a. Certificates:
 - 1) Testing agency product certification
 - b. Qualification Statements:
 - 1) System installers' qualifications
 - 2) Installation supervisors' resumes
4. Closeout Submittals:
 - a. Operation and Maintenance Manuals

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Installer Qualifications:
 - a. Employ installers who specialize in the work of this Section, and who can demonstrate a minimum of three years documented experience.
 - b. Submit the system installers' qualifications.
2. Supervisor's Qualifications:
 - a. Employ supervisor to supervise the installation work who are skilled licensed electricians.
 - b. Submit the installation supervisors' resumes.
3. All products are to be certified by Underwriters Laboratories, Inc. (UL),

B. Regulatory Requirements:

1. All grounding and bonding Work must comply with the requirements of NFPA 70, the National Electrical Code.

C. Certifications:

1. Testing Agency Product Certification:
 - a. Verify product quality by certifying products as meeting the requirements of one of the following:
 - 1) Underwriters Laboratories, Inc. (UL).
 - a) Provide products listed and labeled by UL.
 - b. Testing agency product certification must include agency listing and labeling, either by a printed mark on the data or by a separate listing card.
 - 1) If an item does not have this quality assurance verification, provide a written statement from the product manufacturer indicating why not; such manufacturer's statements are subject to the approval of the Owner and the Engineer.

1.6 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling, and Unloading:

1. Transport materials, both on site and from Contractor's storage to site, in accordance with the recommendations of the respective manufacturers.

B. Storage and Protection:

1. Store materials, both on and off site, in accordance with manufacturer's written instructions.
2. Store products indoors on blocking or pallets.

PART 2 PRODUCTS**2.1 MATERIALS**

A. Conduit and Conduit Fittings:

1. For conduit and conduit fittings that enclose single ground wires without accompanying circuit conductors provide one of the following:
 - a. Schedule 80, non-metallic conduit and fittings conforming to the requirements of Section 16131 and the conduit additionally conforming to the requirements of NEMA TC-2, and the fittings additionally conforming to the requirements of NEMA TC-3.
 - b. Fiberglass reinforced plastic (FRP) conduit and fittings conforming to the requirements of NEMA TC-14 and Section 26 05 33.13.
2. For other conduit and conduit fittings, provide conduit of the types specified or indicated and that conform to the requirements of Section 260533.13.

B. Wire:

1. Bare Ground Wire:
 - a. Soft drawn copper, Class A or Class B stranded, meeting the requirements of ASTM B3 for sizes #6 or larger.
 - b. Soft drawn solid copper, meeting the requirements of ASTM B3 for sizes #8 or smaller.
2. Insulated Ground Wire:
 - a. Provide insulated Class B copper stranded wire rated for 600 volts that conforms to the requirements of NEMA WC-7, and is green in color. Insulation type shall be as specified in Section 26 05 19.
3. Acceptable Manufacturers:
 - a. Continental Wire & Cable Company
 - b. SouthWire
 - c. General Cable
 - d. Okonite Co.
 - e. Or Approved Equal

C. Mechanical Lugs and Connectors

1. Comply with 26 05 19.

D. Exothermic Welding Kits:

1. Provide molds, thermite packages, and other material for exothermic welds that are rated to carry 100 percent of the cable ratings, and which are letter-coded exothermic welded type.
2. Provide all items such as tees, crosses, splices, and cable connections necessary for connecting ground and bonding cables to the following items:
 - a. Ground rods.
 - b. Reinforcing steel bars.
 - c. Ground-bus.

- d. Structural steel.
 - e. Water pipe.
 - f. Bonding to the main-ground-grid.
 - g. Bonding to Copper Grounding Bus Bar
 3. Provide all exothermic welding molds, thermite packages, and other material used throughout the Work from a single manufacturer.
 4. Acceptable Manufacturers:
 - a. Erico, Cadweld
 - b. Harger
 - c. Continental Industries, Inc., Thermoweld
 - d. Or Approved Equal
- E. Ground Rods:
1. Provide UL listed, sectional ground rods fabricated using a electrolytic plating process to copper clad a medium carbon steel core
 2. Diameter: 3/4 inch.
 3. Length: 10 feet.
 - a. To obtain longer length rods, join rod sections using copper clad rod couplers.
 4. Acceptable Manufacturers:
 - a. Erico International Corp.
 - b. Galvan Industries, Inc.
 - c. South Atlantic, LLC
 - d. A.B. Chance Co.
 - e. Or Approved Equal
- F. Concrete Protective Boxes (Ground Wells):
1. Provide precast concrete boxes with flush cast iron covers rated for heavy traffic H20 areas and having slots for conduit entrances.
 - a. Minimum size: 10” diameter by 12” high with maximum depth up to 36”.
 - b. Cover legend: Provide the cast-in legend “GROUND TEST WELL” in the cast iron covers provided.
 2. Acceptable Manufacturers:
 - a. National Lightning Protection Corporation
 - b. Harger
 - c. East Coast Lightning Equipment
 - d. Or Approved Equal

PART 3 EXECUTION

3.1 EXAMINATION

- A. Site Verification of Conditions:
1. The Contract Drawings are generally indicative of the Work, but due to their small scale, it is not possible to indicate some offsets and fittings required nor the minor structural obstructions that may be encountered.
 - a. Perform field measurements to discover offsets and fitting requirements not shown.

- b. Locate all on-site utilities and other obstructions in the area of construction, and verify that interferences will not occur.

3.2 PREPARATION

- A. Layout electrical work to suit actual field conditions and in accordance with accepted standard practice.

3.3 INSTALLATION

- A. Perform required earthwork including excavation, backfill, and compaction, as specified in Division 31.
- B. Construct each ground system and connection so it is mechanically secure and electrically continuous.
 1. Secure grounds to boxes in such a manner that each system is electrically continuous from the point of service to each outlet.
 2. Terminate conduits using double locknuts and bushings.
 - a. Unless a conduit run enters a metallic enclosure via integral threaded hubs, provide the conduit run with two locknuts.
 3. Clean paint, grease and such other insulating materials from the contact points of grounds.
- C. Ground Grids:
 1. Installing Ground Rods:
 - a. Drive ground rods head to 6 inches below grade by using a ground rod cap to protect the head of the rod.
 - 1) If the top of the rod is damaged during driving operations, cut it off.
 2. Installing Ground Wells:
 - a. Install a concrete protective box for the ground well flush with the grade and 4 inches above the top of the ground rod designated on the Contract Drawings.
 3. Installing Ground Wires:
 - a. Excavate the trenches for the ground grid cables, and lay the ground cable in the trenches from ground rod to ground rod without splice, and from one side of the grid to the other as shown on the Contract Drawings.
 - 1) Lay the ground grid cables allowing 10 percent slack.
 - 2) Form 12-inch minimum radius bends at changes in direction.
 - 3) At intersections, place cables so they diverge 60 degrees or more from other cables at the intersection.
 - 4) Connect service entrance grounds directly to the ground grids without splices in the cable.
 - b. Route connecting cables from the ground grid in the trenches to the building structure.
 - 1) Route exposed cables parallel to the building lines, except for bends; form all bends with a 12-inch minimum radius.
 - 2) Wherever the cable breaks grade, provide schedule 80 conduit from 2-feet below finished grade to 3-feet above finished grade for protection; and provide conduit at other points where the cable may be subject to damage.
 - c. Clamp the conduit to the building structure's wall at the ends and at intervals not to exceed 5 feet.

- 1) Whenever cable exits from the conduit, clamp the cable to the wall at intervals not to exceed 5 feet and at each entrance to equipment.
 - 2) Allow a 1/4 inch space between ground cables, conduit, and the surface it is mounted on.
 - d. Remove any damaged or kinked cable.
 4. Welding ground wires to the ground rods and equipment connections.
 - a. Follow the procedures of the exothermic welding kits manufacturer.
 - b. Prior to welding ground wires to the ground rods and equipment connections perform the following:
 - 1) Clean the proposed welding area of combustible and flammable materials; and block access to personnel to protect them from harm; and provide a shield to prevent damage to other materials.
 - 2) Clean insulation from ground wire for a distance of 12 inches, and clean the exposed wire to a bright finish.
 - 3) Clean paint, grease, and other similar insulating materials from contact points.
 - 4) Inspect the molds for damage; and discard any faulty mold or any molds used over 40 times.
 - c. Exothermically weld the ground wires to the ground rods as shown on the Contract Drawings, including to ground rods at grid crossings, to ground rods at grid intersections on the sides of the ground grid, and at all equipment connections.
 5. Make all connections to electrical equipment and ground buses with compression, two-hole lugs and studs.
 - a. Clean paint, grease, and other similar insulating materials from the contact points for the ground lugs and studs.
 - b. Clean all wires to a bright finish prior to construction the connections.
- D. Equipment Ground Buses:
1. Whenever several pieces of equipment, other than service grounds, require external bond wires in an area, provide an equipment ground bus.
 2. Wherever 5 or more conduits enter a box or enclosure, provide an equipment ground bus.
 - a. Connect all equipment ground wires and conduit bond wires within the box or enclosure to a single ground stud or single common ground bus.
 3. Size ground buses to carry 100 percent of the rating or setting of the largest over current device in the circuit(s) ahead of the equipment, conduit, or other item, and as indicated on the Contract Drawings.
- E. Equipment Grounds:
1. Install equipment grounds in spaces accessible to authorized personnel only.
 2. Equipment Grounding Connectors:
 - a. Only use approved grounding connectors.
 - 1) Terminate grounds with closed lugs with star washers on both sides and a 1/4-20 bolt and nut, minimum; spade lugs are not allowed.
 - 2) For portable electrical equipment, provide electric cords having an equipment grounding conductor and a NEMA and UL approved cord cap.
 - b. Do not install grounding lugs on flanges, mounting screws, or standoffs in switches, distribution boxes, or panels.
 - c. Cover or coat grounding clamps and connectors with coating compound.
 3. Equipment Grounding Conductors:

- a. Unless using multi-conductor cable, run equipment grounding conductors inside the same conduit or wiring channel enclosing the power conductors.
 - b. In multi-conductor cable, locate grounding conductor inside the sheath or cable.
 - c. Do not use a system neutral or a current carrying conductor as the equipment grounding conductor.
 - 1) Do not ground the electrical and electronic equipment neutral to chassis, racks, equipment ground conductor, or any non-current carrying conductor on the equipment.
4. Grounding Lighting Fixtures:
- a. Provide the housing of each lighting fixture with a separate, factory-installed grounding device and ground conductor.
 - b. Use the factory-installed grounding device for connecting a separate grounding conductor meeting applicable grounding requirements of the NEC to the fixture.
 - 1) Provide a green covered grounding conductor of the same wire gauge as the two power feed wires.
 - 2) Provide a continuous ground for the fixture construction.
5. Grounding Motors:
- a. Install equipment grounding wire within conduit supplying power to motor.
 - b. Install bonding connectors across the liquid tight flexible conduit supplying motors.
6. Grounding Transformers:
- a. If a transformer is a separately derived system as defined in NFPA 70, provide a ground wire in both the primary and secondary conduits; and bond the ground wire and metallic conduits, if used, to the nearest effectively grounded metallic water pipe or nearest effectively grounded structural steel column.
 - b. Provide an additional bond between cold or hot water pipes and structural steel located near a transformer bond connection.

3.4 REPAIR/RESTORATION

- A. Replace any finished exothermic welded splice connections that inspections find to be defective.
- B. After inspection by Engineer and Owner's representative, backfill the direct buried cables and around ground rod protectors.
 1. Begin backfilling with clean washed sand to 6 inches above the ground rods or to the depth shown on the Contract Drawings, whichever is greater.
 2. Backfill using select fill in accordance with the requirements of Division 31.
 3. Slope the finish grade away from ground rods at a slope of 1 inch in 18 inches for a distance of 27 inches from the rods in all directions.
- C. Install underground warning tape above all buried cables/conduits at a depth of 12" below finished grade.

3.5 FIELD QUALITY CONTROL

- A. Site Testing:
 1. Prior to energizing any system, test the resistance to ground for the system in accordance with Section 26 05 63.

- a. Perform a continuity test from all utilization and distribution equipment to the ground grid on a run-by-run basis.
- B. Inspection:
1. Prior to completion of the Work of this Section, inspect the items provided for conformity to the Contract Drawings and Specifications.
 - a. Leave in-place "made grounds" open until they have been inspected and approved by the Engineer.
 - b. Clean the surfaces involved in "made grounds" before connecting the grounds, and finish the installation with touch up painting or another protective coating to prevent corrosion.
 2. Inspect finished exothermic welded connections for the following defects:
 - a. Conductors appear within the splice area.
 - b. Top of splice risers are below conductors.
 - c. Surfaces exhibiting more than 20 percent slag material.
 - d. Surfaces with over slag material that has flowed into conductors.
 - e. Mold blowouts.
 - f. Excessive porosity.
 - 1) Small pores less than 1/32 inch are permitted.

3.6 PROTECTION

- A. Protect finished insulated wires from being painted.
- B. Protect all ground grid wells from damage during paving and landscaping.
- C. Protect all ground grid installations and ground wires from damage during the work of other Sections.

END OF SECTION 260526

DIVISION 26 – ELECTRICAL
SECTION 260529 – HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for furnishing, installing, cleaning, and protecting hanger and support systems for electrical wiring, conduit boxes, and equipment.

B. Comply with the requirements and provisions of the following:

1. Division 00 – Procurement and Contracting Requirements
2. Division 01 – General Requirements
3. Section 260500 – Common Work Results for Electrical

C. Related Section:

1. Section 260500 – Common Work Results for Electrical

1.2 REFERENCES

A. American Iron and Steel Institute (AISI):

1. AISI Standard Steels (Handbook).

B. American Society for Testing Materials (ASTM):

1. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel.
2. ASTM A 53/A 53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated - Welded and Seamless.
3. ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
4. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
5. ASTM A 283/A 283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
6. ASTM A 325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi, Minimum Tensile Strength.
7. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
8. ASTM A 563 - Standard Specification for Carbon and Alloy Steel Nuts.
9. ASTM A 575 - Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades.
10. ASTM A 576 - Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality.
11. ASTM A 635/A 635M - Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Carbon, Hot-Rolled.

12. ASTM A 1011/A 1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
 13. ASTM B 633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
 14. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- C. American Welding Society (AWS):
1. AWS D1.1/D1.1M - Structural Welding Code - Steel.
- D. National Electrical Manufacturers Association (NEMA):
1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts maximum).
- E. National Fire Protection Association (NFPA):
1. NFPA 70 - National Electrical Code (NEC).
 2. NFPA 258 - Standard Research Test Method for Determining Smoke Generation of Solid Materials.
- F. Society of Automotive Engineers International (SAE):
1. SAE J 429 - Mechanical and Material Requirements for Externally Threaded Fasteners.
- G. The Society for Protective Coatings (SSPC):
1. SSPC Painting Manual.
 - a. SSPC-SP 2 - Hand Tool Cleaning.
 - b. SSPC-Paint 15 - Paint Specification No. 15, Steel Joist Shop Paint, Type I, Red Oxide Paint, Type II, Asphalt Coating.
 - c. SSPC-Paint 20 - Paint Specification No. 20, Zinc-Rich Primers (Type I, "Inorganic," and type II, "Organic").
- H. Underwriters Laboratory, Inc. (UL):
1. UL 568 - Nonmetallic Cable Tray Systems.
 2. UL 635 - Standard for Insulating Bushings.
 3. UL 870 - Standard for Wireways, Auxiliary Gutters, and Associated Fittings.
 4. UL 884 - Standard for Underfloor Raceways and Fittings.
 5. UL 1479 - Standard for Fire Tests of Through-Penetration Firestops.
 6. UL 2239 - Hardware for the Support of Conduit, Tubing, and Cable.
- I. U. S. General Services Administration (GSA)
1. Federal Specifications:
 - a. A-A-1922A - Shield, Expansion (Caulking Anchors, Single Lead).
 - b. FF-S-107C(2) - Screws, Tapping and Drive.

1.3 SUBMITTALS

- A. Submit the following information to the Engineer for approval in accordance with the requirements of Section 26 05 00:
1. Product Data:
 - a. Provide product data and catalog cuts for the products provided under this Section.

2. Shop Drawings:
 - a. Provide Shop Drawings.
 - b. Provide Shop Drawings of hanging supports for conduit.
3. Quality Assurance/Control Submittals:
 - a. Design Data:
 - 1) Provide structural calculations for the following items:
 - a) Equipment backboards and support structures not directly fastened to the walls.
 - b) Hanging supports for conduit.
 - 2) Detailed drawings of proposed departures from the original design.
 - b. Certificates:
 - 1) Testing Agency/Quality Verification:
 - a) With the product data for electrical hangers and supports, provide evidence of quality verification, listing, and labeling by the Electrical Testing Agency (ETA); either by a printed mark on the data, or by a separate listing card.
 - b) If an item does not have ETA quality assurance verification, provide a written quality assurance verification statement from the product manufacturer indicating why the item does not have the specified quality assurance verification.
 - (1) Such quality assurance verification statements are subject to approval by the Owner and the Engineer.
 - 2) Manufacturers' Certificate of Compliance.
 - c. Qualification Statements:
 - 1) Manufacturers' qualifications.

1.4 QUALITY ASSURANCE

A. Qualifications;

1. Electrical Testing Agency (ETA) Qualifications:
 - a. Use the Electrical Testing Agency (ETA) qualified as specified in Section 26 05 00.
2. Manufacturers' Qualifications:
 - a. Provide electrical support framing made by manufacturers that have been manufacturing support framing for a minimum of 5 years, and who carefully controls their operations to ensure that excellent product engineering, quality, safety, and reliability are achieved.
 - b. Submit the manufacturer's qualifications to the Engineer for approval.

B. Certifications:

1. Electrical Testing Laboratory (ETL) Certification:
 - a. Provide products that are listed and labeled by Underwriters Laboratory, Inc. (UL) or certified as meeting the standards of UL by the Electrical Testing Laboratory (ETL) unless products meeting the requirements of these testing laboratories are not readily available or unless standards do not exist for the products.
2. Manufacturers Certificate of Compliance:
 - a. Submit a manufacturer's Certificate of Compliance certifying that both the galvanizing and the products meet the requirements of the ASTM standards.

1.5 DELIVERY, STORAGE AND HANDLING

A. Packaging, Shipping, Handling, and Unloading:

1. Deliver, store, and handle the hangers and supports in accordance with Section 26 05 00, and as specified herein.
2. Deliver material to Site in the original factory packaging.

B. Storage and Protection:

1. Shelter and store the components under cover, and supported off the ground and floors on blocking.

PART 2 PRODUCTS

2.1 MATERIALS

A. Carbon Steel Shapes:

1. Provide shapes of the sizes specified and as indicated on the Contract Drawings:
2. Provide steel shapes complying with the following material specifications for the type of steel shape listed:
 - a. Steel Sections: ASTM A36/A 36M.
 - b. Steel Tubing: ASTM A 500, Grade B.
 - c. Plates: ASTM A 283/A 283M.
 - d. Sheets: ASTM A 1011/A 1011M.
 - e. Pipe: ASTM A 53/A 53M, Grade B, Schedule 40, hot-dipped, zinc-coated.

B. Welding materials:

1. Provide welding materials complying with the requirements of AWS D1.1/D1.1M for the type of material being welded.

2.2 MANUFACTURED UNITS

A. Metal U-Channel Electrical Support Framing Systems and Fittings:

1. Carbon Steel U-Channel Support Framing Systems:
 - a. Provide 1-5/8-inch nominal size U-channel supports fabricated from 12 gauge carbon steel electrolytically galvanized with a zinc-coating thickness commensurate with Service Condition SC 1 (mild) in conformance with the requirements of ASTM B 633.
 - 1) For Type II ASTM B 633 galvanized finishes, fabricate the framing from steel complying with the requirements for Grade 33 specified in ASTM A 1011/A 1011M.
 - 2) For Type III ASTM B 633 galvanized finishes, fabricate the framing from steel complying with the requirements of ASTM A 575, ASTM A 576, ASTM A 635/A 635M, or ASTM A 36/A 36M.
 - b. Where combination members are required, spot-weld the members on 3-inch centers.
 - c. Provide 1-3/8-inch or larger depths, except where supports are mounted directly to walls 13/16-inch or larger depths may be provided.

- d. Provide metal framing systems and fittings for metal framing systems from a single manufacturer.
 - e. Manufacturers:
 - 1) Unistrut Corporation
 - 2) Thomas & Betts
 - 3) Cooper B-Line
 - 4) Or Approved Equal
 2. Stainless Steel U-Channel Support Framing Systems:
 - a. Provide U-channel supports, fittings, threaded rod, and hardware fabricated from Type 316 stainless steel.
- B. Nonmetallic Electrical Support Framing Systems and Fittings:
1. Fiberglass Reinforced Polyester Angles, Channels, and Bars:
 - a. Provide non-metallic angles, channels, and bars fabricated from a high impact strength, fiberglass reinforced polyester formulation having a glass to resin ratio of 45 to 55 percent by weight.
 - b. Provide angles, channels, and bars that meet or exceed a Class 1 flame spread rating of less than 25 determined according to the requirements of ASTM E 84, and a smoke rating of 5 determined according to the requirements of the Smoke Chamber Test specified in NFPA 258.
 2. Pre-Engineered Glass-Fiber-Reinforced Supporting Systems:
 - a. Pre-engineered, UL-listed supporting systems fabricated from glass-fiber-reinforced composites may be used in lieu of field-fabricated support systems.
 3. Manufacturers:
 - a. Unistrut Corporation
 - b. Thomas & Betts
 - c. Cooper B-Line
 - d. Enduro Systems
 - e. Or Approved Equal
- C. Conduit Supports:
1. Malleable Iron Conduit Supports:
 - a. Provide one-hole style galvanized malleable iron fasteners with pipe straps similar to those as manufactured by Thomas & Betts.
 - b. Provide support devices consisting of threaded rods, channel supports, and conduit straps/fasteners.
 2. Stamped Steel Conduit Supports:
 - a. Provide one-hole style galvanized stamped steel fasteners with pipe straps similar to those as manufactured by Thomas & Betts.
 - b. Provide support devices consisting of threaded rods, channel supports, and conduit straps/fasteners.
 3. Special Finishes:
 - a. Where PVC-coated RGS conduits are to be installed, provide stainless steel conduit supports including the threaded rods, channel supports, and conduit straps/fasteners.
 4. Manufacturers:
 - a. Unistrut Corporation
 - b. Thomas & Betts
 - c. Cooper B-Line
 - d. Or Approved Equal

D. Bolts, Nuts, and Washers:

1. For bolts, nuts, and washers smaller than 1/4-inch trade size, provide 316 stainless steel fasteners complying with the requirements of ASTM A 325.
2. For fastening galvanized components, provide stainless steel bolts, nuts, and washers galvanized in accordance with the requirements of ASTM A 325.

E. Anchors and Fasteners:

1. Drive (Deep-Pitch) Screws:
 - a. Provide Type 316 stainless steel self-tapping type drive (deep-pitch) screws that comply with the requirements of FF-S-107C(2).
2. Drilled-In Anchors and Fasteners:
 - a. Provide drilled-in anchors and fasteners that comply with the requirements of FF-S-107C(2).
 - b. Masonry Anchors:
 - 1) Provide masonry anchors designed to accept both machine bolts and threaded rods as fasteners.
 - a) Provide SAE J 429 Grade 2 machine bolt fasteners fabricated from AISI Type 316 stainless steel.
 - b) Provide nuts and washers conforming to the requirements of ASTM A 563.
 - 2) Provide masonry anchors consisting of an expansion shield and expander nut contained inside the shield.
 - a) Expander Nuts:
 - (1) Fabricate square expander nuts with their sides tapered inward from the bottom to the top.
 - (2) Design the expander nuts to simultaneously climb the bolt or rod thread and expand the shield as soon as the threaded expander nut reaches and bears against the shield bottom when being tightened.
 - b) Expansion Shields:
 - (1) Provide expansion shield bodies consisting of four legs, the inside of each tapered toward the shield bottom, or nut end.
 - (2) The end of one leg shall be elongated and turned across shield bottom. Outer surface of shield body shall be ribbed for grip-action.
 - 3) Masonry Anchor Material:
 - a) Provide die cast Zamac No. 3 zinc alloy having a 43,000 psi minimum tensile strength.
 - 4) Manufacturers:
 - a) U.S.E. Diamond, Inc., FORWAY System
 - b) Aerosmith Anchors
 - c) Hilti USA
 - d) Or Approved Equal
 - c. Concrete Anchors:
 - 1) Stainless Steel Anchor/Fastener:
 - a) Provide one-piece AISI Type 303 or 304 stainless steel studs (bolts) with integral expansion wedges, AISI Type 316 stainless steel nuts, and AISI Type 316 stainless steel washers.
 - b) Provide stainless steel anchor/fasteners complying with the physical requirements of FF-S-325 for Group II, Type 4, Class 1.
 - 2) Acceptable Manufacturers:
 - a) U.S.E. Diamond, Inc.; SUP-R-STUD

- b) Hilti Fastening Systems; KWIK-BOLT
 - c) Molly Fastener Group; PARABOLT.
 - d) Phillips; RED HEAD Wedge-Anchor
 - e) Or Approved Equal
- 3) Hammer drive-type explosive charge drive-type anchors and fastener systems are unacceptable.
3. Lead shields, plastic-inserts, fiber-inserts, and drilled-in plastic sleeve/nail drive systems are unacceptable.

2.3 ACCESSORIES

A. Wall Seals:

1. Provide a hydrostatic seal to fill the annular space between conduit and through structure openings.
2. Manufacturer:
 - a. PSI-ThunderLine/Link-Seal Corp., Link-Seal
 - b. Eaton Crouse-Hinds
 - c. Diversified Fluid Controls Inc.
 - d. Or Approved Equal

B. Fire Seals:

1. Where conduit penetrates fire-rated walls, floors, partitions, and ceiling, provide approved fire seals to ensure that the fire rating is maintained.
2. Provide a fire seal system which is UL-listed for the application.
 - a. Provide fire seal compound or a mechanical seal for fire rating of 2 hours or less.
3. Manufacturers:
 - a. Compound Fire Seals:
 - 1) Dow Corning Corporation
 - 2) 3M
 - 3) Trelleborg
 - 4) Or Approved Equal
 - b. Mechanical Fire Seals:
 - 1) PSI-ThunderLine/Link-Seal Corp
 - 2) STI Technologies
 - 3) Or Approved Equal
 - c. Through-Wall Barrier Fire Seals:
 - 1) Cooper Crouse-Hinds
 - 2) Hoodmart
 - 3) Kastar
 - 4) Or Approved Equal

2.4 FABRICATION

- A. Fit and shop assemble items in the largest sections practical for delivery to the Site.

2.5 FINISHES

- A. Prime paint non-galvanized steel items.
 - 1. Prepare surfaces to be primed in accordance with the requirements of SSPC-SP 2.
 - a. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
 - 2. Prime Painting: Apply one coat of primer.
- B. Galvanizing items specified above as galvanized.
 - 1. Galvanize the items after fabrication in accordance with the requirements of ASTM A 123/A 123M.
 - 2. Provide a minimum galvanized coating of 1.25 ounces per square feet (380 grams per square meter).
- C. Touch-Up Primer:
 - 1. For un-galvanized metal surfaces: Provide primer complying with the requirements of SSPC-Paint 15 for Type I, Red Iron Oxide.
 - 2. For galvanized surfaces: Provide primer complying with the requirements of SSPC-Paint 20 for Type I, Inorganic Zinc-Rich Primer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Field Measurement:
 - 1. Although the Contract Drawings are generally indicative of the Work, take field measurements to verify actual conditions.
 - a. Due to the small scale of the Contract Drawings it is not possible to indicate all offsets, fittings, and apparatus required or the minor structural obstructions that may be encountered during the Work.
 - 2. Carefully investigate the structural and finish conditions, and other construction work, at the Site which may affect the work of this Section.

3.2 PREPARATION

- A. After carefully investigating structural and finish conditions and other in-place construction work, produce detailed Shop Drawings showing proposed departures from the original design due to field conditions or other causes.
 - 1. Layout the electrical work according to accepted standard electrical trade practice to suit actual field measurements.
 - 2. Arrange the electrical work to consider existing conditions and to preserve access to other equipment, rooms, areas, and similar features of the construction.
 - 3. Provide plan and profile views of duct banks, and show equipment backboards and support structures not directly fastened to the walls on the Shop Drawings.
 - 4. Indicate the location and details of conflicting utility construction and slopes on the Shop Drawings.

5. Submit the Shop Drawings to the Engineer for approval prior to performing the Work of this Section.
- B. Obtain roughing-in dimensions of electrically operated equipment, including equipment being installed by both electrical and other construction trades.
1. Set conduit and boxes only after receiving approved dimensions and checking such equipment locations.
 2. Arrange electrical Work accordingly and furnish such fittings and apparatus as required to accommodate such conditions and to preserve access to other equipment, rooms, areas, and similar spaces.

3.3 INSTALLATION

- A. Install electrical Work in conformance to the requirements of NFPA 70 for wiring methods general requirements, and to other applicable Articles of the NEC governing methods of wiring.
- B. Installing Anchors and Fasteners:
1. For anchoring or fastening applications in masonry and hollow-core precast concrete structural elements, provide masonry anchors as specified herein.
 2. For anchoring or fastening applications in cast-in-place concrete and solid precast concrete structural elements, provide concrete anchors as specified herein.
 3. Threaded Bolts:
 - a. Draw threaded bolted connections up tight using 316 stainless steel lock washers to prevent the bolt or nut from loosening.
 4. Drilled-In Expansion Anchors:
 - a. Install expansion anchors in strict accordance with manufacturer's instructions and the following.
 - 1) Drill holes to the required diameter and depth in accordance with anchor manufacturer's instructions for the size of anchor being installed.
 - 2) Minimum Embedment:
 - a) Embed expansion anchors to four and one-half bolt diameters minimum unless otherwise indicated on the Contract Drawings.
- C. Field Fabrication:
1. Fabricated Items:
 - a. Fabricate backboards, backboard supports, equipment supports, conduit supports, and the other items as detailed on the Contract Drawings.
 - 1) Hot-dip galvanize mild-steel fabrications in accordance with the requirements of ASTM A 153/A 153M.
 - b. Fabricate backboard posts as detailed on the Contract Drawings from concrete filled steel pipe with a crowned cap; and apply a prime paint finish.
 - c. Supply components required for the anchorage of fabrications.
 - 1) Except where specifically noted otherwise, fabricate anchors and related components from the same material as the fabrication and apply the same finish.
 2. Tightly fit and secure joints.
 - a. Make exposed joints butt tight, flush, and hairline.
 - b. Weld fabricated assemblies in accordance with AWS D1.1/D1.1M.
 - 1) Continuously seal joined members using intermittent welds and plastic filler.

- 2) Dress welds smooth and free of sharp edges and corners.
- c. Grind exposed joints flush and smooth with the adjacent finish surface.
3. Ease exposed edges to a small uniform radius.
 - a. Cut all backboard corners to a 1-inch radius.
4. For the attachment of work and for bolted connections, accurately drill or punch holes for the fasteners as required.
 - a. Burned holes are unacceptable.
 - b. Provide holes no more than 3/32-inch larger than the fasteners.
5. Exposed Mechanical Fastenings:
 - a. Except where specifically noted otherwise in the Contract Documents, provide flush countersunk screws or bolts; unobtrusively located, and consistent with the design of the component.
6. Fabrication Tolerances:
 - a. Squareness: 1/8 inch (3 mm), maximum difference in diagonal measurements.
 - b. Maximum offset between faces: 1/16 inch (1.5 mm).
 - c. Maximum misalignment of adjacent members: 1/16 inch (1.5 mm).
 - d. Maximum bow: 1/8 inch (3 mm) in 48 inches (1.2 m).
 - e. Maximum deviation from plane: 1/16 inch (1.5 mm) in 48 inches (1.2 m).

3.4 REPAIR/RESTORATION

A. Coatings:

1. Repair damage to coatings.
 - a. Touch up damaged coating surfaces using the specified primer for primed steel surfaces, and using zinc-rich primer for galvanized steel surfaces.

3.5 FIELD QUALITY CONTROL

A. Inspection:

1. Verify the adequacy of coatings.
2. Inspect the items provided under this Section for adherence to the fabrication tolerances specified above, and correct any discrepancies:

3.6 PROTECTION

- #### A. Protect the items provided under this Section from damage during the work of other trades.

END OF SECTION 260529

DIVISION 26 – ELECTRICAL
SECTION 260533 – RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for furnishing, installing, connecting, cleaning, and protecting electrical pull and junction boxes.

B. Comply with the requirements and provisions of the following:

1. Division 00 – Procurement and Contracting Requirements
2. Division 01 – General Requirements
3. Section 260500 – Common Work Results for Electrical

C. Related Section:

1. Section 260500 – Common Work Results for Electrical
2. Section 260519 - Low-Voltage Electrical Power Conductors and Cables
3. Section 260526 – Grounding and Bonding for Electrical Systems
4. Section 260529 – Hangers and Supports Systems for Electrical Systems
5. Section 260533.13 – Conduit for Electrical Systems
6. Section 260563 – Acceptance Testing of Electrical Systems

1.2 REFERENCES

A. National Electric Manufacturer's Association (NEMA):

1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
2. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.

B. National Fire Protection Association (NFPA):

1. NFPA 70 - National Electrical Code (NEC).

C. American National Standards Institute (ANSI):

1. ANSI Z55.1 - Gray Finishes for Industrial Apparatus & Equipment (*withdrawn 1990, no replacement*).

D. Underwriters Laboratories, Inc. (UL):

1. UL 886 - Standard for Outlet Boxes and Fittings for Use In hazardous (Classified) Locations.

1.3 DESIGN REQUIREMENTS

A. Product Data:

1. Submit a list of the materials proposed to satisfy the requirements of this Section.
2. Submit the manufacturer's comprehensive calculations used to determine size requirements for the boxes.
3. Submit Product Data and catalog cuts of the materials and equipment proposed to be used to satisfy the requirements of this Section.

1.4 SUBMITTALS

A. Submit the following information to the Engineer for approval in accordance with the requirements of Section 260500:

1. Product Data:
 - a. List of the proposed materials.
 - b. Catalog cuts
2. Quality Assurance/Control Submittals:
 - a. Design Data.
 - 1) Manufacturer's comprehensive calculations.
 - b. Test Reports.
 - 1) Factory test reports.
 - c. Certificates.
 - 1) Testing agency/quality verification, listing, and labeling.
 - d. Qualification Statements.
 - 1) Qualifications of the licensed electricians.
 - 2) Qualifications of the Electrical Testing Laboratory (ETL).

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Installer Qualifications:
 - a. To supervise installation of the Work of this Section, employ licensed electricians.
 - 1) Submit the qualifications of the licensed electricians supervising the Work of this Section.
2. Electrical Testing Laboratory (ETL) Qualifications:
 - a. Employ an independent testing agency, qualified as specified in Section 260563, to perform testing required by this Section.
 - b. Submit information verifying the ETL's qualifications.

B. Regulatory Requirements:

1. Perform the Work of this Section in accordance with the requirements specified in Articles 250, 300, and 370 of NFPA 70 (NEC), and to all other applicable state, local, and national governing codes and regulatory requirements.

C. Certifications:

1. Provide products that are listed and labeled by Underwriters Laboratory, approved by Factory Mutual, or certified as meeting the standards of UL by the Electrical Testing Laboratory (ETL) for the location installed in, and listed and labeled or approved for the application intended as indicated or specified, unless products meeting the requirements of these testing laboratories are not readily available or unless standards do not exist for the products.
 - a. Provide products that are approved, listed, and labeled for the short circuit currents, voltages, and currents indicated or specified to be applied.
 - b. Provide service entrance labeled products for all service entrance equipment.
2. Submit evidence of testing agency/quality verification, listing, and labeling for each product with the submitted product data, either by providing a printed mark on the data or by attaching a separate listing card.
 - a. For items without such evidence, submit a written statement from the product manufacturer that indicates why it does not have quality assurance verification.

1.6 MATERIAL DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling, and Unloading:

1. Pack, ship, handle, and unload products in accordance with the requirements of Section 260500.

B. Acceptance at Site:

1. Accept products at the Site in accordance with the requirements of Section 260500.

C. Storage and Protection:

1. Store products in accordance with the requirements of Section 260500.

PART 2 PRODUCTS**2.1 MANUFACTURERS**

A. Use of Trade Names:

1. The use of trade names within the Contract Documents is intended to establish the basis of design and to illustrate the constructability and level of quality required.
2. The use of trade names is not intended to exclude other manufacturers whose products are equivalent to those named, subject to compliance with Contract requirements.

2.2 MANUFACTURED UNITS

A. Steel Outlet and Device Boxes for General Purpose Applications:

1. For general purpose applications in dry, flush (in-wall) locations only, provide UL Listed galvanized steel outlet and device boxes conforming to NEMA OS 1.
 - a. Boxes shall be fabricated from steel not less than 0.062" thickness.
 - b. Boxes shall have standard trade size knockouts to facilitate conduit and cable connector attachments.

- c. Boxes shall be equipped with one 10-32 tapped hole for ground wire attachment.
2. Manufacturers:
 - a. Appleton Electric
 - b. O-Z/Gedney
 - c. Crouse Hinds
 - d. Thomas & Betts
 - e. Or Approved Equal

B. Cast Outlet Boxes for General Purpose Applications:

1. For Use with Steel Conduit Systems:
 - a. For use with steel conduit systems, provide UL Listed small cast steel or cast malleable iron outlet boxes with threaded hubs that meet the NEMA 250 requirements for Type 12 enclosures.
 - b. If covers are indicated or specified, provide cast steel or cast malleable iron covers with neoprene gaskets.
 - 1) Provide captive Type 316 stainless steel mounting screws for the covers.
 - c. If fixture hangers are indicated or specified, provide ball type cast steel or cast malleable iron fixture hangers with neoprene gaskets.
 - 1) Provide captive Type 316 stainless steel mounting screws for the fixture hangers.
 - d. Finish:
 - 1) Provide outlet boxes, covers, and hangers with an electroplated zinc coating, followed first by a dichromatic prime, and then by an aluminum polymer finish coating conforming to NEMA FB 1.
 - e. Manufacturers:
 - 1) Appleton Electric
 - 2) O-Z/Gedney
 - 3) Crouse Hinds
 - 4) Thomas & Betts
 - 5) Killark
 - 6) Or Approved Equal
2. For Use with Coated Conduit Systems:
 - a. When boxes for use with coated conduit systems are indicated or specified, provide cast outlet boxes as specified for steel conduit systems, but having coatings as specified in Section 260533.13, for the system.
 - 1) Provide a 40 mils thick PVC coating conforming to the requirements of NEMA RN 1 outside, and a 2 mils thick fusion-bonded blue, red, or green urethane coating inside.
 - a) Insure that the color of the PVC coating is uniform throughout the Work of this Contract.
 - 2) For internally threaded openings in the box, provide a 40 mil thick plastic sleeve extending one pipe diameter or 2 inches, whichever is less, beyond the openings with an inside sleeve diameter equal to the outside diameter of the conduit or pipe used.
 - b. Manufacturers:
 - 1) Thomas & Betts, Ocal
 - 2) Perma-Cote
 - 3) Robroy Industries
 - 4) Or Approved Equal

C. Sheet Metal Junction and Pull Boxes for General Purpose Applications:

1. For general purpose applications in dry locations, provide small sheet steel pull and terminal boxes and covers that meet the NEMA 250 requirements for Type 12 enclosures with continuously welded and ground smooth seams, and having no holes or knockouts.
 - a. Cover:
 - 1) Provide overlapping sheet steel screw covers with captivated screws for each box.
 - 2) Provide a means of bonding on the cover.
 - b. Gasket: Provide an oil resistant cover gasket for each box.
 - c. Mounting Brackets:
 - 1) Provide 12 gauge steel wall-mounting brackets.
 - d. Finish:
 - 1) Provide polyester powder coating applied over phosphatized surfaces.
 - 2) Color: ANSI Z55.1 Number 61 gray.
2. Manufacturers:
 - a. Rittal Corp
 - b. Milbank Manufacturing
 - c. Hoffmann
 - d. Hammond
 - e. Or Approved Equal

D. Equipment and Control Device Enclosures:

1. For all areas except outdoor and corrosive locations, provide enclosures with hinged doors that meet the NEMA 250 requirements for Type 4 or 12 enclosures, depending on Contract requirements.
 - a. Enclosure Cabinet:
 - 1) Provide sheet steel boxes having continuously welded seams, ground smooth.
 - 2) Provide enclosures having no holes or knockouts.
 - b. Enclosure Door:
 - 1) Provide overlapping sheet steel hinged doors, having a continuous hinge with a removable heavy gauge hinge pin and door clamps with screws to provide a watertight seal or to exclude liquids and contaminants.
 - 2) Provide a means of bonding on the door.
 - c. Door Gasket:
 - 1) Provide an oil resistant door gasket for each box.
 - d. Security:
 - 1) Provide a mechanism for padlocking the enclosure.
 - e. Finish:
 - 1) Provide polyester powder coating applied over phosphatized surfaces.
 - 2) Color: ANSI Z55.1 Number 61 gray.
 - f. Manufacturers:
 - 1) Rittal Corp
 - 2) Milbank Manufacturing
 - 3) Hoffmann
 - 4) Hammond
 - 5) Or Approved Equal

2. Where indicated, provide enclosures that meet the NEMA 250 requirements for stainless steel Type 4X enclosures:
 - a. Enclosure Cabinet:
 - 1) For wall mounted enclosures, fabricate enclosure bodies from 14 gauge Type 304 or Type 316L stainless steel sheets; and having continuously welded seams, ground smooth.
 - 2) For floor mounted enclosures, fabricate enclosure bodies from 12 gauge Type 304 stainless steel sheets and enclosure backs from 10 gauge Type 304 stainless steel sheets; and having continuously welded seams, ground smooth.
 - a) Provide stainless steel floor stands, if required.
 - b) Provide stainless steel lifting eyes.
 - 3) Provide a grounding stud on the enclosure body.
 - 4) Provide enclosures having no holes or knockouts.
 - b. Enclosure Doors:
 - 1) For wall mounted enclosures, provide a removable hinged door fabricated from 14 gauge Type 304 or Type 316L stainless steel sheets; and having a rolled lip on three sides and a continuous stainless steel hinge with a removable hinge pin on the fourth side.
 - a) Provide a stainless steel door clamp assembly that assures a watertight seal.
 - 2) For floor mounted enclosures, provide either doors similar to those specified for wall mounted enclosures, or 14 gauge Type 304 or Type 316L stainless steel sheets hinged doors with concealed die-cast hinges that allow 180 degree door opening and easy door removal.
 - 3) Provide a means of bonding on the door.
 - c. Door Gasket:
 - 1) Provide a seamless, foam-in-place, oil-resistant door gasket for each enclosure.
 - d. Security:
 - 1) Provide a mechanism for padlocking the enclosure.
 - e. Finish:
 - 1) Provide enclosures with unpainted, Number 4 brushed finish surfaces.
 - f. Manufacturers:
 - 1) Rittal Corp
 - 2) Hoffmann
 - 3) Hammond
 - 4) Or Approved Equal
3. Where indicated, provide enclosures that meet the NEMA 250 requirements for polycarbonate Type 4X enclosures:
 - a. Construction: Polycarbonate/Plastic
 - b. Body shall be manufactured from a high-impact, corrosion resistant material; UV stabilized for outdoor use, and comply with UL-94 minimum V-0 requirements.
 - c. Cover shall be manufactured from a high-impact, corrosion resistant material, UV stabilized for outdoor use, and comply with UL-94 minimum V-0 requirements.
 - d. Body and cover shall maintain physical properties through overall long term temperature range of -40° F to 175°F and short term temperature range of -40°F to 284°F.
 - e. Body and cover shall be free of rough corners, sharp edges or burrs.
 - f. Cover screws (10-32) shall be captive with a slotted stainless steel (type 304) fillister head.
 - g. Door: Continuous hinge; stainless steel lockable latch unless otherwise indicated, formed-in-place (FIP) gasket.

- h. Nonmetallic enclosures shall be listed and labelled as defined in UL 50, by a qualified testing agency, and marked for intended location and application.
- i. Manufacturers:
 - 1) Fibox
 - 2) Rittal Corp
 - 3) Hoffmann
 - 4) Hammond
 - 5) Or Approved Equal

E. Ground Lug/Bus Bar:

- 1. Provide a copper ground lug or a 1/4-inch by 2-inch copper bus bar in large pull and junction boxes.

2.3 SOURCE QUALITY CONTROL

A. Tests:

- 1. Submit factory test reports to the Engineer as specified for the products in this Section.

PART 3 EXECUTION

3.1 INSTALLERS

- A. Install the work of this Section only under the supervision of licensed electricians.

3.2 EXAMINATION

- A. Verify that conduit stub-ups to be mated with electrical boxes and enclosures are the correct type and size, and are at the proper location.

3.3 INSTALLATION

A. Equipment and Control Device Enclosures:

- 1. For all areas except outdoor and corrosive locations, provide enclosures that meet the NEMA 250 requirements for Type 4 or 12 enclosures, depending on Contract requirements.
- 2. For outdoor locations, provide enclosures with covers that meet the NEMA 250 requirements for Type 3R enclosures.
- 3. For corrosive locations, provide enclosures that meet the NEMA 250 requirements for Type 4X enclosures.

B. Installing Boxes for Electrical Outlets and Devices:

- 1. Install boxes level and plumb within 1/16-inch of vertical or horizontal over the length of the box.
- 2. Unless otherwise indicated on the drawings, devices boxes for interior or exterior wiring devices of buildings shall be recessed within the wall construction. The installation of surface mounted device boxes is prohibited.

3. Install device boxes at a uniform height as indicated on the Contract Drawings.
 - a. Mount all adjacent boxes in alignment at the same mounting height.
 - b. Mount outlet boxes for equipment within 18-inches of the equipment power connection.
 4. When installing boxes outside or to exposed conduit, provide cast boxes.
 - a. For interior unfinished locations mount these boxes on spacers to be 1/8-inch from wall unless box has built-in raised pads to perform the same function.
 5. Support cast boxes for outlet and device using one of the following methods:
 - a. Mount the boxes directly to the structure using 4 or more anchors.
 - 1) Attach mounting screws to feet located outside of the box interior.
 - 2) Provide 1/4-inch spacers behind the boxes unless the box has raised pads.
 - b. Attach the box to two 1-inch or larger conduits which are supported within 12-inches of the box.
 - c. Attach the box to two 1-inch or larger conduits which exit from a poured concrete floor no further than 18-inches from the box.
- C. Installing Boxes for Other than Electrical Outlets and Devices:
1. Accurately punch holes for conduit openings using a hydraulic punch and punches sized for the conduit to be installed.
 2. Install a conduit breather in the top of the box and a conduit drain fitting in the bottom of all boxes not located in bone-dry areas that are at least 100 feet from a hose-bib.
 3. Support boxes for other than electrical outlets and devices using one of the following methods:
 - a. Mount the boxes directly to the structure using 4 or more anchors.
 - 1) Attach mounting screws to feet located outside of the box interior. or seal the screw holes to prevent water penetration.
 - 2) Provide 1/4-inch spacers behind the boxes unless the box has raised pads.
 - b. Attach the box to two 1-inch or larger conduits which are supported within 12-inches of the box.
 - c. Attach the box to two 1-inch or larger conduits which exit from a poured concrete floor no further than 18-inches from the box.
 - d. Mount the box on U-channel and structural supports conforming to Section 260529.
- D. Make up all conduit connections to boxes in accordance with the requirements of Section 260533.13.
- E. Install wiring in boxes in accordance with the requirements of Section 260519.
- F. Ground boxes in conformance with Section 260526.

3.4 REPAIR/RESTORATION

- A. Touch up damaged coatings on electrical boxes and enclosures.

3.5 FIELD QUALITY CONTROL

- A. Site Tests:
 1. Test all boxes to verify that they are properly connected to the grounding system.

B. Inspection:

1. Inspect flush boxes to verify that the opening between the box and the wall finish is less than 1/16-inch.
2. Inspect flush boxes to verify that each box is flush with the wall, or protrudes less than 1/16-inch, and is not set behind the wall surface.
3. Inspect surface mounted boxes to verify that they are level and plumb within 1/16-inch as specified.
4. Record the actual installed elevations and locations of pull and junction boxes on record drawings specified in Division 01.

3.6 CLEANING

A. Waste Management and Disposal:

1. Clear and dispose of waste materials in accordance with the requirements of Division 01.

3.7 PROTECTION

- A. Except for surfaces to be painted, mask electrical boxes to protect them from paint overspray or over-brushing during painting operations.
- B. Protect boxes against damage from other work.

END OF SECTION 260533

DIVISION 26 – ELECTRICAL
SECTION 260533.13 – CONDUIT FOR ELECTRICAL SYSTEMS
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for furnishing, installing, energizing, and testing conduit, tubing, and fittings for communication lines and electrical transmission, distribution, and service lines.

B. Comply with the requirements and provisions of the following:

1. Division 00 – Procurement and Contracting Requirements
2. Division 01 – General Requirements
3. Section 260500 – Common Work Results for Electrical

C. Related Section:

1. Section 260500 – Common Work Results for Electrical
2. Section 260526 – Grounding and Bonding for Electrical Systems
3. Section 260529 – Hangers and Supports Systems for Electrical Systems
4. Section 078400– Fire Stopping
5. Section 260563 – Acceptance Testing of Electrical Systems

1.2 REFERENCES

A. American National Standards Institute (ANSI):

1. ANSI/ASME B1.20.1 - Pipe Threads, General Purpose (Inch).
2. ANSI C80.1 - Rigid Steel Conduit - Zinc-Coated (GCR).
3. ANSI C80.3 - Electrical Metallic Tubing - Zinc Coated (EMT).

B. American Society for Testing and Materials (ASTM):

1. ASTM A 568/A 568M - Standard Specification for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold Rolled, General Requirements for.
2. ASTM D 1784 - Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.

C. National Electric Manufacturer's Association (NEMA):

1. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
2. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit.

D. National Fire Protection Association (NFPA):

1. NFPA 70 - National Electrical Code (NEC).

- E. Underwriters Laboratory, Inc. (UL):
 - 1. ANSI/UL 6 - Standard for Rigid Metal Conduit.
 - 2. UL 94 - Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances
 - 1. ANSI/UL 360 - Standard for Liquid-Tight Flexible Steel Conduit.
 - 2. ANSI/UL 498 - Standard for Safety for Attachment Plugs and Receptacles.
 - 3. ANSI/UL 514A - Metallic Outlet Boxes.
 - 4. ANSI/UL 797 - Electric Metallic Tubing - Steel.
 - 5. ANSI/UL 886 - Standard for Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations.
 - 6. ANSI/UL 1203 - Standard for Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations
 - 7. ANSI/UL 1242 - Standard for Electrical Intermediate Conduit – Steel
 - 8. ANSI/UL 2515 - Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
- F. Institute of Electrical and Electronics Engineers (IEEE):
 - 1. IEEE C2 - National Electrical Safety Code.

1.3 DEFINITIONS

- A. Definitions for all items are as stated in NFPA 70, IEEE C2, and in other reference documents unless otherwise stated, specified, or noted.

1.4 DESIGN REQUIREMENTS

- A. Conduit Systems:
 - 1. Provide conduit of the type and material as indicated on the drawings.
 - 2. Provide conduit fittings made of material identical to that of the conduit system with which they are used.

1.5 SUBMITTALS

- A. Submit the following information to the Engineer for approval in accordance with the requirements of Section 260500:
 - 1. Product Data:
 - a. Rigid Polyvinyl Chloride (PVC) Conduit.
 - b. Non-metallic conduit solvent.
 - c. Rigid Fiberglass Conduit (RTRC)
 - d. Electrical Metallic Tubing (EMT)
 - e. Plastic coated rigid galvanized steel conduit.
 - f. Liquid-tite flexible metal conduit.
 - g. Rigid galvanized steel conduit (RGS).
 - h. Fittings for non-metallic conduit systems.
 - i. Fittings for metallic conduit systems.
 - j. Conduit spacers.

- k. Heat- shrink tubing.
- l. Wall and floor penetration seals.
- m. Cold galvanize coating.
- 2. Shop Drawings:
 - a. Proposed departures from the original design.
- 3. Quality Assurance/Control Submittals:
 - a. Qualification Statements:
 - 1) Qualifications of the installer.
 - 2) Qualifications of the Electrical Testing Laboratory (ETL).
 - b. Certificates:
 - 1) Testing agency/quality verification, listing, and labeling.

1.6 QUALITY ASSURANCE

A. Qualifications:

- 1. Installer Qualifications:
 - a. Employ an installation firm with a minimum of three years documented experience installing conduit and tubing similar in type and scope to that required by this Contract to install the Work of this Section.
 - b. Employ skilled licensed electricians to supervise the Work of this Section.
 - c. Submit information verifying the installer's qualifications.
 - d. To assure correct installation of PVC Coated Conduit Systems and Fittings; submit installers current and unexpired certification provided by the Manufacturer of the products being installed
- 2. Electrical Testing Laboratory (ETL) Qualifications:
 - a. Employ an independent testing agency, qualified as specified in Section 260563, to perform the testing required by this Section.
 - b. Submit information verifying the ETL's qualifications.

B. Regulatory Requirements:

- 1. Perform the Work of this Section in accordance with the requirements specified in NFPA 70 (NEC), and to other applicable state, local, and national governing codes and regulatory requirements.

C. Certifications:

- 1. Provide products that are listed and labeled by Underwriters Laboratory, approved by Factory Mutual, or certified as meeting the standards of UL by the Electrical Testing Laboratory (ETL) for the location the product is installed in, and the application intended, unless products meeting the requirements of these nationally recognized testing laboratories are not available or unless standards do not exist for the products.
 - a. Submit evidence with the Product Data that the products represented meet testing agency quality verification requirements, including agency listing and labeling requirements.
 - 1) Such evidence may consist of either a printed mark on the data or a separate listing card.

- b. Submit a written statement from those product manufacturers that do not provide evidence of the quality of their products that indicates why an item does not have a quality assurance verification.
 - 1) Such statements provided in lieu of quality assurance verification are subject to the acceptance of the Owner and the Engineer.

1.7 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling, and Unloading:

1. Pack, ship, handle, and unload products in accordance with the requirements of Section 260500, and as detailed herein.

B. Acceptance at Site:

1. Acceptance products at the Site in accordance with the requirements of Section 260500, and as detailed herein.

C. Storage and Protection:

1. Store products in accordance with the requirements of Section 260500, and as detailed herein.
 - a. Store all products indoors on blocking or pallets.

PART 2 PRODUCTS

2.1 NON-METALLIC CONDUIT

A. Electrical Plastic Tubing and Conduit:

1. Rigid Polyvinyl Chloride (PVC) Conduit:
 - a. Provide high impact PVC conduit conforming to the requirements of NEMA TC 2 at 90 degrees Celsius, and made from compounds conforming to the requirements of ASTM D 1784.
 - 1) Use material that at 78 degrees Fahrenheit has a tensile strength exceeding 5500 psi, a flexural strength exceeding 11,000 psi, and a compressive strength exceeding 800 psi,
 - b. Provide PVC conduits that are UL listed, labeled, or approved for both underground and above ground use.
2. Manufacturers:
 - a. JM Eagle,
 - b. Queen City Plastics, Inc.,
 - c. Prime Conduit Inc.,
 - d. Tyco/Allied Tube and Conduit
 - e. Or Approved Equal

B. Non-Metallic Conduit Solvent:

1. Provide solvent for non-metallic conduit joints from the same manufacturer as the conduit and conforming to the requirements of ASTM D 2564.

C. Reinforced Thermosetting Resin Conduit:

1. Fiberglass reinforced epoxy (FRE) conduit shall be composed of glass filaments encapsulated in an epoxy matrix. Each conduit length shall have an integral wound-in expanded coupling. Sizes 2-inches through 6-inches shall incorporate an integral urethane gasket for sealing. No threads or adhesives shall be required to assembly the joints for inground installations. Watertight joints shall be assembled as specified below in Paragraph 3.03. All conduit and fittings shall be pigmented with carbon black dispersed homogeneously throughout the epoxy glass matrix for U.V. protection.
2. Conduit and fittings shall be filament wound.
3. Conduit shall be suitable for continuous operation from -40 degrees C to + 110 degrees C without significant change of mechanical properties.
4. Conduit combustion by-products shall not contain chlorine gas in excess of trace levels and always less than safe OSHA limits.
5. Conductors shall not adhere to conduit or fitting in fault conditions.
6. Conduit and fittings in the 2-inches through 6-inches sizes inclusive shall have inside diameters equal to the trade size.
7. Conduit and fittings shall bear nationally accepted testing laboratory approval from U.L. Above ground shall be fire resistance per UL 2515. Below ground conduit meets the UL 94 requirement. Conduit and fitting shall be suitable for use in direct burial, concrete encasement and underwater when joints are properly treated. When waterproofed, the conduit and joints shall not fail when subjected to water pressures at depths of one hundred feet.
8. Acceptable Manufacturers:
 - a. FRE Northeast
 - b. Champion Fiberglass, Inc.
 - c. Or Approved Equal

2.2 METALLIC CONDUIT**A. Electrical Metallic Tubing (EMT):**

1. Provide electrical metallic tubing (EMT) conforming to the requirements of Article 358 in NFPA 70 (NEC) for materials and uses, ANSI C80.3 and UL 797.
2. Provide galvanized steel tubing conduit lengths bearing the manufacturer's trademark.
3. Manufacturers:
 - a. Tyco/Allied Tube and Conduit
 - b. Western Tube
 - c. Wheatland Tube Company, Division of John Maneely Company
 - d. Or Approved Equal

B. PVC Coated Rigid Galvanized Steel Conduit:

1. Provide PVC coated rigid galvanized steel conduit bearing the UL label.
2. Provide base conduit of rigid hot-dip galvanized steel conduit as specified in Paragraph 2.02E, and of the type indicated, specified, or scheduled to be coated.
3. Apply PVC coating in accordance with the following:
 - a. Apply a 40-mil thick PVC coating on the outside and a 2-mil thick fusion-bonded urethane coating on the inside, exterior coatings conforming to the requirements of NEMA RN 1.
 - b. Provide PVC coating of one uniform color on all PVC coated rigid galvanized steel conduit provided for the Contract.

4. Provide 40-mil thick PVC sleeves to protect internally threaded conduit openings.
 - a. Provide sleeves with an inside diameter equal to the outside diameter of the conduit/pipe protected by it; and extending either one pipe diameter or 2-inches, whichever is less, beyond the opening.
 5. Manufacturers:
 - a. OCAL
 - b. Plasti-Bond
 - c. Perma-Cote
 - d. Kor-Kap
 - e. O'kote
 - f. Or Approved Equal
- C. Liquidtite Flexible Metal Conduit:
1. Provide PVC coated flexible metal conduit conforming to the requirements of Article 350 of NFPA 70 (NEC) for materials and uses and ANSI/UL 360.
 2. Provide conduit with interlocking spiral strip construction capable of bending to a minimum radius of five times its diameter without deforming the spiral strips both inside and outside of the conduit.
 - a. Provide conduit with a flexible, galvanized, interlocking spiral strip steel core jacketed with smooth, liquid-tight polyvinyl chloride designed to withstand temperatures from minus 40 degrees Celsius to plus 60 degrees Celsius.
 3. Finish the interior and exterior of flexible conduit smooth and free from burrs, sharp edges, and other defects that may injure wires; and place the manufacturer's trademark on each length.
 4. Furnish an integral continuous copper ground in 1/2-inch through 1-1/4-inch PVC coated flexible metal conduit.
 5. Acceptable Manufacturers
 - a. Electri-Flex Company, Liqueatite®, Type LA
 - b. Garvin Industries
 - c. ANAMET Electrical, Inc., Anaconda Sealtite
 - d. Or Approved Equal
- D. Rigid Galvanized Steel Conduit (RGS):
1. Provide rigid galvanized steel conduit (RGS) conforming to the requirements of Article 344 of NFPA 70 (NEC) for materials and uses, ANSI C80.1, and UL 6.
 2. Fabricate the RGS from mild steel piping, galvanized or sherardized inside and outside, and protected against corrosion by a dichromate rinse or a zinc chromate coating.
 3. Provide defect free conduit bearing the UL label, and furnished in 10-foot minimum lengths with both ends threaded and one end fitted with a coupling.
 - a. Provide tapered NTP 3/4 inch per foot threads complying with ANSI/ASME B1.20.1.
 4. Acceptable Manufacturers:
 - a. Tyco/Allied Tube and Conduit
 - b. Octal
 - c. Wheatland Tube Company
 - d. Or Approved Equal

2.3 CONDUIT FITTINGS

A. Fittings for Non-Metallic Conduit Systems:

1. Electrical Plastic Tubing and Conduit:
 - a. Provide high impact non-metallic fittings conforming to same requirements as for the plastic tubing and conduit as specified in Article 2.01.
 - b. Non-Metallic Conduit Expansion Fittings:
 - 1) Provide a two-piece nonmetallic, noncorrosive, nonconductive, UL listed expansion fitting.
 - c. Acceptable Manufacturers:
 - 1) Lamson & Sessions, Carlon
 - 2) Cantex
 - 3) Queen City Plastics, Inc.
 - 4) Or Approved Equal
2. Reinforced Thermosetting Resin Conduit:
 - a. All fittings, elbows and accessories shall conform to same requirements as for the reinforced thermosetting resin conduit as specified in Article 2.01.
 - b. Acceptable Manufacturers:
 - 1) FRE Northeast
 - 2) HazGuard
 - 3) Champion Fiberglass, Inc.
 - 4) Or Approved Equal

B. Fittings for Threaded Metallic Conduit Systems:

1. Construct conduit bodies/fittings from cast malleable iron or cast steel.
2. "Form 7" Type, or similar, fittings using wedge clip covers are not permitted. All fittings shall utilize stainless steel cover screws threaded into the fitting body.
3. For PVC coated raceway systems, provide PVC coated fittings of cast malleable iron or cast steel from the same manufacturer that provides the uncoated conduit bodies/fittings.
4. Conduit Outlet Bodies:
 - a. Provide malleable iron threaded entry type conduit outlet bodies with neoprene gaskets and cast steel cover.
 - b. Acceptable Manufacturers:
 - 1) Crouse-Hinds
 - 2) O-Z/Gedney
 - 3) Appleton
 - 4) Thomas and Betts
 - 5) Or Approved Equal
5. Conduit Expansion Joints:
 - a. Provide telescoping sleeve type galvanized, weatherproof, and vapor tight conduit expansion joints designed for 4-inch maximum expansion with an insulated bushing and lead-wool packing.
 - b. Acceptable Manufacturers:
 - 1) Crouse-Hinds
 - 2) O-Z/Gedney
 - 3) Appleton
 - 4) Thomas and Betts
 - 5) Or Approved Equal
6. Conduit Unions:

- a. Provide conduit unions capable of completing a conduit run when neither conduit end can be turned.
 - b. Acceptable Manufacturers:
 - 1) Crouse-Hinds
 - 2) O-Z/Gedney
 - 3) Appleton
 - 4) Thomas and Betts
 - 5) Or Approved Equal
7. Conduit Outlet Boxes:
- a. Provide malleable or cast iron conduit outlet boxes conforming to the requirements of UL 886, and having a cover with O-rings to keep out moisture.
 - b. Acceptable Manufacturers:
 - 1) Crouse-Hinds
 - 2) O-Z/Gedney
 - 3) Appleton
 - 4) Thomas and Betts
 - 5) Or Approved Equal
8. Conduit Device Boxes:
- a. Provide malleable iron conduit device boxes with internal grounding screws and conforming to the requirements of UL 498 and UL 514A.
 - b. Acceptable Manufacturers:
 - 1) Crouse-Hinds
 - 2) O-Z/Gedney
 - 3) Appleton
 - 4) Thomas and Betts
 - 5) Or Approved Equal
9. Conduit Sealing Fittings:
- a. Provide, triple coated, malleable iron conduit sealing fittings.
 - 1) Coat the conduit sealing fittings with zinc electroplate, dichromate, and an epoxy powder coat.
 - b. Provide drain fittings in conduit sealing fittings where required.
 - c. Provide sealing covers for junction boxes where required.
 - d. Acceptable Manufacturers:
 - 1) Crouse-Hinds
 - 2) O-Z/Gedney
 - 3) Appleton
 - 4) Thomas and Betts
 - 5) Or Approved Equal
- C. Fittings for Electrical Metallic Tubing Conduit Systems:
1. Construct conduit bodies/fittings from steel.
 2. Provide only compression type connectors.
 3. Fittings shall be galvanized or zinc electroplated.

2.4 CONDUIT SPACERS

- A. Provide non-metallic, interlocking type conduit spacers which snap together to join any combination of intermediate and base units together, both vertically and horizontally.

B. Manufacturers:

1. Underground Devices Inc.
2. Cal AM
3. The George-Ingraham Corp.
4. Or Approved Equal

2.5 HEAT SHRINK TUBING

A. Provide all-weather corrosion resistant vinyl plastic heat shrink tubing designed for application on the exterior of metallic conduit to protect against galvanic action, moisture or other deteriorating contaminants.

B. Manufacturers:

1. Tyco Electronics
2. Thomas & Betts
3. 3M
4. Or Approved Equal

2.6 WALL AND FLOOR PENETRATION SEALS

A. Provide watertight mechanical seals capable of holding up to 20 psig, and sealing against water, soil, and backfill material.

B. Acceptable Manufacturers:

1. Pipeline Seal & Insulator, Inc., Thunderline/Link-Seal
2. Flexicraft Industries, PipeSeal
3. GPT Industries
4. Or Approved Equal

2.7 FINISHES

A. Cold Galvanize Coating:

1. Provide a cold galvanize coating to provide protection against corrosion by forming an insoluble zinc salt barrier from a cathodic reaction when the coating is damaged by abrasion and exposed to weather.
 - a. Provide a single component pre-mixed liquid organic zinc compound producing 95 percent zinc in the dry film.
 - b. Provide a coating that bonds to clean iron, steel, or aluminum through electrochemical action.
2. Acceptable Manufacturers:
 - a. ZRC
 - b. Clearco
 - c. Krylon
 - d. Rustoleum
 - e. Or Approved Equal

PART 3 EXECUTION**3.1 EXAMINATION**

- A. Although the Contract Drawings are generally indicative of the Work, take field measurements to verify actual conditions.
 - 1. Due to the small scale of the Contract Drawings it is not possible to indicate all offsets, fittings, and apparatus required or the minor structural obstructions that may be encountered during the Work.
- B. Inspect the condition of existing conduit that is required for the Work of this Section.

3.2 PREPARATION

- A. After carefully investigating structural and finish conditions and other in-place construction work, prepare and submit detailed Shop Drawings showing proposed departures from the original design due to field conditions or other causes.
 - 1. Layout the electrical work according to accepted standard electrical trade practice to suit actual field measurements.
 - 2. Arrange the electrical work to consider existing conditions and to preserve access to other equipment, rooms, areas, and similar features of the construction.
 - 3. Include plan and profile views of duct banks.
 - 4. Indicate the location and details of conflicting utility construction and slopes.
 - 5. Submit these Shop Drawings to the Engineer for approval prior to performing the Work of this Section.
- B. Submit Product Data and catalog cuts for all products provided under this Section.
 - 1. Clearly indicate the usage of each product on the submittal.
- C. Obtain roughing-in dimensions of electrically operated equipment, including equipment being installed by both electrical and other construction trades.
 - 1. Set conduit and boxes only after receiving approved dimensions and checking such equipment locations.
- D. Remove dirt, debris, and other obstructions from existing conduit required for the Work of this Section by blowing out and mandreling the conduits as applicable.

3.3 INSTALLATION

- A. Perform the Work of this Section as specified in Section 260500, Common Work Results for Electrical.

- B. Fabricate and install conduit and wireway systems in accordance with accepted electrical trade standard practice.
1. Layout the electrical work of this Section to suit actual field measurements.
 - a. Record the actual installed elevations and locations of duct banks and the as-found locations of conflicting utility lines on the record drawings specified in Section 017839, and submit the record drawings.
 2. Install the electrical Work of this Section in conformance to the wiring methods general requirements of Article 300 in NFPA 70 (NEC), and to all other applicable Articles of NFPA 70 governing wiring methods.
 3. Cut conduit and wireway square, and ream the cut ends according to the requirements of NFPA 70 (NEC) to deburr the openings so that they are not restricted more than cuts made by the material manufacturer.
 4. Avoid bending conduits as much as possible and practical; but if bends are made, use an approved conduit bending tool or machine to make the bends.
 5. Do not install crushed or deformed conduit, and remove crushed or deformed conduit from the Site.
 6. On conduit that is installed outside, provide a second equipment ground conductor and use fittings with a built-in ground lug for bonding.
 7. Provide flexible conduit only to the extent permitted by NFPA 70 (NEC).
 - a. In flexible conduits that do not have an integral ground wire, install a green insulated wire in addition to the neutral wire for grounding purposes.
 - 1) Form a 'J' or 'S' hook with a drip loop to allow flexibility.
 - 2) Provide a second equipment grounding conductor on outside conduit and provide fittings with built-in ground lug for bonding.
 - b. In exposed areas, use PVC coated flexible metal conduit and fittings.
 - c. Use flexible metal conduit or liquid tight flexible metal conduit for final connection to recessed lighting fixtures and rotating and vibrating equipment.
 - 1) Flexible Metal Conduit is only permitted for final connections to lighting fixtures in dry, environmentally conditioned spaces.
 - 2) Liquid tight flexible metal conduit, as herein specified, for final connection to recess mounted lighting fixtures in unconditioned spaces and to all rotating and vibrating equipment including transformers, motors, solenoid valves, pressure switches, limit switches, generators, engine-mounted devices and pipe-mounted devices.
 - 3) Flexible conduit not to exceed 18 inches in length for motor connections, 36 inches in length for equipment connections or 72-inches for lighting fixture connections.
 8. Provide fittings and apparatus as required to construct the approved electrical design.
 - a. Running threads on conduit are not permitted.
 - 1) Where couplings and connectors are required for metal conduits, use approved threaded couplings and connectors.
 - b. Provide conduit unions where necessary to complete a conduit run when neither conduit end can be turned.
 - c. Where conduit and raceway runs cross building expansion joints, make provision for expansion in the conduit and raceway runs.
 - d. Provide sealing fittings with drain fittings in all lower runs and vertical runs.
 - e. Provide sealing covers for junction boxes where required.
 - f. Provide weatherproof conduit hubs on all conduit connections exterior to the building, and on instruments, process equipment, and pump motors.

9. Installing RGS and PVC Coated Conduit:
 - a. Installation of the RGS and PVC Coated Conduit System shall be performed in accordance with the Manufacturer's recommendations.
 - b. To assure correct installation of PVC Coated Conduit System, the installer shall have a current and unexpired certification provided by the Manufacturer to install coated conduit.
 - c. Threading Conduit:
 - 1) Field thread the conduits per the manufacturers instructions.
 - a) For PVC coated conduit, first use a cylindrical guide, oversized to fit over the plastic coating, to neatly cut the coating off at the proposed end of the threads.
 - b) Do not damage or remove the coating beyond the proposed end of the threads.
 - 2) Once the threading operation is complete, protect the newly cut threads against corrosion by applying a "sealing" compound as recommended by the manufacturer.
 - d. Assembling RGS and PVC Coated Conduit Fittings:
 - 1) Use PVC coated conduit bodies, clamps, supports, accessories, and fittings with coated conduit systems.
 - 2) Just prior to assembling each conduit joint, apply the conduit manufacturer's touch-up compound to the end of the conduit in the area normally covered by the fitting sleeve.
 - 3) Use cloth or other material over strap type wrenches to protect the coating while tightening conduits.
10. Reinforced Thermosetting Resin Conduit:
 - a. The end of the conduit, consisting of a bell and spigot joint, shall be forcibly inserted into the urethane seal and made tight.
 - b. The entire work area of the joint, plus a minimum distance of 6 inches both ways, shall be thoroughly cleaned (with a solvent if recommended by the respective manufacturers) removing all foreign debris such as dirt, sand and mud prior to the following work being started.
 - c. Waterproof grout shall be applied to the entire circumference of the bell end of the coupling to provide a smooth tapered surface.
 - d. Apply an all-weather, fiberglass reinforced epoxy tape to the conduit joint area providing two full half-lap wraps the entire length of the joint; which is considered a minimum distance of 4 inches past the end of the end bell in both directions.
11. Breathers and drains shall be provided at the low point(s) of all conduit runs in damp, wet, and hazardous, and where otherwise subject to the accumulation of condensation. Conduits shall be arranged to drain away from dry areas toward damp or wet areas, and away from equipment and enclosures.

C. Exposed Work:

1. In exposed work, run conduit and raceway parallel to centerlines and structure surfaces; or perpendicular to centerlines where required, with right angle turns consisting of symmetrical bends or fittings.
2. Maintain at least 6 inches clearance between conduit and raceway runs and pipes, ducts, and flues of mechanical systems.
3. If a portion of a metallic conduit run, whether plastic-coated or not, extends above grade or is otherwise exposed to personnel, ensure that the conduit is properly bonded to an equipment grounding conductor at both ends.
 - a. Install the equipment grounding conductor either inside or outside the box.

D. Concealed Work:

1. When performing electrical work in concealed spaces, provide the same quality workmanship as in exposed work.
2. Conceal conduits and raceways in the structure's construction where practicable unless otherwise indicated on the Contract Drawings or required by the Engineer.
 - a. Group conduit and raceway runs in concealed work as much as practical to avoid congesting the concealed spaces.
 - b. Do not weaken the structure by excessive or unnecessary cutting.
 - 1) Only make cuts into the structure's construction in conformance to the applicable building codes.
3. Conduits and Raceways Embedded in Concrete Slabs:
 - a. Separate multiple conduits encased together by not less than two inches of concrete.
 - b. Locate conduit installed in floor slabs within the reinforced area of the slab.
 - c. Where conduit crosses expansion joints, provide weather tight expansion and deflection fittings and bonding jumpers.
4. Install below grade conduit in conformance with the requirements of Section 337119.
 - a. For conduits that pass under building support walls, provide a minimum of 3 inches of concrete encasement all around.
 - b. For underground and concrete encased duct banks, provide non-metallic conduit spacers.
 - 1) Provide sufficient space to allow pouring the concrete envelope without displacing or shifting the individual conduits.
 - 2) Install conduit spacers at intervals not exceeding five feet.

E. Hangers and Supports:

1. Install auxiliary support structures, anchors, and fasteners as specified in Section 260529.
 - a. Mount or suspend conduit and wireway systems directly on structural members of the structures and walls.
 - b. Do not attach conduit or raceway systems to suspended ceiling members or to the suspending mediums.
 - c. Securely attach anchors into walls.
2. At all conduit attachments, allow space between the mounting surfaces and the conduit by providing U-channel supports, clamp-backs, or spacers.
 - a. Attach wall-mounted conduit runs close to the walls following the contour of the walls, parallel to the walls and other building lines except at bends.

F. Structure Penetrations:

1. Make penetrations in existing concrete structures by core-drilling.
 - a. Drill the penetrations true, clean, and free from spalling.
2. Make floor penetrations as detailed on the Contract Drawings.
 - a. Seal all conduit penetrations through floor slabs on grade in buildings with a floor penetration seal.
3. Install a wall penetration seal at all wall penetrations.
 - a. Size wall penetrations to accommodate the conduit outside diameter plus either 1/4 inch or a hole allowance to allow the installation of the wall penetration seal.
4. For conduits that enter rooms from concrete floors or masonry, provide corrosion protection by using an RGS or PVC coated conduit that extends from 12 inches inside the concrete or masonry to at least 6 inches into the room.

G. Wiring:

1. Install wiring in conduit as indicated.
2. Prior to the installation of any wire, verify that the conduit is clean and free of debris.
3. Install a separate ground conductor within every conduit.

3.4 FIELD QUALITY CONTROL

A. Inspection:

1. Inspect installed conduit runs for obstructions, proper support, proper grounding, and completeness.
2. Record the actual installed elevations and locations of conduit and tubing on record drawings specified in Section 017839.

END OF SECTION 260533.13

DIVISION 26 – ELECTRICAL
SECTION 260548 – VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

- A. This dual-purpose section provides for vibration isolation as well as seismic control for the “equipment” as listed below. This specification is part of the general conditions for the Electrical contract. The new Generator Foundation is classified as Seismic Design Category B by the International Building Code (IBC) and ASCE 7-10.

1.2 REFERENCES

- A. American Society of Civil Engineers (ASCE)
1. ASCE 7-10 – Minimum Design Loads for Buildings and Other Structures
- B. International Code Council
1. International Building Code (IBC) 2018

1.3 DESCRIPTION

- A. Intent:
1. All equipment listed below and conduit shall be seismically braced. Vibration control shall apply as described herein.
 2. Seismic bracing and isolation materials shall be of the same manufacturer and shall be certified by the manufacturer.
 3. It is the intent of the seismic portion of this specification to keep all electrical building system components in place during a seismic event and operational.
 4. All such systems must be installed in strict accordance with seismic codes, component manufacturer’s and building construction standards. Whenever a conflict occurs between the manufacturers or construction standards, the most stringent shall apply.
 5. This specification is considered to be minimum requirements for seismic consideration.
 6. Any variance or non-compliance with these specification requirements shall be corrected by the contractor in an approved manner.
- B. The work in this section includes, but is not limited to the following:
1. Vibration isolation for equipment.
 2. Seismic restraints.
 3. Certification of seismic restraint designs and installation supervision.
 4. Certification of seismic attachment of housekeeping pads.
 5. All equipment, (components) requiring IBC certification.
 6. All inspection and test procedures for equipment, (components) requiring IBC certification.

7. All electrical equipment and systems within or on the building. Equipment buried underground is excluded but entry of services through the foundation wall is included. Equipment referred to below is typical. (Equipment not listed is still included in this specification).

For IBC projects, all systems listed in or part of this paragraph are referred to as components.

Generators
Conduit
All supports
Electrical Switchboards
Electrical Panelboards

C. Definitions (all codes):

1. Positive Attachment:
 - a. Positive attachment is defined as a cast-in anchor, a drill-in wedge anchor, a double-sided beam clamp loaded perpendicular to a beam, or a welded or bolted connection to structure. Single sided "C" type beam clamps for support rods of overhead piping, duct work, fire protection or any other equipment are not acceptable on this project as seismic bracing points.
2. Transverse Bracing:
 - a. Restraint(s) applied to limit motion perpendicular to the centerline of the pipe or duct.
3. Longitudinal Bracing:
 - a. Restraint(s) applied to limit motion parallel to the centerline of the pipe or duct.
4. Refer to IBC and Amendments for additional definitions.

1.4 QUALITY ASSURANCE

- A. Substitution of internally or externally isolated and restrained equipment supplied by the equipment vendor, in lieu of the isolation and restraints specified in this section, is acceptable provided all conditions of this section are met. The Equipment manufacturer shall provide a letter of guarantee from their Engineering Department P.E. stamped and certified per the section on Seismic Restraint Design (paragraph 1.05) stating that the seismic restraints are in full compliance with these specifications.

Letters from field offices or representatives are unacceptable. All costs for converting to the specified vibration isolation and/or restraints shall be borne by the equipment vendor in the even of non-compliance with the preceding.

- B. Letters from representatives are unacceptable.

1.5 SUBMITTAL DATA REQUIREMENTS

- A. Refer to Section 260500.

- B. The manufacturer of vibration isolation and seismic restraints shall provide submittals for products as follows:
1. Descriptive Data:
 - a. Catalog cuts or data sheets on vibration isolators and specific restraints detailing compliance with the specification.
 - b. Detailed schedules of flexible and rigidly mounted equipment, showing vibration isolators and seismic restraints by referencing numbered descriptive drawings.
 2. Shop Drawings:
 - a. Submit fabrication details for equipment bases including dimensions, structural member sizes and support point locations.
 - b. Provide all details of suspension and support for ceiling hung equipment.
 - c. Where walls, floors, slabs or supplementary steel work are used for seismic restraint locations, details or acceptable attachment methods for ducts and pipe must be included and approved before the condition is accepted for installation. Restraint manufacturers' submittals must include spacing, static loads and seismic loads at all attachment and support points.
 - d. Provide specific details of seismic restraints and anchors; include number, size and locations for each piece of equipment.
 3. Seismic Certification and Analysis:
 - a. Calculations by the Manufacturer's qualified licensed Engineer substantiating the mounting system, seismic restraints and recommended anchor bolts shall be submitted for approval along with the shop drawings. Calculations shall be based on the loads as established in the table at the end of this section. All analysis shall be stamped by a registered professional having a P.E. from the same state as the project.
 - b. Unless otherwise specified, all equipment and conduit shall be restrained to resist seismic forces. Restraints shall maintain equipment or conduit in a captive position. Restraint devices shall be designed and selected to meet seismic requirements as defined in the latest issue of:
 - 1) Applicable state and local codes
 - 2) IBC International Building Code
 4. International Building Code Additions: In addition to all of the above provisions, Contractor shall comply with sections 16 and 17 of the International Building Code using only vendors that comply with the provisions stated herein and submitting the special inspections listed within these specifications. Where compliance is not possible, each contractor shall submit a vendor report clearly indicating that none of the specified, listed or other vendors known to the contractors meet the compliance, testing and certification portions of the IBC spec section 16 and 17. Special inspections shall still be conducted even if no vendors meet the enclosed requirements. All non-isolated and isolated equipment, (components) shall be secured to the structure in accordance with that code.
 - a. All component manufacturers shall submit for approval the following as required below:
 - 1) All components noted in this specification will have the manufacturer of that component submit the Approved Agencies Certificate of Compliance for their equipment when used on a Seismic Design Category is "C-F".
 - 2) All components containing hazardous or flammable materials will have the manufacturer of that component submit the Approved Agencies Certificate of Compliance for their equipment when used on any project having a minimum Seismic Design Category of "C-F". Analytical or Shaker Test Certification thru the total component's load path to structure at its center of gravity shall include anchorage and

structural capability to insure against loss of hazardous or flammable, (explosive) material.

- 3) All components that are not listed in the above categories shall have the manufacturers of each component submit a PE stamped calculation package that their project specific equipment will accept anchorage through the component's load path to structure at its center of gravity at the designated anchorage locations. This requirement is for all projects having a Seismic Design Category of "C-F".
- b. The following systems shall require Special Inspection and Periodic Special Inspection for anchorage during the course of construction as defined earlier in this section for all buildings in Seismic Design Categories "C-F".
 - 1) All electrical components for standby or emergency power systems require Periodic Special inspection.
 - 2) All flammable, combustible and highly toxic piping and their associated mechanical systems.
 - 3) All equipment using combustible or toxic energy sources.
 - 4) All electric motors, transformers, switchgear unit substations and motor control centers.
 - 5) Reciprocating and rotting type machinery.
 - 6) Conduit, 3" and larger.
 - 7) Isolator units for seismic isolation system.

C. Contractor Responsibilities and Approvals:

1. Each contractor responsible for the installation of the components above shall be responsible for submitting to the design team for their approval a written contractor's statement of responsibility as outlined below.
 - a. Identify the components that are part of the Quality Assurance Plan.
 - b. Identify all Special Inspection and Testing.
 - c. List control procedures within the contractor's organization including methods and frequency of reporting and their distribution.
 - d. List personnel and their qualifications exercising control over the seismic aspects of the project.

D. Design Loads:

1. Testing or calculations (including the combining of tensile and shear loadings) to support seismic restraint designs must be stamped by a registered Professional Engineer with at least five years of seismic design experience and licensed in the state of the job location. Testing and calculations must include shear and tensile loads as well as one test or analysis at 45° to the weakest mode. IBC Component testing must be by an Approved Agency.
2. Analysis for anchorage must indicate calculated dead loads, static seismic loads and capacity of materials utilized for connections to equipment and structure. Analysis must detail anchoring methods, bolt diameter, embedment and/or welded length. All seismic restraint devices shall be designed to accept, without failure, the forces detailed in Section 4 acting through the equipment center of gravity. Overturning moments may exceed forces at ground level.
3. Vertical load shall be calculated at 2/3 the horizontal load.
4. Internally isolated equipment in lieu of specified isolation and restraint systems must meet the specified isolation and system restraint criteria.
5. A seismic design Errors and Omissions insurance certificate MUST accompany the equipment manufacturer's certification. Product liability insurance certificates are not acceptable.

6. In the event that the equipment is internally isolated and restrained, the entire unit assembly must be seismically attached to the structure. Curb or roof rail mounted equipment must not only have seismic attachment of the equipment to the roof but also to the curb or rails. The attachment and certification thereof shall be by this section.

1.6 RELATED WORK

- A. Housekeeping pad design shall be as indicated on the drawings. Attachment shall be designed and certified according to this section by the seismic/isolation supplier. Material and labor required for attachment and construction shall be by the contractor. Housekeeping pads shall be sized to accommodate a minimum of six (6) inches of clearance all around the equipment or 12 times the anchor bolt diameter, whichever is greater and its mounting package. Structural support and connections for all equipment, including roof-mounted equipment, specified in other sections shall comply with all IBC requirements indicating load path to the structure.

1.7 CODE AND STANDARDS REQUIREMENTS

- A. Applicable Codes and Standards:
 1. All City, State and Local Codes.
 2. American Society for Testing and Materials (ASTM) Standard.
 3. International Building Code (IBC).
- B. In cases where requirements vary, the guideline for the most stringent shall be utilized.

1.8 MANUFACTURER'S RESPONSIBILITY

- A. Manufacturer of vibration isolation and seismic control equipment shall have the following responsibilities:
 1. Determine vibration isolation and seismic restraint sizes and locations.
 2. Provide vibration isolation and seismic restraints as scheduled or specified.
 3. Provide calculations and materials if required for restraint of unisolated equipment.
 4. Provide installation instructions, drawings and trained field supervision to insure proper installation and performance.
 5. Certify correctness of installation upon completion.
 6. All provisions of section 1.05.B.3. Seismic Certification & Analysis.
- B. All manufacturers providing equipment and/or vibration/seismic control systems must provide a Seismic Design Error and Omissions Insurance Certificate for their firm or their design consultant to certify their ability to provide engineering and design as required by this Section.
- C. All manufacturers' including Original Equipment Manufacturers (OEM) are responsible for Section 1.01 through 1.06, including 1.05.B.3. Seismic Certification & Analysis.

PART 2 PRODUCTS**2.1 DESCRIPTION**

- A. All vibration isolation and seismic devices described in this section shall be the product of a single manufacturer.
- B. Design of hardware and devices such as beam clamps, anchor bolts, cable and cast-in-place plates must be by this section's supplier to ensure seismic compliance and certification. The contractor has the option to utilize alternate fastening devices (anchor bolts) so long as the sizing and dimensions on seismic submittals are followed.
- C. Unless otherwise specified, all isolator hardware shall be zinc plated. Springs with a deflection of up to 2 inches shall be coated with a polyester epoxy powder. Springs and rubber isolators shall be color coded for proper identification of rated load capacity. Zinc plating shall conform at ASTM B633, Class 2 SC2, minimum. All other metal parts used outdoors shall be hot spray or hot dipped galvanized.

2.2 VIBRATION ISOLATION AND SEISMIC RESTRAINT TYPES

- A. Double Deflection Neoprene
 - 1. Double deflection neoprene mountings shall have a minimum rated static deflection of 0.40 inches. Steel top plate and base plate shall be completely bonded and embedded in oil-resistant elastomer. Mountings shall be molded in color for ease of identification of load capacity, and shall have ribbed neoprene surfaces on top and bottom to provide friction pads for those applications, which do not need to be bolted to the floor or to equipment. Bolt holes shall be provided on the bottom plate, and a tapped hole on the top, for applications requiring positive tie down.
 - 2. Acceptable Manufacturers:
 - a. Vibration Mountings and Controls, Inc.
 - b. Mason Industries.
 - c. Vibration Eliminator.
 - d. Or Approved Equal
- B. Floor Mounted Spring Isolators
 - 1. Free standing spring-type isolators, shall be laterally stable without housing, snubbers, or guides, and shall include a steel reinforced, ribbed neoprene cup ($\frac{1}{4}$ inch minimum thickness) between the baseplate and the support. Mountings shall have leveling bolts on the top, consisting of an adjusting bolt, cap screw and washer. Mountings shall include a bolt hole in the bottom cup or a two hole rectangular steel baseplate for bolting to the structure.
 - 2. Springs shall not be welded to the baseplate or cup. Spring diameters shall be no less than 0.8 times the compressed height of the spring at rated load. Springs shall also have a minimum additional travel to solid equal to 50% of the rated deflection.
 - 3. Acceptable Manufacturers:
 - a. Vibration Mountings and Controls, Inc.
 - b. Mason Industries.
 - c. Vibration Eliminator.
 - d. Or Approved Equal

C. Housed Springs With Limit Stops

1. Free standing, laterally stable spring type isolators. Isolator is the same as described in Specification 2.02.B, except that it includes a housing to provide vertical limit stops to prevent spring extension during weight changes, or when equipment is exposed to uplift loads such as wind loading. The housing serves as blocking during erection, and shall be located between the equipment and supporting structure. There shall be a minimum clearance of ¼" between the restraining bolts and the housing and spring to prevent interference with spring performance. Limit stops shall be out of contact during normal operation. Mountings shall have an adjusting bolt on the top of the spring compression plate. For non-seismic applications, neoprene acoustical non-skid pads (¼ inch minimum thickness) shall be attached to the bottom plate. When used in seismic applications, neoprene bushings shall be incorporated in the limit stop plate. Spring diameters shall be no less than 0.8 times the compressed height of the spring at rated load. Springs shall also have a minimum additional travel to solid equal to 50% of the rated deflection. Springs shall not be welded to the cups or housings.
2. Acceptable Manufacturers:
 - a. Vibration Mountings and Controls, Inc.
 - b. Mason Industries.
 - c. Vibration Eliminator.
 - d. Or Approved Equal

D. Combination Spring/Rubber Isolation Hangers

1. Spring-Flex hangers shall consist of a steel spring in series with a .2 inch (minimum) deflection neoprene element. Springs shall be color coded, and elastomer element molded in specific colors for proper identification of rated load capacity. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Pipe isolators shall have spring diameters and hanger box lower hole sizes of sufficient size to permit the hanger rod to swing approximately 30° before contacting the box. Hangers which are to be used with flat iron duct straps will be provided with eye bolts on both ends.
2. Acceptable Manufacturers:
 - a. Vibration Mountings and Controls, Inc.
 - b. Mason Industries.
 - c. Vibration Eliminator.
 - d. Or Approved Equal

E. Spring/Rubber Pre-Positioning Hangers

1. Spring-Flex hangers shall consist of color-coded steel spring in series with a neoprene element molded in specific colors for proper identification of rated load capacity. Hanger design shall incorporate a means for supporting the suspended equipment or piping at a fixed elevation during installation regardless of load changes as well as a means for transferring the load to the spring.
2. Acceptable Manufacturers:
 - a. Vibration Mountings and Controls, Inc.
 - b. Mason Industries.
 - c. Vibration Eliminator.
 - d. Or Approved Equal

F. Pre-Compressed Hangers

1. Spring-Flex hangers shall consist of a color-coded steel spring in series with a neoprene element molded in specific colors for proper identification of rated load capacity. Springs shall be pre-compressed to the rated deflection so as to support the suspended equipment or piping at a fixed elevation during installation regardless of load changes. For 30° misalignment capability, spring diameters and hanger box lower hole sizes shall be of sufficient size to permit the hanger rod to swing approximately 30° before contacting the box.
2. Acceptable Manufacturers:
 - a. Vibration Mountings and Controls, Inc.
 - b. Mason Industries.
 - c. Vibration Eliminator.
 - d. Or Approved Equal

G. Spring Hangers

1. Spring-Flex hangers shall consist of a color-coded steel spring with a neoprene and steel washer, which will properly distribute the load on the spring. For 30° misalignment capability, spring diameters and hanger box lower hole sizes shall be of sufficient size to permit the hanger rod to swing approximately 30° before contacting the box. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Hangers, which are to be used with flat iron duct straps will be provided with eye bolts on both ends.
2. Acceptable Manufacturers:
 - a. Vibration Mountings and Controls, Inc.
 - b. Mason Industries.
 - c. Vibration Eliminator.
 - d. Or Approved Equal

H. Self-Aligning Spring Hanger

1. Spring-Flex hangers shall consist of a color-coded steel spring seated in a neoprene spring cup with integral bushing to insulate the lower support rod from the hanger box. The steel hanger box shall be hinged to allow for a minimum of 30° misalignment between the rod attachment to structure and the connection to the supported equipment. Hanger boxes shall withstand three times the rated load without failure.
2. Acceptable Manufacturers:
 - a. Vibration Mountings and Controls, Inc.
 - b. Mason Industries.
 - c. Vibration Eliminator.
 - d. Or Approved Equal

I. Floor, Wall, And Ceiling Sleeves

1. Where piping passes through walls, floors, or ceilings, a vibration control sleeve shall be provided to reduce the transmission of vibration. The sleeve shall consist of two pipe halves with neoprene sponge material bonded to the inside and a bolting arrangement for secure fit around piping. Where temperature exceeds 240°F, an appropriate density fiberglass shall be used in place of neoprene material.
2. Acceptable Manufacturers:
 - a. Vibration Mountings and Controls, Inc.
 - b. Mason Industries.

- c. Vibration Eliminator.
- d. Or Approved Equal

J. Seismic Spring Mountings

1. Steel spring isolator incorporating elastomeric snubbing in all directions. The snubber shall be adjustable in the vertical direction and allow a maximum of ¼" travel in all directions before contacting the elastomer cushion. Spring diameters shall be no less than 0.8 times the compressed height of the spring at rated load. Springs shall also have a minimum additional travel to solid equal to 50% of the rated deflection. Housing shall have provision to adjust the rebound plate and to inspect the spring. Housing shall be of cast ductile iron, malleable cast iron or of welded steel construction. Gray iron castings are not permitted. Springs shall be color coded for proper identification of rated load capacity. Springs shall be coated with a polyester epoxy powder. Hardware shall be stainless steel, or zinc plated.
2. Acceptable Manufacturers:
 - a. Vibration Mountings and Controls, Inc.
 - b. Mason Industries.
 - c. Vibration Eliminator.
 - d. Or Approved Equal

K. Seismic Snubbers/Restraints

1. All-directional seismic snubbers shall include all directional elastomer elements, having a minimum elastomer thickness of ¾" in all directions. Elastomers shall be easy to inspect and shall consist of replaceable elastomer inserts. Elastomer shall be neoprene or a high quality rubber including anti-ozone and anti-oxidant materials and conform to ASTM D2000 Grade 2BC or Bridge Bearing Neoprene. Snubbers shall be manufactured with an air gap between steel and elastomer of 1/8 inch to ¼ inch. Snubbers shall be installed with factory set clearances. Snubber must have at least two anchor bolt holes and shall have an ultimate load capacity of at least four times the rated static load capacity.
2. Acceptable Manufacturers:
 - a. Vibration Mountings and Controls, Inc.
 - b. Mason Industries.
 - c. Vibration Eliminator.
 - d. Or Approved Equal

L. Cable Restraints/Single Arm Brace

1. Steel aircraft cable restraints are designed and installed to limit motion on suspended isolated equipment, piping or ducting. Cable are installed with enough slack to engage only when ¼ inch movement occurs. On suspended equipment, cables are installed in sets of four, located at 45° angles to all three axes. Where required at pipe hangers, cables are placed two at each location, alternating orientation at successive locations. Cable shall be 7x19 galvanized or stainless steel aircraft cable conforming to FED-STD-RR-W-410D.
2. Non-isolated equipment, pipe, and duct shall be seismically restrained with the use of a rigid brace consisting of two steel brackets designed to accept a steel angle or unistrut. Brackets shall provide easy installation by allowing full range of motion in horizontal and vertical directions. Rigid braces with slotted holes or hinges are not acceptable.
3. Acceptable Manufacturers:
 - a. Vibration Mountings and Controls, Inc.
 - b. Mason Industries.

- c. Vibration Eliminator.
- d. Or Approved Equal

M. Captive Elastomer Mountings

1. Consist of a captive elastomeric mount molded from neoprene or EPDM compound conforming to the requirements of ASTM D2000. Load bearing elastomer element shall be housed in a cast ductile iron housing. Mount shall incorporate a fail-safe captive design, and shall provide a vertical natural frequency of approximately 8 Hz at rated static load. Mount shall be capable of providing dynamic deflections of up to .5 inches.
2. Acceptable Manufacturers:
 - a. Vibration Mountings and Controls, Inc.
 - b. Mason Industries.
 - c. Vibration Eliminator.
 - d. Or Approved Equal

N. Structural Bases

1. Integral structural steel bases shall be rectangular in shape. All structural members shall be of wide flange, angle or channel steel with depth equal to a minimum of 1/10 of the longest span of equipment, but not less than 6 inches. Built-in adjustable motor slide rails and height saving brackets shall be supplied as in integral part of the base.
2. Acceptable Manufacturers:
 - a. Vibration Mountings and Controls, Inc.
 - b. Mason Industries.
 - c. Vibration Eliminator.
 - d. Or Approved Equal

O. Structural Rails

1. Rails for indoor applications or outdoor applications where equipment supports are mounted on isolation systems shall be of wide flange, angle or channel steel with depth equal to a minimum of 1/10 of the longest span of equipment, but not less than 6 inches. Height saving brackets shall be supplied as an integral part of the rails. For seismic applications rails must be structurally attached to one another.
2. Rails for outdoor applications where weatherproofed isolated equipment supports are required, shall be a continuous structural support rail that combines equipment support and isolation mounting into one unitized assembly. Rails shall incorporate roof-enclosed springs, which are adjustable, removable and interchangeable, after equipment has been installed. The system shall maintain the same installed and operating height with or without the equipment load and shall be capable of being utilized as a blocking device. The entire assembly shall be an integral part of the roof's membrane waterproofing. Unit to be supplied with continuous upper and lower galvanized flashing. Rails shall be cross-braced at support and equipment attachment points when used in seismic zones. Rails shall be bolted or welded to the building steel or anchored to the concrete deck to attain specified acceleration criteria.
3. Acceptable Manufacturers:
 - a. Vibration Mountings and Controls, Inc.
 - b. Mason Industries.
 - c. Vibration Eliminator.
 - d. Or Approved Equal

PART 3 EXECUTION**3.1 GENERAL**

- A. All vibration isolators and seismic restraint systems must be installed in strict accordance with the manufacturer's written instructions and all certified submittal data.
- B. Installation of vibration isolators and seismic restraints must not cause any change of position of equipment or conduit resulting in stresses or misalignment.
- C. No rigid connections between equipment and the building structure shall be made that degrades the noise and vibration control system herein specified.
- D. The contractor shall not install any isolated equipment, which makes rigid connections with the building unless isolation is not specified. "Building" includes, but is not limited to, slabs, beams, columns, studs and walls.
- E. Coordinate work with other trades to avoid rigid contact with the building.
- F. Overstressing of the building structure must not occur because of overhead support of equipment. Contractor must submit loads to the structural engineer of record for approval. General bracing may occur from flanges to structural beams, upper truss cords in bar joist construction and cast in place inserts or wedge type drill-in concrete anchors.
- G. Seismic cable restraints shall be installed slightly slack to avoid short circuiting the isolated suspended equipment.
- H. Seismic cable assemblies are installed taut on non-isolated systems. Seismic solid braces may be used in place of cables on rigidly attached systems except where single arm braces incorporate resilient bushings.
- I. At locations, where seismic cable restraints or seismic solid braces are located, the support rods must be braced when necessary to accept compressive loads.
- J. At all locations where seismic cable braces and seismic cable restraints are attached to pipe clevises, the clevis bolt must be reinforced with pipe clevis cross bolt braces or double inside nuts if required by seismic acceleration levels.
- K. Vibration isolation manufacturer shall furnish integral structural steel bases as required. Independent steel rails are not permitted.
- L. Where piping passes through walls, floors or ceilings, the contractor shall provide wall seals or resilient packed pipe sleeves.
- M. Special & Periodic Inspections for items listed in Section 1.03 (Article #4) shall be conducted and submitted on a timely basis.

3.2 EQUIPMENT INSTALLATION

- A. Equipment shall be isolated and restrained as follows:
1. The following equipment shall be vibration isolated:
 - a. Engine-generator sets.
 - b. Transformers.
 - c. Uninterruptible power supplies.
 2. All floor-supported equipment shall be seismically braced.
 3. All ceiling suspended equipment shall be seismically braced.
 4. All wall-mounted equipment shall be seismically mounted.
 5. All conduit, cable tray, bus duct and wireway shall be seismically braced.
 6. Exhaust piping for engine-generator sets shall be seismically braced.
- B. Place floor mounted equipment on 4" high concrete housekeeping pads properly doweled or expansion shielded to the deck to meet acceleration criteria (see Section 1.06). Anchor isolators and/or bases to housekeeping pads. Concrete work is specified under Division 2.
- C. Additional Requirements:
1. The minimum operating clearance under bases shall be 2".
 2. All bases shall be placed in position and supported temporarily by blocks or shims, as appropriate, prior to the installation of the equipment, isolators and restraints.
 3. The equipment shall be installed on blocks to the operative height of the isolators. After the entire installation is complete, and under full operational load, the isolators shall be adjusted so that the load is transferred from the blocks to the isolators. Remove all debris from beneath the equipment and verify that there are no short circuits of the isolation. The equipment shall be free in all directions.
 4. Ceilings containing diffusers must meet seismic zone requirements by using earthquake clips or other approved means of positive attachment to secure diffuser to T-bar structure.
 5. All floor or wall mounted equipment shall be restrained.

3.3 SEISMIC RESTRAINT OF PIPING, CONDUIT, BUS DUCT AND CABLE TRAY

- A. All high hazard and life safety pipe regardless of size such as fuel oil piping shall be seismically restrained. Seismic cable restraints or seismic solid braces may be used. There are no exclusions for size or distance for this category.
- B. Seismically restrain all conduit seismic cable restraints or seismic solid braces may be used on unisolated conduit.

C. See the below Table A for maximum seismic bracing distances.

TABLE A SEISMIC BRACING TABLE ON CENTER SPACING			
Equip	Transverse	Longitudinal	Within Each Change Of Direction (Larger of)
Conduit	40 Feet	80 Feet	10 Feet or 15 Diameters
Cable Tray	40 Feet	80 Feet	10 Feet

D. Multiple runs of conduit on the same support shall have distance determined by calculation.

E. Rod braces shall be used for all rod lengths greater than 3’.

F. Clevis hangers shall have spacer placed inside of hanger at seismic brace locations.

G. Transverse restraint for one conduit section may also act as a longitudinal restraint for a conduit section of the same size connected perpendicular to it if the restraint is installed within 24” of the elbow or TEE or combined stresses are within allowable limits at longer distances.

H. Hold down clamps must be used to attach conduit to all trapeze members before applying restraints.

I. Branch lines may not be used to restrain main lines.

3.4 INSPECTION

A. All independent Special and Periodic Inspections must be performed and submitted on as outlined in Section 1.05.

B. Upon completion of installation of all vibration isolation devices, the local representative shall inspect the completed project and certify in writing to the Contractor that all systems are installed properly, or require correction. The Contractor shall submit a report to the Architect, including the representative’s report certifying correctness of the installation or detailing corrective work to be done.

END OF SECTION 260548

DIVISION 26 – ELECTRICAL
SECTION 260550 – BASIC ELECTRICAL MATERIALS AND METHODS
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for basic electrical materials and methods for Work of this Contract.

B. Related Sections:

1. Section 013300 - Submittal Procedures
2. Section 016000 - Product Requirements
3. Section 017300 - Execution
4. Section 260526 - Grounding and Bonding for Electrical Systems
5. Section 260529 - Hangers and Supports for Electrical Systems
6. Section 260553 - Identification for Electrical Systems
7. Section 260563 - Acceptance Testing of Electrical Systems
8. Section 024119 - Minor Electrical Demolition
9. Section 260519 - Low-Voltage Electrical Power Conductors and Cables
10. Section 260533.13 - Conduit for Electrical Systems
11. Section 260533 - Raceway and Boxes for Electrical Systems
12. Section 262510 - Portable Generator Tap Box

1.2 REFERENCES

A. America National Standards Institute (ANSI):

1. ANSI Z535.4, Product Safety Signs and Labels.

B. American Society of Mechanical Engineers (ASME):

1. ANSI/ASME Y14.2M, Line Conventions and Lettering.
2. ANSI/ASME Y14.24M, Types and Applications of Engineering Drawings.
3. ANSI/ASME Y14.34M, Associated Lists.
4. ANSI/ASME Y14.35M, Revision of Engineering Drawings and Associated Documents.
5. ANSI/ASME Y14.100, Engineering Drawing Practices.

C. InterNational Electrical Testing Association, Inc. (NETA):

1. ANSI/NETA ETT Standard for Certification of Electrical Testing Technicians.

D. National Electric Manufacturer's Association (NEMA).

1. NEMA ICS 6, Industrial Control and Systems: Enclosures.

E. National Fire Protection Association (NFPA):

1. NFPA 70, National Electrical Code (NEC).

2. NFPA 70E, Standard for Electrical Safety Requirements for Employee Workplaces.
- F. New Jersey Administrative Code (N.J.A.C.):
1. Uniform Construction Code and Sub Codes.
- G. The Society for Protective Coatings (SSPC):
1. SSPC-SP 2, Hand Tool Cleaning.

1.3 DEFINITIONS

- A. Skeleton One-Line Diagram: A one-line diagram which encompasses and includes a complete and simplified subset of all identified series-circuit upstream overcurrent devices, trip units and protective relaying devices, equipment, and product type identification from the originating normal source of service supply to the final distribution equipment as suitable to determine short circuit and protective device coordination analysis,
1. Including all:
 - a. All potential sources of normal electrical service supply
 - b. Circuit breaker or fuses, with interrupting ratings, trip settings, voltage class, maximum voltage/current ratings and product type indicated.
 - c. All loadbreak or non-load break switches, fused or otherwise, with interrupting ratings, trip settings, voltage class, maximum voltage/current ratings and product type indicated.
 - d. All step down transformers, with voltage ratings, tap settings, type and impedance information.
 - e. All current transformers, with actual CT ratio settings; and accuracy class, where available.
 - f. All feeders, sub-feeders, and conductor sets, including type of raceway, estimated distances, number of phase conductor, neutral, and equipment ground conductors and sizes; and conductor insulation types, where available.
 - g. All potential motor contributing sources as identified; or as best estimated.
 2. Excluding
 - a. Any consideration of other multiple Main-Tie-Main arrangements, other than normal supplies to the final distribution equipment.
 - b. Any information that cannot be otherwise obtained by field observation or by the Owner, due to the vital nature of the energized and operating electrical equipment. Best information will be used, as available from existing documents, in lieu.
 - c. Any information that otherwise places the Engineer within a recognized “arc flash hazard”, or in opposition to the Engineer’s or Owner’s Safety Programs, or limited due to Owner’s Security Access Program, to obtain.
 3. Best information will be used, as available from existing documents, in lieu.

1.4 DESIGN REQUIREMENTS

- A. Design, Installation, and Material Requirements - Existing Building:
1. The electrical installation and material requirements for the electrical Work of the Contract shall be meet in accordance with State of New Jersey Sub Code,
 2. Refer to Section 260528 – Hangers and Supports for attachments and structural loading requirements as placed upon the existing building by installed electrical equipment.

1.5 SUBMITTALS

- A. Submit the following information for approval in accordance with the requirements of Section 01300, Submittal Procedures:
1. Product Data:
 - a. Submit Product Data, including catalog cuts, for all products provided for the electrical work of this Contract and as specified in other Sections.
 - 1) Clearly indicate the usage of each product on each submittal.
 2. Shop Drawings:
 - a. Submit Shop Drawings for the electrical work of this Contract as specified in other Sections.
 3. Quality Assurance/Control Submittals:
 - a. Design Data:
 - 1) Valve Motor Data and Branch Circuit Overcurrent Protective Device Schedule.
 - b. Certificates:
 - 1) Testing agency quality verification that all products meet requirements or manufacturer disclaimer statements.
 4. Closeout Submittals:
 - a. Operation and Maintenance Manuals.

1.6 SUBSTITUTIONS, BASIS OF DESIGN, AND ACCEPTABLE MANUFACTURERS

- A. The Owner has previously identified approved materials supplier listings for this Contract. All substitutions to identified materials or equipment shall comply with the applicable requirements of Division 1. In any case of conflict between such requirements of Division 1 and this paragraph, the more stringent requirements shall govern.
- B. Whenever an item of material or equipment is identified by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function and quality required. Unless the identification or description contains or is followed by words reading that no like, equivalent or “or- equal” item or no substitution is permitted, material or equipment of other Suppliers may be proposed.
- C. Where substitutions to identified items are permitted, any proposed substitution or alternate must fully comply with the following in order to be considered by the Engineer:
1. Be of a reputable manufacturer,
 2. Be fully compliant with the requirements of this Section and the Drawings,
 3. Be fully compatible with all interfacing items and work, and with the installation environment,
 4. Be appropriate (as determined by the Engineer) for the proposed application, and
 5. Be equivalent (as determined by the Engineer) in character, performance, and quality to any identified Basis of Design.
- D. Where a specific manufacturer or product is identified as the Basis of Design or listed first in a list of acceptable manufacturers, the overall project design is based on the identified manufacturer or product. If the Contractor elects to substitute a manufacturer or product which differs from the identified Basis of Design, the Contractor shall bear all efforts and costs of any design changes necessary in order to achieve finished work which is equal in character, performance, and quality to the original design depicted in the Contract Documents. Such changes shall include, but not necessarily be limited to: changes to ratings and/or features of other equipment, changes to material sizes and/or types, new

material and/or equipment, and changes to structural and/or architectural features (including room sizes). Approval by the Engineer of a proposed substitute item shall not relieve the Contractor of this responsibility.

- E. The listing of specific manufacturers is solely intended to identify reputable manufacturers who are known to provide quality products of the general type specified. Such listing is in no way intended to imply that the identified manufacturers product(s) have been verified to satisfy the specified requirements, or to be equivalent to any identified Basis of Design manufacturer. Nor does such a listing imply acceptance of products which do not meet the specified requirements, ratings, features, dimensions, and functions as indicated.

1.7 QUALITY ASSURANCE

A. Qualifications:

1. Testing Agency Qualifications:

- a. Use a NETA accredited testing agency, or approved equal, that is accredited for the region in which the Contract work is performed.
- b. Submit the testing agency's qualifications to the Engineer for approval.

B. Regulatory Requirements:

- 1. Perform all electrical work in conformance with the requirements of NFPA 70, the National Electrical Code.

C. Certifications:

- 1. Submit evidence with all Product Data that the products represented meet testing agency quality verification requirements, including agency listing and labeling requirements.
 - a. Such evidence may consist of either a printed mark on the data or a separate listing card.
 - b. Submit a written statement from those product manufacturers that do not provide evidence of the quality of their products that indicates why an item does not have quality assurance verification.
 - 1) Such statements provided in lieu of quality assurance verification are subject to the acceptance of the Owner and the Engineer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials and equipment to the work site in accordance with the requirements of Section 01600.

- 1. Deliver materials and equipment in a clean condition.
 - a. Provide packaging that plugs, caps, or otherwise seals openings both during shipping and temporary storage.
- 2. Provide equipment needed for unloading operations, and have such equipment on the work site to perform unloading work when the material and equipment is delivered.
 - a. If possible, clearly identify pick-points or lift-points on electrical equipment crating and packaging.
 - b. In the absence pick-points or lift-points on equipment crating and packaging, identify pick-points or lift-points on the equipment itself.

- B. Handle materials and equipment in accordance with the requirements of Section 01660.
 - 1. Handle materials and equipment in accordance with manufacturer's written instructions.
 - 2. When unloading materials and equipment, provide special lifting harnesses or apparatus as required by manufacturers.

- C. Store electrical materials and equipment, whether on-site or off-site, in accordance with Section 01660 and the following:
 - 1. Follow the manufacturer's written instructions for storing the items.
 - 2. Store electrical equipment and products under cover.
 - a. Except for electrical conduit, store electrical equipment and products in heated warehouses or enclosed buildings with auxiliary heat and that provide protection from the weather on all sides.

1.9 SYSTEM INSTALLATION AND STARTUP

- A. Electrical Switching and Circuit Isolation: The Owner shall provide all electrical switching, and associated OSHA lock-out tag-out tagging requirements in accordance with Suez Water Company WTP safety procedures.
 - 1. The Contractor shall similarly abide by the Owners tagging
 - 2. procedures and shall similarly apply his own Company's lock-out tag-out tags in accordance with his Employee Safety Program.
 - 3. Contractor lock-out tag-out tags shall be applied by the Contractor to the safety disconnects prior to any work being initiated on the isolated equipment.

- B. Electrical Outage Scheduling and Coordination: The Contractor shall coordinate all outages of existing affected equipment with the Owner.
 - 1. Provide two (2) full working days notice when requesting identified equipment or circuit outage.
 - 2. Submit request in writing to the designated Owner's Operating Staff representative for the Contract Work.

1.10 MAINTENANCE

- A. Operation and Maintenance Manuals:
 - 1. Prepare Operation and Maintenance Manuals in conformance with the requirements of Section 017823, other Contract requirements, and as follows:
 - a. Organize Operation and Maintenance Manuals by Specification Section and equipment number as designated on the Contract Drawings.
 - b. Include suppliers, supplier addresses, and supplier telephone numbers for the equipment and products furnished.
 - c. Prepare information as identified and required, where required within the above listed Reference Sections.
 - 2. 60 days prior to the request for final payment, prepare and submit two copies of the proposed Operation and Maintenance Manuals to the Engineer for approval.
 - 3. Upon approval of the proposed Operation and Maintenance Manuals, submit six corrected copies as follows:
 - a. Submit one set to the Engineer.

- b. Deliver the remaining five copies to the Owner.
4. Insert final record drawings in each set of Operation and Maintenance Manuals at Project Closeout.

PART 2 PRODUCTS

2.1 MATERIALS

A. Grounding and Bonding Materials:

1. Provide grounding and bonding materials in accordance with the requirements of Section 16060.

B. Hangers and Supports:

1. Provide hangers and supports for electrical equipment in accordance with the requirements of Section 260528

C. Electrical Identification Materials:

1. Provide and install electrical identification and labeling materials in accordance with the requirements of Section 260553

D. Wire and Cable:

1. Provide low-voltage electrical wire, cable, and accessories in accordance with the requirements of Section 260519

E. Conduit and Raceway:

1. Provide conduit and raceway as indicated, as appropriate for the application per NFPA 70, and in accordance with the requirements of Section 260533.13

F. Boxes:

1. Provide junction and pull boxes and accessories in accordance with the requirements of Section 260533

2.2 SHOP FINISHING

- A. For electrical equipment, factory-apply paint and coating systems that at a minimum meet the requirements of the NEMA ICS 6 corrosion-resistance test and the additional requirements specified in individual Specification Sections.

PART 3 EXECUTION

3.1 PANELBOARD DIRECTORIES

- A. Update new panelboard directory information, in permanent typewritten or printed fashion. Provide newly printed directory cards within the respective panelboards:

1. New Panelboard “LP-SCR-1”. (LLPS Building, 1st Floor)

3.2 ARC-FLASH LABELS

- A. Update all identified electrical equipment with new arc-flash labeling.

3.3 INSTALLATION

- A. Field-Applied Finishes:

1. Except for factory-finished items that have been completely finished with factory- applied primer and final finish coatings, finish installed electrical materials, equipment, apparatus, and items in the field in accordance with the requirements of Section 09900.
 - a. Apply paint material matching the composition of the factory-applied products.
 - 1) Obtain factory-supplied paint for this work whenever available.
 - b. Comply with the paint manufacturer’s instructions for mixing, thinning, surface preparation, application, spreading rate, drying time, and environmental limitations concerning application of the paint.
 - c. Apply paint in such a manner so that the finished appearance will match as nearly as possible the factory finish.
 - 1) Poorly applied paint may be required to be repaired and re-applied by the Contractor in accordance at no additional cost to the Owner.
2. Coordinate the painting of large areas with the Engineer to minimize the duration of exposure of other workers to toxic paint fumes.

3.4 REPAIR/RESTORATION

- A. If the factory finishes of factory-finished component items become damaged for any reason, repair, touch-up, or refinish the item.
- B. If an item that has several surfaces has damage on one surface, refinish the entire damaged surface.
 1. Surface Preparation:
 - a. Outside the damaged area, lightly sand the entire surface and perform additional sanding to profile the damaged paint edge.
 - b. Prepare the surfaces of damaged areas in accordance with SSPC-SP 2.
 - c. Observe equipment manufacturer’s painting requirements and use approved touch-up paint, as provided by the manufacturer.
- C. Refer to Section 024119 – Minor Electrical Demolition for the repair/restoration of existing building facilities

3.5 FIELD QUALITY CONTROL

- A. Perform electrical testing as detailed in Section 260563 and in each Specification Section.
- B. Have electrical work inspected as required by the local Authority Having Jurisdiction (AHJ).

1. Submit a copy of the certification of inspection with the final project closeout documents, and post the original in the electrical room on-site protected by a metal frame with a protective plate glass cover.
- C. The quality of finishing and refinishing work is subject to approval by the Engineer.

END OF SECTION 260550

DIVISION 26 – ELECTRICAL
SECTION 260551 – EMERGENCY STANDBY POWER SYSTEM
DPMC No. A1346-00

PART 1 GENERAL

1.1 GENERAL

- A. The Generator and Day Tank shall be furnished by the Owner. The Generator and Day Tank are currently stored offsite at the Treasury Print Shop at 101 Carroll Street, Trenton, NJ, 08625. Both assets will be relocated to the Department of Labor and Workforce Development (DLWD) Building at 1 John Fitch Way, Trenton NJ. The approximate distance is between 1-1.5 miles.

1.2 SCOPE OF WORK

- A. The Contractor shall provide, install, and perform acceptance test a complete owner furnished Cummins, 600KW,480V, 3Ph Diesel Generator and a separate Day Tank of 3000 Gallons. The Generator and day tank are at the following location and shall be rigged to the proposed location as shown on the design drawings.
- B. The Contractor shall rig both the Generator and Fuel Tank from the existing location to the new proposed location as shown on the Contract Drawings. The Contractor shall arrange all necessary permits, permit fees, scheduling with local Police Department for necessary road closures, and cost of Police Officer(s).
- C. Related Work
1. Section 013300 - Submittal Procedures
 2. Section 016000 - Products
 3. Section 017300 - Operation and Maintenance Data
 4. Section 099000 - Paints and Coatings
 5. Section 260526 - Grounding and Bonding for Electrical Systems
 6. Section 260529 - Hangers and Supports for Electrical Systems
 7. Section 260553 - Identification for Electrical Systems
 8. Section 260563 - Acceptance Testing of Electrical Systems
 9. Section 024119 - Minor Electrical Demolition
 10. Section 260519 - Low-Voltage Electrical Power Conductors and Cables
 11. Section 260533.13 - Conduit for Electrical Systems
 12. Section 260533 - Raceway and Boxes for Electrical Systems

PART 2 PRODUCTS

2.1 MATERIALS

- A. Generator Remote Annunciator
1. General

- a. Provide and install a 20-light LED type remote alarm annunciator with horn, which will be compatible with the existing 600KW generator set and shall be located as shown on the drawings or in a location that can be conveniently monitored by facility personnel. The remote annunciator shall provide all the audible and visual alarms called for by NFPA Standard 110 for level 1 systems for the local generator control panel. Spare lamps shall be provided to allow future addition of other alarm and status functions to the annunciator. Provisions for labeling of the annunciator in a fashion consistent with the specified functions shall be provided. Alarm silence and lamp test switch(es) shall be provided. LED lamps shall be replaceable and indicating lamp color shall be capable of changes needed for specific application requirements. Alarm horn shall be switchable for all annunciation points. Alarm horn (when switched on) shall sound for first fault, and all subsequent faults, regardless of whether first fault has been cleared, in compliance with NFPA110 3-5.6.2. The interconnecting wiring between the annunciator and other system components shall be monitored and failure of the interconnection between components shall be displayed on the annunciator panel.

- B. The annunciator shall draw power from the generator batteries and shall include the following alarm labels, audible annunciation features, and lamp colors:

Condition	Lamp Color	Audible Alarm
Normal Power (to Loads)	Green	No
Genset Supplying Load	Amber	No
Genset Running	Green	No
Not in Auto	Red (Flashing)	Yes
High Battery Voltage	Red	Yes
Low Battery Voltage	Red	Yes
Charger AC Failure	Red	Yes
Fail to Start	Red	Yes
Low Engine Temperature	Amber	Yes
Pre-High Engine Temperature	Amber	Yes
High Engine Temperature	Red	Yes
Pre-Low Oil Pressure	Amber	Yes
Low Oil Pressure	Red	Yes
Overspeed	Red	Yes
Low Coolant Level	Amber	Yes
Low Fuel Level	Amber	Yes/Yes
Network OK	Green	Yes
(4) Spares		(Configurable)

Low battery voltage lamp shall also be lighted for low cranking voltage or weak battery alarm.

- C. Battery Charger
 - 1. The battery charger shall be a float type charger rated 2 amps. The battery charger shall include an ammeter for display of charging current and shall have fused AC inputs and DC outputs.
 - 2. Provide a minimum 12 amp battery charger for each generator set battery bank.
 - 3. The charger(s) shall include the following capabilities:
 - a. Chargers shall be UL 1236-BBHH listed and CSA or CUL certified for use in emergency applications.
 - b. The charger shall be compliant with UL991 requirements for vibration resistance.

- c. The charger shall comply with the requirements of EN61000-4-5 for voltage surge resistance; EN50082-2 for immunity; EN61000-4-2 for ESD; EN61000-4-3 for radiated immunity; ANSI/IEEE C62.41 category B and IN61000-4-4 for electrically fast transient; EN61000-4-6 for conducted emissions; and FCC Part 15 Class A for radiated emissions.
- d. The charger shall be capable of charging a fully discharged battery without damage to the charger. It shall be capable of returning a fully discharged battery to fully charged condition within 24 hours. The charger shall be UL-labeled with the maximum battery amp-hour rating that can be recharged within 24 hours. The label shall indicate that the charger is suitable for charging of 200AH batteries per NFPA requirements.
- e. The charger shall incorporate a 4-state charging algorithm, to provide trickle charge rate to restore fully discharged batteries, a bulk charge rate to provide fastest possible recharge after normal discharge, an absorption state to return the battery to 100 percent of charge, and a float stage to maintain a fully charge battery and supply battery loads when the generator set is not operating. In addition, the charger shall include an equalization timer. Charge rates shall be temperature compensated based on the temperature directly sensed at the battery.
- f. The DC output voltage regulation shall be within plus or minus 1%. The DC output ripple current shall not exceed 1 amp at rated output current level.
- g. The charger shall include the following features:
 - 1) two line alphanumeric display with programming keys to allow display of DC output ammeter and voltmeters (5% accuracy or better), display alarm messages, and perform programming;
 - 2) LED indicating lamp(s) to indicating normal charging condition (green), equalize charge state (amber), and fault condition (red);
 - 3) AC input overcurrent, over voltage, and undervoltage protection;
 - 4) DC output overcurrent protection;
 - 5) Alarm output relay
 - 6) Corrosion resistant aluminum enclosure
 - 7) Supply power failed indication shall be displayed on the Annunciator panel.

D. Auxiliary Fuel Pumping System.

1. Contractor shall remove and replace the existing fuel pumping system and shall replace with a new Dual Pumping System as manufactured by TRAMONT System 2000PLUS ECM Pumping System consisting of Dual Fuel Pumps and a reverse fuel Pump. The system shall be UL listed and shall be based upon state-of-the-art microprocessor-based control system.
2. The system shall be self-diagnostic. The main features of the fuel control system shall be:
 - a. UL 508 listed
 - b. Shall operate on 120V AC, single phase
 - c. LED Indicating lights for all functions.
 - d. Fuel level sensing.
 - e. Motor control relay with LED signal, rated 1/2HP.
 - f. High and low fuel alarms.
 - g. Electronic Control Module functional signals
 - h. Manual control with ON/OFF and Test buttons.
 - i. Secure internal test button for warning LEDs and remote annunciation of warning.
3. The following option shall be included in the pump system:
 - a. Duplex pumping system consisting of second pump which will operate in a lead –lag fashion.
 - b. Pump running contacts for remote Annunciator.
 - c. Critical high shutdown. A separate float switch which senses high fuel level and disengaging motor and solenoid valve. Warning relay shall be supplied for remote Annunciation.

- d. Power shall be supplied from the local Power Panel located inside the generator housing. Refer to design drawings.

PART 3 EXECUTION – NOT USED

END OF SECTION 260551

DIVISION 26 – ELECTRICAL
SECTION 260551.01 – GENERATOR BATTERY CHARGER
DPMC No. A1346-00

PART 1 GENERAL

1.1 GENERAL

- A. The Contractor shall provide and install a Battery Charger compatible with the owner furnished Cummins Diesel Generator.
- B. Related Work
1. Section 013300 - Submittal Procedures
 2. Section 016000 – Product Requirements
 3. Section 017823 - Operation and Maintenance Data
 4. Section 260551- Emergency Standby Power System
 5. Section 260551.01 – Generator Battery Charger
 6. Section 260551.03 - Generator Auxiliary Fuel Pumps.
 7. Section 260551.05 – Heat Tracing for Diesel Fuel Lines.
 8. Section 260526 - Grounding and Bonding
 9. Section 260529 - Hangers and Supports
 10. Section 260553 - Electrical Identification
 11. Section 260563 – Acceptance Electrical Testing
 12. Section 024119 - Minor Electrical Demolition
 13. Section 260519 - Low-Voltage Wire, Cable, and Accessories
 14. Section 260533 – Boxes for Electrical Systems
 15. Section 260533.13 – Conduit for Electrical Systems
- C. Requirements.
1. The battery charger shall be a float type charger rated 2 amps. The battery charger shall include an ammeter for display of charging current and shall have fused AC inputs and DC outputs.
 - a. Provide a minimum 12 amp battery charger for each generator set battery bank. The charger(s) shall include the following capabilities:
 - 1) Chargers shall be UL 1236-BBHH listed and CSA or CUL certified for use in emergency applications.
 - 2) The charger shall be compliant with UL991 requirements for vibration resistance.
 - 3) The charger shall comply with the requirements of EN61000-4-5 for voltage surge resistance; EN50082-2 for immunity; EN61000-4-2 for ESD; EN61000-4-3 for radiated immunity; ANSI/IEEE C62.41 category B and IN61000-4-4 for electrically fast transient; EN61000-4-6 for conducted emissions; and FCC Part 15 Class A for radiated emissions.
 - 4) The charger shall be capable of charging a fully discharged battery without damage to the charger. It shall be capable of returning a fully discharged battery to fully charged condition within 24 hours. The charger shall be UL-labeled with the maximum battery amp-hour rating that can be recharged within 24 hours. The label shall indicate that the charger is suitable for charging of 200AH batteries per NFPA requirements.
 - 5) The charger shall incorporate a 4-state charging algorithm, to provide trickle charge rate to restore fully discharged batteries, a bulk charge rate to provide fastest possible recharge after normal discharge, an absorption state to return the battery to 100 percent of charge, and a float stage to maintain a fully charge battery and supply battery loads when the generator set is not operating. In addition, the charger shall include an equalization timer.

Charge rates shall be temperature compensated based on the temperature directly sensed at the battery.

- 6) The DC output voltage regulation shall be within plus or minus 1%. The DC output ripple current shall not exceed 1 amp at rated output current level.
- 7) The charger shall include the following features:
 - a) Two line alphanumeric display with programming keys to allow display of DC output ammeter and voltmeters (5% accuracy or better), display alarm messages, and perform programming;
 - b) LED indicating lamp(s) to indicating normal charging condition (green), equalize charge state (amber), and fault condition (red);
 - c) AC input overcurrent, over voltage, and undervoltage protection;
 - d) DC output overcurrent protection;
 - e) Alarm output relay
 - f) Corrosion resistant aluminum enclosure
 - g) Supply power failed indication shall be displayed on the Annunciator panel.

Acceptable Manufacturer:

- a) SEN

END OF SECTION 260551.01

DIVISION 26 – ELECTRICAL
SECTION 260551.03 – GENERATOR AUXILIARY FUEL PUMPS
DPMC No. A1346-00

PART 1 GENERAL

1.1 GENERAL

- A. The Contractor shall provide and install Dual Diesel Pump System which will transfer fuel from the Auxiliary Day Tank to the Generator subbase fuel tank compatible with the owner furnished Cummins Diesel Generator.
- B. Related Work
 - 1. Section 013300 - Submittal Procedures
 - 2. Section 016000 – Product Requirements
 - 3. Section 017823 - Operation and Maintenance Data
 - 4. Section 260551- Emergency Standby Power System
 - 5. Section 260551.01 – Generator Battery Charger
 - 6. Section 260551.03 - Generator Auxiliary Fuel Pumps.
 - 7. Section 260551.05 – Heat Tracing for Diesel Fuel Lines.
 - 8. Section 260526 - Grounding and Bonding
 - 9. Section 260529 - Hangers and Supports
 - 10. Section 260553 - Electrical Identification
 - 11. Section 260563 – Acceptance Electrical Testing
 - 12. Section 024119 - Minor Electrical Demolition
 - 13. Section 260519 - Low-Voltage Wire, Cable, and Accessories
 - 14. Section 260533 – Boxes for Electrical Systems
 - 15. Section 260533.13 – Conduit for Electrical Systems

1.2 AUXILIARY FUEL PUMPING SYSTEM.

- A. Contractor shall remove and replace the existing fuel pumping system and shall replace with a new Dual Pumping System as manufactured by TRAMONT System 2000PLUS ECM Pumping System consisting of Dual Fuel Pumps and a reverse fuel Pump. The system shall be UL listed and shall be based upon state-of-the-art microprocessor-based control system.
- B. The system shall be self-diagnostic. The main features of the fuel control system shall be:
 - 1. UL 508 listed
 - 2. Shall operate on 120V AC, single phase
 - 3. LED Indicating lights for all functions.
 - 4. Fuel level sensing.
 - 5. Motor control relay with LED signal, rated 1/2HP.
 - 6. High and low fuel alarms.
 - 7. Electronic Control Module functional signals
 - 8. Manual control with ON/OFF and Test buttons.
 - 9. Secure internal test button for warning LEDs and remote annunciation of warning.
- C. The following option shall be included in the pump system:
 - 1. Duplex pumping system consisting of two pumps which will operate in a lead –lag fashion.

2. A reverse pump shall be incorporated for pumping the fuel from sub-base tank to the day tank. Provide a motor starter for the reverse pump.
3. All fuel lines shall be double walled and shall be equipped with leak detection sensors in the secondary containment pipes.
4. Diesel Fuel lines shall be Heat Traced. Power for heat Tracing shall be taken from the local Panel PP-GP.
5. Provide continuous level sensor and critical level sensor in the Day tank. Wire the level sensors to the Diesel Fuel Control Panel.
6. Pump running/ failure contacts shall be wired to the remote Annunciator.
7. Critical high shutdown. A separate float switch which senses high fuel level and disengaging motor and solenoid valve. Warning relay shall be supplied for remote Annunciation.
8. Power shall be supplied from the local Power Panel PP-GP located inside the generator housing. Refer to design drawings.
9. Fuel piping contractor shall submit shop drawing showing the piping and pumping schematic to the Engineer for approval.

END OF SECTION 260551.03

DIVISION 26 – ELECTRICAL
SECTION 260551.05 – HEAT TRACING FOR DIESEL FUEL PIPING
DPMC No. A1346-00

PART 1 GENERAL

1.1 GENERAL

- A. This section describes the requirement for supplying, installing, and testing of the electric heat tracing system of the diesel fuel piping. Freeze protection shall be utilized for domestic water piping in are

1.2 RELATED WORK

- A. Section 010000, General Requirements.
- B. Section 013300, Submittal Procedures.
- C. Section 260519, Low Voltage Electrical Power Conductors and Cables, As subject to freezing temperatures.

1.3 STANDARDS

- A. The Institute of Electrical and Electronic Engineers (IEEE):
1. 515.1-2012 Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Commercial Applications
- B. International Code Council, (ICC):
1. IPC-2018 International Plumbing Code
- C. National Fire Protection Association (NFPA):
1. 70-2020 National Electrical Code (NEC)
- D. Underwriters' Laboratories, Inc. (UL):
1. 508-2018 Industrial Control Equipment

1.4 SUBMITTALS

- A. Submittals, including number of required copies, shall be submitted in accordance with Section 013300, Submittal Procedures.
- B. Manufacturer's Literature and Data including full item description and optional features and accessories. Include dimensions, weights, materials, applications, standard compliance, model numbers, size, and capacity.
1. Rated capacity.
 2. Length of cable.
 3. Cable spacing/pitch.
 4. Electrical power requirements.
 5. Controls.

6. Enclosures.
 7. Accessories.
- C. The shop drawings shall include plans, sections, details, wiring diagrams, and attachments to other work. The wiring diagrams shall include power, signal, and control wiring.
- D. Field quality control test reports shall be submitted.
- E. Complete operating and maintenance manuals including wiring diagram, technical data sheets, information for ordering replaceable parts, and troubleshoot guide:
1. Include complete list, indicating all components of the systems.
 2. Include complete diagrams of the internal wiring for each item of equipment.
 3. Diagrams shall have their terminals identified to facilitate installation, operation, and maintenance.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Ten years' experience in design, engineering, manufacture and support of specified system and components.
- B. Product Requirements:
1. Pipe heat tracing cable assembly shall be field installed, and cable shall be factory tested for immersed in water for a minimum of 12 hours, and then tested for insulation resistance, high potential breakdown and continuity before leaving the factory.
 2. Factory Mutual approved heating cable that has the same wattage per lineal foot (power output), throughout its entire length.
 3. UL Listed, thermostat and contactor panel.
 4. UL Listed Control/Monitor Panel.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 SELF-REGULATING PARALLEL RESISTANCE HEATING CABLES

- A. Self-regulating parallel resistance heating cables shall comply with IEEE 515.1.
- B. The heating element shall be a pair of parallel conductors constructed of industrial grade 16 AWG buss wire with a tinned copper braid and over jacketing, SRL ensures operating integrity in Div. 2 hazardous environments as well as certain corrosive industrial environments. SRL heating cable has a maximum maintenance temperature rating of 150 F (65 C).
- C. Copper bus wires embedded in cross linked conductive polymer core, which varies heat output in response to temperature along its length. Cables shall be terminated with waterproof, factory assembled non heating leads with connects at one and seal the opposite end watertight. The cable shall be capable of crossing over itself without overheating.
- D. The electrical insulating jacket shall be flame-retardant polyolefin.
1. The capacities and characteristics shall be:
 2. Maximum heat output (5.0 W/foot)/
 3. Pipe Diameter: 1 inch
 4. Number of parallel cables: 1
 5. Spiral wrap pitch: Recommended by the manufacturer

6. See electrical drawings for electrical characteristics.

1.7 CONTROLS

- A. Pipe mounting thermostats for Freeze protection shall be a remote bulb unit with adjustable temperature range from minus 1 to 10 degrees C (34 to 50 degrees F). The thermostat shall be snap action, open-on-rise, single pole switch with minimum current rating adequate for the connected cable. The thermostat shall be remote bulb on capillary, resistance temperature device, or thermistor for direct sensing of pipe wall temperature. The control enclosure shall be corrosion resistant and waterproof.
- B. The enclosure shall be the NEMA 4X type.
- C. A minimum 30-amp contactor shall be provided to energize cable or close other contactors. Provide relay with contacts to indicate operational status, on/off, and for interface with central energy management and control system.

1.8 ACCESSORIES

- A. Cable Installation Accessories: Fiberglass tape, heat-conductive putty, cable ties, silicone end seals and splice kits, and installation clips all furnished by manufacturer, or as recommended in writing by manufacturer. Provide a complete operating system with following components included as a minimum.
 1. Warning Labels: Shall comply with NFPA 70.
 2. Warning Tape: Continuously printed "Electrical Tracing"; vinyl, at least 0.08 mm (3 mils) thick, and with pressure-sensitive, permanent, waterproof, self-adhesive back.
 3. Width for Warning Tape on Pipes with Outside Dimension, Including Insulation, Less Than 150 mm (6 inches): 19 mm (3/4 inch) minimum.
 4. Heat Trace Control Panel with Alarm and dry contact for remote alarm for common failure of heat tracing system.
 5. Power connection kit.
 6. Above insulation end seal kit
 7. Pipe straps.
 8. Fiberglass tape.
 9. Thermostat/RTD.
 10. A minimum of 1 inch insulation suitable for outdoor application with Aluminum
 11. Foil wrapped.

1.9 EXECUTION

- A. Inspect surfaces and substrates of electric heating cables for compliance with requirements of this specification. Ensure surfaces and pipes in contact with electric heating cables are free of burrs and sharp protrusions.
- B. Notify COR if the existing substrate conditions are unsuitable for application of heating cables in accordance with manufacturer's recommendations.
- C. If the installation of the heat tracing is unsatisfactory, then the Contractor shall correct the installation at no additional cost or time to the Owner.
 1. Electric heating cable for pipe freeze protection shall be installed according to the following:
 2. Electric heating cables shall be installed after piping has been tested and before insulation is installed.

3. Electric heat cables shall be installed according to IEEE 515.1
4. Insulation shall be installed or applied over piping with electric cables.
5. Warning tape shall be installed on pipe insulation where piping is equipped with electric heating cables.
6. Power shall be supplied from Panel PP-GP located inside the Generator Housing. Feeding circuit breakers shall be GFCI type.
7. Heating cables including leads shall be protected from damage.
8. Equipment shall be grounded according to Section 260519, Low Voltage Electrical Power Conductors and Cables.
9. Wiring shall be connected according to Section 260519, Low Voltage Electrical Power Conductors and Cables.

1.10 ACCEPTABLE MANUFACTURERS

- a) Nelson Heat Trace
- b) Raychem
- c) Thermon
- d) Chromolox

1.11 TESTING

- A. Perform tests after cable installation but before application of coverings such as insulation, wall or ceiling construction, or concrete.
- B. Test cables for electrical continuity and insulation integrity before energizing.
- C. Test cables to verify rating and power input. Energize and measure voltage and current simultaneously.
- D. Repeat tests for continuity, insulation resistance, and input power after applying thermal insulation on pipe-mounted cables.
- E. If deficiency is found, Contractor shall correct all deficiencies at no addition cost or time to the Owner.
- F. Prepare test and inspection reports.

END OF SECTION 260551.05

DIVISION 26 – ELECTRICAL
SECTION 260553 – ELECTRICAL IDENTIFICATION
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for furnishing, installing, and protecting identification signs and labels for electrical systems.

B. Comply with the requirements and provisions of the following:

1. Division 00 – Procurement and Contracting Requirements
2. Division 01 – General Requirements
3. Section 260500 – Common Work Results for Electrical

C. Related Section:

1. Section 260500 – Common Work Results for Electrical
2. Other Division 26 Sections as applicable

1.2 REFERENCES

A. American National Standards Institute (ANSI):

1. ANSI Z535.4, Product Safety Signs and Labels.

B. National Electrical Manufacturer’s Association (NEMA):

1. NEMA 250, Enclosures for Electrical Equipment.

C. National Fire Protection Association (NFPA):

1. NFPA 70, National Electrical Code (NEC).
2. NFPA 70E, Standard for Electrical Safety Requirements for Employee Workplaces.
3. NFPA 704, Identification of the Hazards of Materials for Emergency Response

D. International Code Council

1. International Fire Code (IFC)

E. U. S. Government:

1. Code of Federal Regulations (CFR)
 - a. 29 CFR 1910 Occupational Safety and Health Standards.

1.3 SUBMITTALS

- A. Submit the following information for approval in accordance with the requirements of Section 26 05 00:
 - 1. Product Data:
 - a. Provide catalog cuts for the actual products provided, and indicate clearly the usage of each product.
 - 2. Shop Drawings:
 - a. Provide a schedule depicting all nametag legends.
 - b. Provide drawings of typical nametags.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Comply with the all applicable requirements of OSHA, but particularly those stated in 29 CFR 1910.144 and 29 CFR 1910.145.
 - 2. Comply with the requirements of NFPA 70E that are applicable to electrical identification items as listed below in this Specification Section.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Protect items from damage during delivery, storage, and handling in accordance with Section 26 05 00 and as detailed below.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Provide products meeting the specified requirements from one of the following manufacturers, unless otherwise indicated:
 - 1. Brady Worldwide, Inc.
 - 2. Seton Identification Products
 - 3. LEM Products, Inc
 - 4. Or Approved Equal
- B. To serve as examples of the quality required of the specified products, several Brady Worldwide, Inc. Product Numbers are listed for informational purposes only.

2.2 MATERIALS

- A. Laminated Phenolic or Plastic:
 - 1. Provide rigid, thermosetting resin or polymer material that is heat- and fire-resistant, abrasion resistant, electronically non-conductive, and non-corroding.

2. Extrude the thermosetting resin or polymer into sheets, and laminate the sheets together so that colored top and bottom layers sandwich a contrasting color core in the middle.

B. Mounting Hardware:

1. Provide number 10 hex-head machine screws and lock-washers, or hex-head bolts, lock-washers, and nuts for mounting identification nameplates onto electrical equipment.
2. Provide either type 316 stainless steel or brass fasteners; however, all fasteners used on the same nameplate must be of the same material.

2.3 EQUIPMENT IDENTIFICATION NAMEPLATES

- A. Provide laminated phenolic or plastic equipment identification nameplates having beveled edges and engraved lettering.
1. Drill holes for mounting hardware in the equipment identification nameplates as follows:
 - a. For nameplates that are more than 2 inches wide, drill four holes.
 - b. For nameplates that are more than 1-1/2 inches high, drill four mounting holes.
 - c. For smaller nameplates, drill holes for two fasteners.
 2. Provide equipment identification nameplates long enough to ensure that the heads of fastening hardware do not extend beyond the nameplate material, and come no closer than 1/16-inch to the nearest letter of the nameplate legend and no closer than 1/16-inch to the nearest edge.
- B. Engrave the following information on each equipment identification nameplate, similar to that shown in Examples 1 and 2 below except appropriate for the specific equipment being identified:
1. In the first line, indicate the equipment type and identification number.
 2. In the second line, indicate the equipment Voltage, the equipment current if known, the phase, and the number of wires.
 - a. If the current is listed, provide a description that further identifies the current, such as “overload protection current”, full load amps (FLA), or other information identifying the current indicated.
 3. In the third line, indicate the words “SERVED FROM” followed by the serving equipment and the branch circuit.
 - a. If multiple sources serve the equipment, list all sources on succeeding lines.

EXAMPLE 1:

<p>POWER PANELBOARD PPB-2 208/120 VOLTS, 10.8 FLA, 3-PHASE, 4-WIRE SERVED FROM PPB-1, CIRCUITS F1 THROUGH T1</p>

- b. If the equipment is supplied through automatic transfer switches and transformers or other items without disconnects, include data on all upstream disconnects; and beneath the sources add the word “THROUGH” followed by the name of the equipment that the sources are connected through.

EXAMPLE 2:

**POWER PANELBOARD PPB-2
 480/277 VOLTS, 3-PHASE, 4-WIRE
 SERVED FROM
 BOTH EGS-2 AND MCC-1
 THROUGH ATS-1**

- 4. For motor starters, circuit breakers, transformers, and disconnect switches, provide an additional line with the word “SERVES” and the equipment served.
- C. Engrave the following information on identification plate for any distribution equipment (i.e. switchboard, panelboard, motor control center, switchgear, etc).
 - 1. The conductor insulation color coding for feeder and branch circuit wiring originating from each piece of distribution equipment per NFPA 70. Refer to Specification Section 260519 for wire and cable color coding requirements.

EXAMPLE for 208Y/120 volt equipment:

<u>PHASE</u>	<u>COLOR</u>
A	BLACK
B	RED
C	BLUE
GROUNDING CONDUCTOR (NEUTRAL)	WHITE
EQUIPMENT GROUNDING CONDUCTOR	GREEN

- D. Engrave equipment identification nameplates with all capital, Helvetica Medium font, or equal, lettering.
 - 1. Provide black letters on a white background, except for warning nameplates provide white lettering centered on red backgrounds.
 - 2. Provide a minimum 1/8-inch border between the nameplate lettering and the tops and bottoms of the nameplates.
 - 3. Use 3/8-inch high letters for the first line, and 1/4-inch letters for succeeding lines; except, in cases where the tag will not fit because the equipment is too small, use 3/16-inch letters for the first line and 1/8-inch letters for succeeding lines.

2.4 CONDUIT AND RACEWAY LABELS

A. Conduit Voltage Markers:

- 1. Provide conduit markers consisting of polymer-coated cloth tape with a printable top coat and a rubber based pressure sensitive adhesive on the back to provide oil and water resistance, good print durability, and the flexibility to allow it to be wrapped around curved surfaces.
- 2. Clearly mark the voltages in black lettering on orange colored tape backgrounds.

B. Conduit Wiring System Identification:

1. Provide companion type labeling markers to indicate the wiring system in each raceway and consisting of a vinyl film substrate with a pressure sensitive acrylic adhesive backing.
2. Clearly mark the wiring systems in black lettering on orange colored tape backgrounds.
3. To properly identify each electrical system in the raceway, provide the following, or similar, wording on the labeling markers corresponding to the systems:
 - a. For electrical power systems, word the labels "POWER".
 - b. For control systems, word the labels "CONTROL".
 - c. For instrumentation systems, word the labels "INSTR."
 - d. For telephone systems, word the labels "TELEPHONE"
 - e. For supervisory control and data acquisition systems, word the labels "SCADA",
 - f. For local area networks, word the labels "LAN".

C. Conduit Feeder Identification:

1. Provide conduit feeder identification markers consisting of polymer-coated cloth tape with a printable top coat and a rubber based pressure sensitive adhesive on the back to provide oil and water resistance, good print durability, and the flexibility to allow it to be wrapped around curved surfaces.
2. Provide conduit feeder identification labels that identify the feeder circuit with 3/4-inch high black lettering on yellow backgrounds.

D. Hazard Material and Safety Signage:

1. For Generators with sub-base fuel tanks provide hazard material and safety signage per the International Fire Code and NFPA 704.

E. Conduit and Raceway Label Dimensions:

1. Provide label color field lengths and lettering height as indicated in Table 26 05 23-1:

Table 26 05 23-1 Conduit and Raceway Label Sizes			Background Length	Lettering Height
Raceway Outside Diameter (Inches)		(Inches)		(Inches)
3/4 to 2		7		1
1-1/2 to 2		7		1
2-1/2 to 6		14		1-1/4

F. Product Examples:

1. Conduit Voltage Markers: Brady Worldwide, Inc., B-946 custom self-sticking pipe markers or color code tape.
2. Conduit Wiring System: Brady Worldwide, Inc., B-946 custom self-sticking pipe markers or color code tape.
3. Conduit Feeder Identification: Brady Worldwide, Inc., Product Number 31964.

PART 3 EXECUTION**3.1 PREPARATION**

- A. Prior to installing electrical identification items, verify with the Engineer that the data on each is correct.

3.2 INSTALLATION**A. Wiring Identification:**

- 1. Identify wiring in conformance with the requirements of Section 260513 and Section 260519.

B. Conduit and Raceway Identification:

- 1. Identify the wiring systems in conduit and raceway by providing companion type labeling markers to indicate the systems in each.
- 2. Identify the Voltages carried in conduit and raceway by providing voltage labeling markers on all accessible raceways.
- 3. Identify feeders by providing identification labels.

C. Electrical Box Identification:

- 1. For each pull box and junction box, if it is not otherwise indicated, install a laminated phenolic identification nameplate with 1/8-inch black letters on a white background above or next to the box identifying its source of power; for example, indicate the panelboard and circuit number supplying power to a box with an identification nameplate.
- 2. For each device and outlet box used as a branch circuit junction or pull box provide a legible hand written panel designation and circuit number on exterior of box cover. Utilize a permanent black marker.
- 3. For above ground pull boxes and junction boxes, install nameplates adjacent to or above the item in a visible location.
 - a. For NEMA 1 and 12 enclosures constructed as specified in NEMA 250, fasten the nameplate to the enclosure using 316 stainless steel screws or an approved equal.
 - b. For other than NEMA 1 and 12 enclosures, fasten the nameplate to the enclosure using Seton number15660 adhesive or an approved equal.
- 4. For in-ground pull boxes and junction boxes, install nameplates adjacent to or above the item in a visible location and inside the box immediately below the cover.
 - a. For NEMA 1 and 12 enclosures constructed as specified in NEMA 250, fasten the nameplate to the enclosure using 316 stainless steel screws or an approved equal.
 - b. For other than NEMA 1 and 12 enclosures, fasten the nameplate to the enclosure using Seton number15660 adhesive or an approved equal.

D. Wiring Device Faceplate Labeling

- 1. Outside of faceplate:
 - a. On receptacle faceplates, provide a label indicating panel designation and circuit number. Utilize a thermal label maker device with clear label tape, font color shall be black and type shall be Arial.

2. Inside of faceplate:
 - a. On receptacle and lighting control device faceplates, provide a legible hand written panel designation and circuit number tag. Utilize a permanent black marker.
- E. Electrical Equipment Identification:
 1. Provide identification nameplates on the front of the following electrical equipment:
 - a. Diesel electric generators
 - b. Dry Type Transformers
 - c. Surge Protective Devices (SPD)
 - d. Medium-voltage fusible interrupter switchgear
 - e. Low-voltage enclosed switches
 - f. 480V LV Switchgear
 - g. Low-voltage motor starter switches and controllers
 - h. Low voltage motor control centers
 - i. Low-voltage variable frequency controllers
 - j. Enclosed contactors
 - k. AC distribution switchboards
 - l. Panelboards
 - m. Low-voltage transformers
 2. Install nameplates in the top center of the front face of the electrical equipment in a visible location.
 - a. For NEMA 1 and NEMA 12 enclosures constructed as specified in NEMA 250, fasten the nameplate to the enclosure using 316 stainless steel screws or an approved equal.
 - b. For other than NEMA 1 and 12 enclosures, fasten the nameplate to the enclosure using Seton number 15660 adhesive or an approved equal.
 3. Provide a manufacturer installed mimic bus; field installed mimic buses are not acceptable.

END OF SECTION 260553

DIVISION 26 – ELECTRICAL
SECTION 260563 – ACCEPTANCE TESTING OF ELECTRICAL SYSTEMS
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: The work specified in this Section consists of materials to performance test electrical systems and equipment.
1. Items Supplied Under This Section:
- a. Electrical System Testing
 - b. Thermographic Testing
 - c. Ground System Testing
 - d. Insulation Testing
 - e. Equipment Testing
 - f. Performance Test
 - g. Test Procedure
 - h. Test Report
- B. All testing required by this Section is the responsibility of the Contractor.
1. Dry Type, Medium Voltage Transformers
 2. Medium Voltage Fusible Interrupter Switchgear
 3. AC Distribution Switchboards Modified and New
 4. Motor Control Center
 5. Variable Frequency Controllers
- C. Comply with the requirements and provisions of the following:
1. Division 00 – Procurement and Contracting Requirements
 2. Division 01 – General Requirements
 3. Section 260500 – Common Work Results for Electrical
- D. Related Sections:
1. Division 01 – General Requirements
 2. Division 26 Sections, As Applicable

1.2 REFERENCES

- A. Applicable Documents and Testing Requirements of:
1. America National Standards Institute (ANSI): as applicable, including:
 - a. ANSI C2, National Electrical Safety Code.
 - b. ANSI Z244.1 American National Standards for Personnel Protection.
 2. National Electrical Manufacturer's Association (NEMA): as applicable, including:
 - a. NEMA ICS 2.3 - Instructions for the Handling, Installation, Operation and Maintenance of Motor Control Centers.

- b. NEMA ICS 7.1 - Safety Standards for Construction and Guide for selection, Installation, and Operation of Adjustable Speed Drive Systems.
 - c. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
 - d. NEMA PB 2.1 - Proper Handling, Installation, Operation and Maintenance of Deadfront Switchboards Rated 600 Volts or Less.
3. American Society for Testing and Materials (ASTM), as applicable.
 4. Institute of Electrical and Electronics Engineers (IEEE), as applicable, including:
 - a. IEEE C57.13 - IEEE Standard Requirements for Instrument Transformers.
 - b. IEEE 43 - Recommended Practice for Testing Insulation Resistance of Electric Machinery.
 - c. IEEE 400 - IEEE Guide for Field Testing and Evaluation of the Insulation of Shielded Power Cable Systems Rated 5 kV and Above
 - d. IEEE 400.3 - IEEE Guide for Partial Discharge Testing of Shielded Power Cable Systems in a Field Environment
 5. National Fire Protection Association (NFPA), as applicable, including:
 - a. NFPA 70 - National Electrical Code (NEC).
 - b. NFPA 70E - Electrical Safety Requirements for Employee Workplaces.
 - c. NFPA 72 - National Fire Alarm Code (NFAC).
 6. Insulated Cable Engineer's Association (ICEA), as applicable.
 7. State and Local Codes and Ordinances as applicable
 8. Occupational Safety and Health Administration (OSHA), as applicable, including: Title 29, Parts 1907, 1910 and 1936.
 9. International Electrical Testing Association (NETA) as applicable, including:
 - a. ATS-2013 - Acceptance Testing Specifications for Electric Power Distribution Equipment and Systems.
 - b. MTS-2013 - Maintenance Testing Specifications for Electric Power Distribution Equipment and Systems.

1.3 SUBMITTALS

- A. Submit documentation as required by this Section of the Contract to the Design Engineer in strict accordance with the provisions of Section 26 05 00 for review, comments and subsequent approval.
- B. Submission to include the following:
 1. Field inspection report as required for each item of material and/or equipment outlined herein.
 2. Manufacturer's directions for use of ground megger with proposed method indicated.
- C. Submit test reports as specified elsewhere in this Section.
 1. Furnish five copies of each completed report to the Design Electrical Engineer no later than 30 days after completion of each test. Assemble and certify the testing firm each final test report, which must be submitted to the Design Engineer for review, comments and subsequent approval.

1.4 QUALITY ASSURANCE

- A. Qualifications of Testing Agency: Select an independent nationally recognized testing agency that is independent from electrical contractor that meets the following qualifications:
 1. Is nationally recognized as an electrical testing agency.

2. Has been regularly engaged in the testing of electrical systems and equipment for at least 2 years.
 3. Is independent from the electrical contractor, the Owner, the Engineer and all other contractors on the job.
 4. Has at least one Professional Engineer on staff that is licensed in the State where the project site is located.
 5. Derives more than 75 percent of its income from electrical testing.
 6. Owns or leases sufficient calibrated equipment to do the testing required.
 7. Has a means to trace all test instrument calibration to The National Institute of Standards and Technology.
- B. Membership in the International Electrical Testing Association (NETA) shall be considered evidence of meeting items A. 1. through and including A. 5
- C. Testing shall be done under the supervision of a technician certified by International Electrical Testing Association or by technicians that are both certified by the National Society of Professional Engineers and experienced in electrical testing with 5 years of testing experience.
- D. The testing agency shall supervise or perform all testing of equipment and oversee setting of all circuit breakers and calibration of all instruments.
- E. The testing firm used must be approved by the Engineer.
- F. Include the cost of such tests in the Contractors Bid Price for the applicable bid item.

1.5 GENERAL REQUIREMENTS

- A. Field Inspection:
1. This Contractor is responsible for a complete inspection of all equipment (new and existing), prior to testing and energizing to ascertain that it is free from any damage, scratches, or missing components and that all power connections are correct, free from unintentional shorts or grounds, and tight in conformance with recommended standard practice. The inspection is to also include a check of control wiring, terminal connections and all bolts and nuts.
 2. Perform field inspection by this Contractor during a time when the Field Engineer and the Design Engineer are present to witness each inspection and its performance.
 3. Correct any deficiencies found during the inspection by this Contractor prior to the energizing and testing of the equipment.

1.6 SCHEDULING

- A. Schedule all testing with work of other contractors to ensure an orderly sequence of startup and completion of work.

1.7 UNDERGROUND CONDUIT SYSTEM INSPECTION (IF APPLICABLE)

- A. General Requirements: Perform inspection of the underground conduit systems installation by a representative of the Engineer as the work progresses. Inspect each of the following prior to proceeding to the next phase of the installation.

1. Trench bed.
2. Lower sand bed.
3. Lower concrete protection slab, where indicated or required.
4. Upper sand bed for conduits.
5. Each layer of conduits.
6. Soil backfill.
7. Warning Tape.
8. Soil backfill.

- B. Failure to comply with any of the above, indicated sequential inspection requirements is just cause for the Engineer to request removal of the work and reinstall as per these specifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 ELECTRICAL INSPECTIONS AND TESTS

- A. Perform, supervise, and furnish all test equipment needed to perform tests and provide safety measures, procedures and equipment required for each test.
- B. Schedule all testing with the Engineer. Perform testing in the presence of the Engineer except when the Engineer approves in writing conducting a specific test without the Engineer's presence.
- C. Notify all involved parties including the Engineer prior to tests, advising them of the test to be performed and the scheduled date and time.
- D. Coordinate the tests with others involved.
- E. Prepare written test procedures and forms used in the test reports and submit for approval prior to commencement of testing.
- F. Test Reports
1. For all inspections and tests, provide reports which include the following information.
 - a. Job title and location
 - b. Description of equipment tested
 - c. Description of test(s)
 - d. Results
 - 1) Provide results numerically/graphically (where applicable)
 - 2) Also indicate pass/fail based on relevant industry standards and/or manufacturer's criteria
 - e. Conclusions and recommendations
 - f. Appendix, including appropriate test forms
 - g. Identification of test equipment used, including copies of current calibration certificates.
 - h. Signature of responsible party.

G. Safety and Precautions:

1. Safety practices are to include, but are not limited to, the following requirements:
 - a. Occupational Safety and Health Act of 1970-OSHA.
 - b. Accident Prevention Manual for Industrial Operations, National Safety Council, Chapter 4.
 - c. Applicable State and Local safety operating procedures.
 - d. IETA Safety/Accident Prevention Program.
 - e. Owner's safety practices.
 - f. National Fire Protection Association - NFPA 70E.
 - g. ANSI Z244.1 American National Standards for Personnel Protection.
2. Perform all tests with apparatus de-energized except where otherwise specifically required.
3. The testing firm is to have a designated safety representative on the project to supervise operations with respect to safety.

3.2 TESTING TO BE PERFORMED BY THE CONTRACTOR

- A. Visually and mechanically inspect and electrically test items as described herein using the procedures of NETA ATS-2013 and other standards as indicated.
 1. When a test for a particular item is not specified in NETA ATS-2013, test using the procedures in NETA MTS-2011.
 2. For tests specified in both NETA ATS-2013 and MTS-2011, perform all indicated tests and checks, including those denoted as “optional”, except where specifically excluded by this Section or where found to be not applicable to the equipment under test.
 3. The Contractor is required to obtain copies of NETA ATS-2013 and MTS-2013, and to keep at least one copy of each at the project site, to use as reference for testing requirements.
- B. Continuity Test: Make test for continuity and correctness of wiring and identification on all conductors installed.
- C. Low Voltage Wire and Cable:
 1. Test all wires and cables sized No. 2 and larger in accordance with NETA ATS-2013.
 2. Perform visual, mechanical, and electrical tests on all No. 4 and No. 6 power cables that operate at voltages exceeding 150 volts to ground in accordance with NETA ATS-2013.
 3. Perform visual, mechanical, and electrical tests on all other wires and cables in accordance with NETA ATS-2013.
 4. Replace any wires which have been damaged.
 5. Correct causes of all readings which do not meet the acceptable minimum insulation readings as stated in NETA ATS-2013. Exceed the nominal expected temperatures for the actual load.
 6. Retest items requiring correction.
- D. Surge Protective Device (SPD):
 1. Visually and mechanically inspect the SPD unit and connections.
 2. Use an AC voltmeter to check all voltages and ensure that normal operating voltages of the power system match the voltage rating on the SPD nameplate.
 3. Check LED status indicators on the display panels and suppression modules to confirm normal status.
 4. Press the alarm test button to confirm the audible alarm and LED.
 5. Operate the alarm silence switch to confirm proper operation.

- E. Ground Fault Circuit Interrupter (GFCI) Receptacles:
 - 1. Test all GFCI receptacles as specified in Section 26 27 26.
- F. Lighting Tests
 - 1. Emergency, standby, equipment and lighting test-trip all incoming utility power and ascertain that all standby and emergency equipment operates. Replace and correct defective equipment. Operate battery systems for emergency lighting without power for 90 minutes and correct all defects and retest.
- G. Initial and Final Mechanical Performance Tests
 - 1. Provide on-site electricians and support to the general contractor during the initial and final mechanical performance tests.
 - 2. Refer to Section 01 91 13 for test details.

3.3 TESTING TO BE PERFORMED BY THE TESTING AGENCY

- A. Select, hire and pay an independent nationally recognized electrical testing agency to perform all testing specified in this article. Obtain Owner's approval of the testing agency and the testing agency proposed test procedure prior to commencement of any tests.
- B. Set all adjustments for all overcurrent protection devices in accordance with the protection and coordination study of Section 26 05 00.
- C. The Contractor is required to obtain copies of NETA ATS-2013 and MTS-2013, and to keep at least one copy of each at the project site, to use as reference for testing requirements.
- D. Visually and mechanically inspect and electrically test items as described herein using the procedures of NETA ATS-2013 and other standards as indicated.
 - 1. When a test for a particular item is not specified in NETA ATS-2013, test using the procedures in NETA MTS-2011.
 - 2. For tests specified in both NETA ATS-2013 and MTS-2011, perform all indicated tests and checks, including those denoted as "optional", except where specifically excluded by this Section or where found to be not applicable to the equipment under test.
 - 3. Resistance Checks of Bolted Connections
 - a. Where resistance checks of bolted current carrying connections are specified, perform such checks in accordance with the following.
 - 1) For bolted connections of current carrying components that are made in the field (cable lugs, busbar splices, etc.), use both of the following methods.
 - a) Verify tightness by calibrated torque wrench
 - b) Check connection resistance using a DC low-resistance ohmmeter
 - 2) For bolted connections that are made in the factory, use one or both of the following methods.
 - a) Verify tightness by calibrated torque wrench
 - b) Check connection resistance using a DC low-resistance ohmmeter
 - b. Use of thermographic study as the sole method for verifying low resistance of bolted connections is not acceptable.

- c. Results of resistance checks shall be in accordance with NETA ATS-2013 and/or the manufacturer's published data.
- d. Perform the following diagnostic tests for new cables.
 - 1) DC insulation resistance test as specified in NETA ATS-2013.
 - 2) Power factor / dissipation factor (tan delta) test
 - a) Perform test using a Very Low Frequency (VLF) test source, 0.1 Hz or less. Record the actual frequency used for testing, and use the same frequency for all cables tested.
 - b) Perform on each cable with the other cables of the circuit grounded.
 - c) Make initial measurements in increments of 25%, 50%, 75%, and 100% of the cable's nominal rated line-to-ground operating voltage (U_0), and analyze the results.
 - d) If the initial results indicated good insulation, continue testing up 200% of U_0 in increments of 25% of U_0 . If the initial results indicate significant cable defects, do not continue testing of the cable in question at voltages higher than 100% of U_0 .
- e. Perform the following diagnostic tests for existing cables designated for testing.
 - 1) All diagnostic tests specified for new cables.
 - 2) Offline Partial Discharge Test – For testing of existing cables only
 - a) Perform test using a Very Low Frequency (VLF) test source, 0.1 Hz or less. Record the actual frequency used for testing, and use the same frequency for all cables tested.
 - b) Perform on each cable with the other cables of the circuit grounded.
 - c) Perform testing in accordance with IEEE 400 and 400.3.
4. Perform tests in the following order:
 - a. Insulation resistance
 - b. Dielectric withstand, where specified
 - c. Other diagnostic tests
 - 1) Offline partial discharge test, where specified
 - 2) Power factor / dissipation factor (tan delta) test
5. Acceptable values are as stated in NETA ATS-2013 and other relevant standards.
6. Following testing, apply grounds for a time period adequate to drain all insulation stored charge. Make proper notification to all concerned parties if grounds are left in place.

E. Thermographic Inspection:

1. Perform thermographic inspection of the electrical equipment and installations as listed below in accordance with NETA ATS-2013, and as detailed below. The following equipment is to be scanned:

a. Switchboards	all ratings
b. Switchgear	all ratings
c. Panelboards	all ratings
d. Individually Mounted Circuit Breakers	100 amp and larger
e. Disconnect Switches	100 amp and larger
f. Individually Mounted Motor Starters	Size 1 and larger
2. Provide report including the following items:
 - a. Items scanned
 - b. Whether item passed or failed
 - c. All items in NETA ATS-2013
 - d. The probable cause

- e. Severity of defect
- f. Recommended corrective measures
- g. Video recording of test.
3. Scan using an infrared camera with video scanner output to a display screen with a range of at least 1 degree C to 75 degrees C with an accuracy of 0.1 degree C and with the following equipment:
 - a. One 7 degree telephoto lens
 - b. One 20 degree wide angle lens
 - c. One 40 degree extra-wide angle lens
4. Record output of camera during testing onto a DVD or store digital images of each piece of equipment inspected onto a CD as a record of the temperature variations. Record either by order or by digital imprinting the actual equipment being scanned. Turn off recordings during inactive periods or edit DVD to eliminate dead periods.
5. Display data on a monitor capable of providing both a gray step mode and color monitor. These capabilities allow distinct temperature levels to be shown in black and white and color on the thermogram.
6. Submit three copies of report and two copies of the DVD or CD.
7. Include DVD or CD of thermographs of the defective equipment and installations. Also include in report.
8. Submit both copies of the report to the Engineer who will make the determination of corrective measurements.

F. Grounding Electrode System Tests:

1. Visually and mechanically inspect and electrically test all made grounding electrode systems in accordance with NETA ATS-2013. For the point-to-point tests of NETA ATS-2013, measurements are only required for equipment conductors run with services, and feeders and branch circuits rated over 400 amperes.
2. Determine acceptable values as follows:
 - a. Main service entrance ground: 5 ohms.
 - b. Emergency/standby generator ground grid: 5 ohms.
 - c. Panelboards ground bus: 10 ohms.
 - d. Manhole ground rod electrodes: 25 ohms
 - e. Prior to the electric service being energized and prior to the installed products being covered, measure the ground system resistance to earth in the presence of the Engineer.
 - f. Grounds not otherwise covered in this Specification with a maximum of 25 ohms.
 - g. For continuity tests, determine the acceptable value for the equipment grounding conductor by the following formula:

$$R_{EquipGndCond} \leq 0.1x \frac{V_{LineToGnd}}{I_{OverCurrentProtection}}$$

Where the following definitions apply:

$R_{equipGndCond}$ = The measured resistance of the Equipment Grounding Conductor.

$V_{linetoGnd}$ = The Nominal Line to Ground Voltage of the circuit or feeder.

$I_{overcurrentprotection}$ = The Trip, or Melting Current of the overcurrent protective device for the circuit.

G. Low Voltage Circuit Breaker Tests:

1. The testing specified herein applies to all low voltage circuit breakers:
 - a. Low Voltage Power Circuit Breakers (LVPCBs)
 - b. Low Voltage Insulated Case Circuit Breakers (LVICBs)
 - c. Low Voltage Molded Case Circuit Breakers (LV MCCBs)
2. Visually and mechanically inspect and electrically test all low voltage circuit breakers in frame sizes rated 150A or more in accordance with NETA ATS-2013, modified as follows.
 - a. Pole Resistance Tests
 - 1) For all circuit breakers, perform pole contact resistance testing by use of a DC low-resistance ohmmeter.
 - 2) For circuit breakers which are also subjected to field primary injection testing, also perform pole contact resistance testing by use of the millivolt drop method at 24 volts or less AC, and at the breaker's rated trip current or 500 amperes whichever is less.
 - b. Circuit Breakers with Electronic Trip Units
 - 1) Verify pickup and delay settings via secondary current injection.
 - 2) Verify pickup and delay settings via primary injection testing, except for new breakers where a factory test report indicating that primary injection testing was performed at the factory has been submitted. Refer to Section 26 24 16.
 - c. Circuit Breakers with Thermal-Magnetic Trip Units
 - 1) Field primary current injection testing of these units is not required.
3. Testing of existing low voltage circuit breakers is not within the scope of this project, except as otherwise noted.
4. Acceptable values are as stated in NETA ATS-2013.

H. Low Voltage Panelboard Tests:

1. Visually and mechanically inspect and electrically test all low voltage panelboards in accordance with the applicable requirements of NETA ATS-2013 for Low Voltage Switchboards.
2. In addition to the Thermographic Inspection required elsewhere in this section, verify bolted connections using one of the following methods in accordance with NETA ATS-2013.
 - a. Use of a low resistance ohmmeter
 - b. Check fastener torque, using a calibrated torque wrench, versus the manufacturer's published data
3. Acceptable values are as stated in NETA ATS-2013.
4. Test all components as specified in this Section.

I. Dry-Type Transformers Tests:

1. Visually and mechanically inspect and electrically test low voltage dry-type transformers in sizes rated over 7.5 kVA, 3-phase and rated less than 500 kVA, 3-phase in accordance with NETA ATS-2013.
2. Acceptable test values are as stated in NETA ATS-2013.

J. Ground Fault Protection Testing:

1. Visually and mechanically inspect and electrically test all ground fault protection systems in accordance with NETA ATS-2013.
2. Acceptable test values are as stated in NETA ATS-2013.

K. AC Motor Testing:

1. Visually and mechanically inspect and electrically test all AC motors rated 10-horsepower or more in accordance with NETA ATS-2013.
2. Perform winding insulation resistance testing in accordance with IEEE 43, and calculate the polarization index.
3. Acceptable test values are as stated in NETA ATS-2013.
4. Immediately report all motors which fail inspection to the Engineer for correction.

L. Low Voltage Motor Starter Tests:

1. Visually and mechanically inspect and electrically test all low voltage motor starters rated 10-horsepower or more in accordance with NETA ATS-2013.
2. Acceptable values are as stated in NETA ATS-2013.

M. Voltage Adjustment:

1. Measure the plant voltage with the plant operated at both no load and at nominal load at the following locations.
 - a. Main Distribution Switchboard.
 - b. Each panelboard bus.
2. Adjust all transformer taps to bring the no-load voltage above nominal, but in no case, higher than 105.8% of nominal. Adjust the operated loaded voltage to a value above 91.7%, (ANSI Range A), with only momentary excursions to a maximum of 105.8% and a minimum of 88.3% for all loads and 86.7% for motor loads. (ANSI Range B).
3. After all adjustments have been made, re-measure all voltages.
4. For record purposes measure and record on all 3-phases, actual plant load at all switchboard and panelboard buses.
5. With a minimum/maximum recording voltmeter measure starting voltage dip for the largest motor at:
 - a. Starter terminals.
 - b. Panelboard.
 - c. Main Distribution Switchboard.
6. Measure minimum/maximum/average voltage at Main Distribution Switchboard over a 24 hour period with the plant running on at least one phase with recording voltmeter.

N. Harmonic Testing

1. Conduct harmonic testing at:
 - a. Main Distribution Switchboard.
 - b. Points of Common Coupling (PCC). PCC defined as nearest switchboard or panelboard which directly serves each variable frequency drive.
 - c. Generator terminals.
 - d. Transformer primary terminals.
2. Measure and record the following data at each location where harmonic testing is required:
 - a. Current Distortion: Total harmonic distortion (THD) and individual harmonic components up to and including the 35th harmonic.
 - b. Voltage Distortion: Total harmonic distortion (THD) and individual harmonic components up to and including the 35th harmonic.
 - c. Voltage Notching: Notch area (volt-microseconds) and depth (volts).
 - d. For record purposes measure and record on all 3-phases, actual plant load at all switchboard and panelboard buses.

3. Conduct harmonic testing with harmonic producing loads in operation. Record the following information for variable frequency drives, taken at the time harmonic distortion measurements are made:
 - a. Output frequency.
 - b. Output current.
 - c. Output voltage.
 - d. Output power factor when motor metering includes this capability.
4. Conduct harmonic testing with variable frequency drives operating at full load and half load.
5. Test report shall include the following calculated values at each location where harmonic testing is required:
 - a. Total demand distortion (TDD).
 - b. Individual harmonic current distortion in percent of the maximum demand load current up to and including the 35th harmonic.

3.4 CORRECTION OF DEFICIENCIES

- A. Report all unacceptable values immediately. Correct all deficiencies found in work of this contract and separately report deficiencies in work of items of other contracts.
 1. Retest items requiring correction. Correct or have corrected any remaining deficiencies and retest until work is acceptable.

3.5 RETESTING

- A. After equipment has been in service for a period of nine months repeat the following tests:
 1. Thermographic testing. Correct all causes of readings above the nominal expected reading for the load encountered.
 2. Insulation tests of all motors over 100 horsepower, switchgear, switchboards, and transformers over 50 kVA.

END OF SECTION 260563

DIVISION 26 – ELECTRICAL
SECTION 262200 – LOW-VOLTAGE TRANSFORMERS
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: The work specified in this Section consists of material for furnishing, installing, connecting, energizing, testing, cleaning and protecting transformers.
- B. Comply with the requirements and provisions of the following:
1. Division 00 – Procurement and Contracting Requirements
 2. Division 01 – General Requirements
 3. Section 260500 – Common Work Results for Electrical
- C. Related Section:
1. Section 260500 – Common Work Results for Electrical
 2. Section 260526 – Grounding and Bonding for Electrical Systems
 3. Section 260533.13 – Conduit for Electrical Systems
 4. Section 260548 – Vibration and Seismic Control for Electrical Systems
 5. Section 260563 – Acceptance Testing of Electrical Systems

1.2 REFERENCES

- A. Institute of Electrical and Electronic Engineers/American National Standards Institute (IEEE/ANSI):
1. IEEE/ANSI C57.12.01 General Requirements for Dry-type Distribution And Power Transformers.
 2. IEEE/ANSI C57.12.59 Guide for Dry-type Transformer Through-Fault Current Duration.
 3. IEEE/ANSI C57.12.70 Terminal Markings and Connections for Power and Distribution Transformers.
 4. IEEE/ANSI C57.12.80 Standard Terminology for Power and Distribution Transformers.
 5. IEEE/ANSI C57.12.91 Test Code for Power and Distribution Transformers.
 6. IEEE/ANSI C57.94 Recommended Practice for Installation, Application, Operation, and Maintenance of Dry-Type General Purpose Distribution and Power Transformers.
 7. IEEE/ANSI C57.96 Guide for Loading Dry-Type Distribution and Power Transformers.
- B. National Electric Manufacturer's Association (NEMA):
1. NEMA ST 20 Dry Type Transformers for General Applications.
 2. NEMA TR 1 Transformers, Regulators, and Reactors.

- C. Underwriter's Laboratory, Inc. (UL):
 - 1. UL 1561 Transformers, Dry-Type General Purpose and Power.
- D. National Fire Protection Association (NFPA):
 - 1. NFPA 70 National Electrical Code (NEC).

1.3 DEFINITIONS

- A. Definitions of terms are as indicated in NFPA 70, IEEE/ANSI C57.12.80 and NEMA ST 20 unless otherwise indicated, noted or specified.

1.4 SYSTEM DESCRIPTION

- A. Design Criteria:
 - 1. Provide transformers with ratings as indicated.
 - 2. Provide transformers designed for the following conditions:
 - a. 40 degrees C. maximum ambient temperature.
 - b. -20 degrees C. minimum ambient.
 - c. 1,000 feet (300m) above sea-level.
 - d. Indoors unless otherwise indicated or specified.
- B. Provide transformers for connecting to the following systems with nominal voltages and operating ranges as specified in IEEE/ANSI C84.1:
 - 1. 480 Volt, 3-phase, 3-wire, solidly grounded wye source.
- C. Provide transformers for supplying the following systems with nominal voltages and operating ranges as specified in IEEE/ANSI C84.1
 - 1. 208/120 Volt, 3-phase, 4-wire, solidly grounded wye
- D. Provide transformers for connecting to systems with a let-through fault capability up to the limits of IEEE/ANSI C57.12.59.

1.5 SEISMIC REQUIREMENTS:

- A. Refer to Section 260548.
- B. Seismic qualification for the installation shall be based upon testing of representative manufacturer's equipment.
- C. The following minimum equipment manufacturer requirements shall be met:
 - 1. Provide certification that the equipment can withstand the vertical and horizontal response spectra identified
 - 2. Provide installation guidelines and details for the field assembly of the equipment.

- D. Provide field equipment anchors and support designs as coordinated with the equipment as provided, prepared and sealed by a Registered Structural Professional Engineer within the State of New Jersey.

1.6 SUBMITTALS

- A. Testing Agency/Quality Verification: Provide with all product data evidence of testing agency/quality verification, listing, and labeling either by printed mark on the data or by a separate listing card. Provide from product manufacturers a written statement indicating why an item does not have a quality assurance verification. Such statements are subject to the approval of the Engineer.
- B. Product Data:
 - 1. List of transformers and accessories to be furnished and installed.
 - 2. Catalog cuts of all transformers and accessories.
- C. Shop Drawings: Provide shop drawings for the following:
 - 1. Complete outline drawing, showing overall length, width, and height and including ratings of equipment, impedance, and installation restrictions.
- D. Submit Operation and Maintenance Manual.

1.7 QUALITY ASSURANCE

- A. Provide products that are listed and labeled by Underwriters Laboratory, approved by Factory Mutual, or certified as meeting the standards of UL by the Electrical Testing Laboratory unless products meeting the requirements of these testing laboratories are not readily available or unless standards do not exist for the products. Provide products that are listed and labeled or approved as stated above for the location installed in and listed and labeled or approved as indicated and specified for the applications the items are intended for.
- B. Conform all work to NFPA 70, National Electrical Code.
- C. Install work under supervision of skilled licensed electricians.

PART 2 PRODUCTS

2.1 SECONDARY TRANSFORMERS

- A. Provide transformers of the general purpose, indoor, double-wound, ventilated, dry-type designed and tested in accordance with NEMA Standard ST 20 and ANSI Standard C57.12.01, Underwriter's Laboratories Standard UL-1561, and ANSI C57.12.91 of capacities and mounting arrangements, (floor or wall) as indicated on the Drawings. Provide wall-mounted transformers with the wall bracket that is adequate for the supporting weight.
- B. Design transformers for continuous operation at rated KVA, 24 hours a day, 365 days a year, with normal life expectancy as defined in ANSI/IEEE C57.96. Unless otherwise indicated on the Drawings, provide a transformer which will make this performance obtainable without exceeding 150 degree C.

average temperature rise by resistance or 180 degree C. hot spot temperature rise in a 40 degree C. maximum ambient and 30 degree C. average ambient. Do not exceed 220 degree C as the maximum coil hot spot temperature.

- C. Provide proven 220 degree C. insulation systems.
- D. Wind the coils with copper, which has insulated, proven, high temperature resistant, 220 degree C. materials.
- E. Use all materials in the transformer that are flame retardant and do not support combustion as defined in ASTM Standard Test Method D635.
- F. Totally immerse the transformer in an insulating varnish, which will maintain superior bond strength, high dielectric strength, and outstanding power factors at temperatures associated with the 220 degree C. system as a final insulation treatment. After immersion, cure the varnish at normal operating temperatures for such a period of time as to assure complete curing of the varnish and scouring of volatiles in the varnish solvent.
- G. Construct transformers with core materials of a high quality, low loss nature as to minimize exciting current, no-load losses, and interlaminar vibrations. K rating of the transformer shall be as shown on the design drawings.
- H. The core and coil assembly shall be installed on vibration-absorbing pads.
- I. Transformer average sound levels shall not exceed the following ANSI and NEMA levels for self-cooled ratings:

1.	Up to 9 kVA	40 db
2.	10 to 50 kVA	45 db
3.	51 to 150 kVA	50 db
4.	151 to 300 kVA	55 db
5.	301 to 500 kVA	60 db
6.	501 to 700 kVA	62 db
7.	701 to 1000 kVA	64 db
8.	1001 to 1500 kVA	65 db
- J. Design the core-coil assembly and mechanically brace to withstand short circuit tests as defined in ANSI C57.12.91 by the use of full scale testing. The coil construction and mechanical bracing members shall be such as to prevent mechanical degradation of the insulation structures during short circuit.
- K. Provide single phase transformers 2 KVA and below without taps. Provide 3 KVA and 5 KVA with 2-2 ½ percent above nominal full capacity (ANFC) and 2-2 ½ percent below nominal full capacity (BNFC) taps. Provide 7-1/2 KVA and above with 2-2 ½ percent ANFC and 4-2 ½ percent BNFC taps.
- L. Provide three phase transformers with 2-2 ½ percent ANFC and 4-2 ½ percent BNFC taps.
- M. Provide transformer with enclosures removable front and back panels, and must have screened or grilled ventilation openings designed to prevent accidental access to electrified parts.

- N. The following factory tests shall be made on all transformers:
1. Ratio tests at the rated voltage connection and at all tap connections.
 2. Polarity and phase relation tests on the rated voltage connection.
 3. Applied potential tests.
 4. Induced potential tests.
 5. No-load and excitation current at rated voltage on the rated voltage connection.
- O. Transformers shall be low loss type with minimum efficiencies per NEMA TP-1 when operated at 35% of full load capacity.
- P. Acceptable Manufacturers:
1. Square D Company (Basis of Design)
 2. Eaton Electric
 3. Hammond
 4. Siemens
 5. Acme

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install, connect, and interconnect products where indicated, and in accordance with NEMA Standards, manufacturer's printed installation instructions, and this Section. Make connections in a manner, which will insure electrical continuity and operability of the products.
- B. Protect the equipment against foreign matter and moisture during installation.
- C. Install a 3-foot (1m) length of liquid-tight flexible metal conduit between transformer and fixed conduit system in accordance with Section 260533. Make power conductor connections in accordance with manufacturer's drawings, and as indicated on the Drawings.
- D. Ground in accordance with Section 260526. Provide ground bond for enclosure and neutral, minimum size #6 AWG to nearest structural steel and nearest water pipes to conform with Section 260526 and the NEC.

3.2 FIELD QUALITY CONTROL

- A. Dry out dry-type transformers before they are energized.
- B. Check transformer for tightness of external structural members and mechanical joints in order to minimize audible sound levels. Check the ground connections.
- C. Test as specified in Section 260563.

END OF SECTION 262200

DIVISION 26 – ELECTRICAL
SECTION 262416 – PANELBOARDS
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: The work specified in this Section consists of all materials for furnishing, installing connecting, energizing, testing, cleaning and protecting wall-mounted panelboards.
- B. Comply with the requirements and provisions of the following:
 - 1. Division 00 – Procurement and Contracting Requirements
 - 2. Division 01 – General Requirements
 - 3. Section 260500 – Common Work Results for Electrical
- C. Related Section:
 - 1. Section 260500 – Common Work Results for Electrical
 - 2. Section 260519 - Low-Voltage Electrical Power Conductors and Cables
 - 3. Section 260529 – Hangers and Supports Systems for Electrical Systems
 - 4. Section 260553 – Identification for Electrical Systems
 - 5. Section 260563 – Acceptance Testing of Electrical Systems

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM B164 Nickel-Copper Alloy, Bar and Wire.
 - 2. ASTM B187 Standard Specifications for Copper Bus, Bus Bar, Rod and Shapes
- B. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA 250 Electrical Enclosures.
 - 2. NEMA AB 1 Molded Case Circuit Breakers and Molded Case Switches.
 - 3. NEMA AB 2 Molded Case Circuit Breakers and their Application.
 - 4. NEMA PB 1 Panelboards.
 - 5. NEMA PB 1.1 General Instructions for Proper installation, Operation, and Maintenance of Panelboards.
- C. National Fire Protection Association (NFPA):
 - 1. NFPA 70 National Electrical Code (NEC).
- D. Underwriters Laboratories (UL):
 - 1. UL 489 Molded Case Circuit Breakers and Circuit Breaker Enclosures
 - 2. UL 50 Cabinets and Boxes
 - 3. UL 67 Panelboards

1.3 SYSTEM DESCRIPTION

- A. Panelboards are connected to system voltages as follows:
 - 1. 480 Volt, 3-phase, 3-wire (solidly grounded source)
 - 2. 208Y/120 Volt, 3-phase, 4-wire

1.4 SEISMIC REQUIREMENTS

- A. Seismic qualification for the installation shall be based upon testing of representative manufacturer's equipment.
- B. The following minimum equipment manufacturer requirements shall be met:
 - 1. Provide certification that the equipment can withstand the vertical and horizontal response spectra identified
 - 2. Provide installation guidelines and details for the field assembly of the equipment.

1.5 SUBMITTALS

- A. Testing Agency/Quality Verification: Provide with all product data evidence of testing agency/quality verification, listing, and labeling either by printed mark on the data or by a separate listing card. Provide from product manufacturers a written statement indicating why an item does not have a quality assurance verification. Such statements are subject to the approval of the Engineer.
- B. Product Data and Catalog Cuts: Provide product data for all products provided. Indicate clearly the usage and designation of each product.
- C. Shop Drawings: Submit shop drawings for all panelboards.
- D. Provide manufacturer's instructions for all panelboards.

1.6 QUALITY ASSURANCE

- A. Provide panelboards, which have been design tested in accordance with NEMA PB 1.
- B. Provide panelboards which have been production tested in accordance with NEMA PB 1.
- C. Conform all work to NFPA 70, National Electrical Code.
- D. Install work under supervision of licensed electricians.

1.7 FACTORY TESTS

- A. Upon receipt of all approved shop drawings for the panelboards, the manufacturer shall fabricate and factory test the equipment in question.

- B. Perform primary current injection testing on all circuit breakers with frame ratings of 150A and larger supplied under this Section as part of the factory testing.
 - 1. Provide documentation of successful completion of this test as part of the certified test report.
 - 2. Breakers which are not provided with documentation of successful primary injection testing at the factory will be required to be primary injection tested in the field in accordance with Section 260563.
- C. Upon completion of the factory tests, and prior to shipment, forward the following to the Engineer for review and comments.
 - 1. Certified test report, or in lieu thereof certified letter, ascertaining that the equipment in question was tested in strict conformance with all applicable Standards, and that the equipment met or exceeded all tests requirements.
 - 2. A certified quality control report indicating the items checked, the date when checked and initialed by the individual performing the quality control.
 - 3. Provide as part of this submittal the Operational and Maintenance Manuals for the referenced equipment as specified herein in this Section of the Specifications.
- D. Equipment not accepted at the job site without prior receipt of the associated certified test report or the certified letter and the certified quality control report referenced to above.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Basic Electrical Materials: Those products such as conduit, wireways, wire and connectors, cable, support devices, fasteners, and similar devices as required for work of this Section are as specified in other Sections of these Specifications.

2.2 PANELBOARDS

- A. Provide dead-front panelboards as follows:
 - 1. Accommodate bolt-on molded case circuit breakers as specified below.
 - 2. Conform to NEMA PB 1 and NFPA 70, Article 384.
 - 3. Consist of interiors, matching enclosures and covers of a single manufacturer as specified below.
 - 4. Have circuit breakers of frame sizes, trip ratings, number of poles, and types as scheduled, indicated and noted.
 - 5. Provide branch circuits phased in sequence vertically and numbered uniformly left to right, top to bottom.
- B. Provide panelboards that are rated for a short circuit capacity as scheduled, indicated, and noted on the Drawings.
 - 1. Provide all panelboards as fully rated, except as explicitly noted otherwise.
 - 2. Provide series rated panelboards only where explicitly noted as such on the drawings. Provide series rated panelboards with NEC required labeling.

C. Interiors: Provide interiors, as follows:

1. Provide tin plated main, ground and neutral copper buses conforming to ASTM B187 having not less than 98 percent conductivity.
2. Mount interiors on galvanized steel backplate.
3. Make provisions for future breakers and for circuit breakers in all future spaces as indicated, scheduled or noted and so that additional breakers can be mounted without additional connectors or extension of busses.

D. Provide solderless type main, sub-feed, and through feed lugs rated for copper and aluminum conductors of size, number and type, as indicated, scheduled and noted on the Drawings.

E. Enclosures:

1. Provide enclosures conforming to NEMA 250 for the types as indicated, scheduled, noted, and specified. Provide NEMA 1 enclosures unless otherwise indicated on the Drawings.
2. Fabricate from galvanized steel without knockouts.
3. Provide side, bottom, and top gutters of minimum 4-inch (10cm) width, of minimum 5-1/2 inch (14cm) depth, and sized as indicated, scheduled, and noted and as required by NFPA 70 Article 312 for the actual entry point.
4. Provide circuit directory of sufficient size to allow 40-characters per circuit; indicate the source of service (i.e. upstream panelboard, switchboard, motor control center, etc.) to the panelboard. Mount the directory in a transparent protective covering.

F. Doors: Provide doors as follows:

1. Provide concealed hinges and trim clamps.
2. Provide combination catch and master keyed, flat key lock with two keys for each lock and common keying throughout each building of the facility.

G. Finishes:

1. Factory finish enclosure cover completely using an electro-deposition process that deposits a complete finish coat of paint on all interior and exterior surfaces as well as bolted joints.
2. Include in the paint process cleaning, rinsing, phosphatizing, pre-paint and post paint rinses, bake-cure and cool down steps.
3. Finish switchboards with rust inhibiting primers and electro-disposition acrylic baked enamel top coating of No. 49 medium light grey conforming to ANSI Z55.1.
4. Provide overall finish capable of passing a 300-hour salt spray per ASTM B117 with less than 1/8 loss of paint from a scribed line.

H. Molded case circuit breakers:

1. Provide inverse time and instantaneous tripping characteristics.
2. Provide trip ratings, frame sizes, and number of poles as indicated, scheduled, and noted on the Drawings.
3. Provide full rated circuit breakers with short circuit ratings equal to the panelboard installed as scheduled on the Drawings.
4. Provide molded case circuit breakers conforming to NEMA AB 1, and UL 489.
5. Provide circuit breakers of the same manufacture and type as the panelboard installed.
6. New circuit breakers for existing panelboards or loadcenters shall match the existing circuit breaker type, manufacturer, and AIC rating. Circuit breakers that are added into existing equipment shall be new, unless noted on the drawings as existing to be relocated and/or reused;

and shall be purchased from an authorized manufacturer's distributor. Purchase of used, reconditioned, or brokered circuit breakers is prohibited unless approved by the Engineer.

7. Provide circuit breakers with thermal-magnetic trip units as indicated on the drawings.
- I. Panelboard Types:
 1. Branch Power and Lighting – Square D NQ or NF
 - J. Acceptable Manufacturers:
 1. Square D (Basis of Design)
 2. Eaton Electric
 3. Siemens
 4. Or approved equal

PART 3 EXECUTION

3.1 PREPARATION

- A. Painted surfaces, which will be covered by items of this Section have a prime and finish coat of paint.
- B. Ensure that all indoor areas are enclosed from the weather.

3.2 INSTALLATION

- A. Space enclosures out from surfaces mounted on 1/4-inch (6mm) spacers or U-channel supports. Provide supports as specified in Section 260529.
- B. Install all panelboards and circuit-breakers in accordance with the manufacturer's instructions and NEMA PB 1.1.
- C. Set enclosure top 6-feet 6-inches above finished floor or grade unless otherwise indicated or specified.
- D. Punch holes for conduit entries in the enclosures.
- E. In all areas except dry areas, install conduit drain fitting in punched hole in bottom of enclosure, conduit breather fitting in top of enclosure.
- F. Interface with other work:
 1. Connect conduits to enclosure with watertight hubs, except in damp locations on the bottom of enclosures a sealing locknut may be used in place of watertight hubs, and in dry locations two locknuts and bushings may be used.
 2. Connect wiring to line and load terminals with lugs provided or approved by manufacturer in conformance with Section 260519. Remove interior or protect interior components during wire pulling.
 3. Identify in accordance with Section 260553.
- G. At the end of the project update the circuit directories to reflect as-built conditions. Circuit directions shall be typed.

3.3 CLEANING

- A. After wiring, vacuum out interior and wipe clean of all foreign material.
- B. After painting in areas, remove all over paint, drips and splashes.

3.4 FIELD QUALITY CONTROL

- A. Site Testing:
 - 1. Prior to Energizing:
 - a. Have insulation testing and setting of overcurrent protective device adjustments made in conformance of Section 260563.
 - b. Ensure that all load side wiring is clear of shorts and has received and passed the insulation tests of Section 260563.
 - c. Open all downstream disconnects and open circuit breaker.
 - 2. Final testing after energizing:
 - a. Perform thermographic test and record circuit parameters in conformity with Section 260563.

3.5 PROTECTION

- A. During painting, mask all nameplates, all plastic parts, and all items not to be painted.
- B. Protect all items during work of other trades including welding and cutting.
- C. Protect panelboards against overloads, short circuits, and improper operation, padlock off when work is being done on downstream circuits.

END OF SECTION 262416

DIVISION 26 – ELECTRICAL
SECTION 262510 – PORTABLE GENERATOR TAP BOX
DPMC No. A1346-00

PART 1 GENERAL

1.1 - SCOPE

- A. This section specifies the furnishing, installation, and connection requirements for Generator Inlet Panel “Tap Box” manufactured by Powertron Corp or approved equal..

1.2 PURPOSE

- A. Generator Quick Connection Tap Box shall be designed and tested to allow a safe connection between mobile generator and Tap Box while the facility is at loss of power. When permanently installed correctly, the tap can help the process of restoring power quickly once the mobile generator arrives.
- B. The Tap Box shall be permanently installed by a qualified licensed electrician to the exterior of the building and be hardwired to a transfer switch or switchboard.
- C. A separate disconnect switch may be installed in an integral circuit breaker/disconnect is not available integral to the Tap Box.

1.3 QUALITY & CRAFTSMANSHIP

- A. All Generator Tap Boxes shall be built in accordance with the National Electric Code.
- B. Underwriters Laboratory, Inc. {UL} shall conform to cULus 1008 Standards in US in Canada and be listed under one of the following UL categories;
1. Transfer Switch Accessory – Breaker Series
- C. A Written quality control process to inspect finished goods shall be documented for all manufactured products.
- D. Tap Box manufacturer shall be manufacturing “Tap Boxes” for at least ten (10) years.

1.4 REFERENCES

- A. Section 260526 - Grounding and Bonding
- B. Section 260529 - Hangers and Supports for Electrical Systems
- C. Section 260553 - Identification for Electrical Systems
- D. Section 260563 - Acceptance Testing of Electrical Systems

- E. Section 024119.49 - Minor Electrical Demolition
- F. Section 260519 - Low-Voltage Electrical Power Conductors and Cables
- G. Section 260533.13 - Conduit for Electrical Systems
- H. Section 260533 – Raceway and Boxes for Electrical Systems
- I. Section 265100 – Portable -Generator Tap Box

1.5 WARRANTY

- A. Products manufactured and delivered will be free from defects in material and workmanship for a period of fifteen (15) months after date of shipment.

1.6 INSTALLATION AND USE

- A. Installation of the Tap Box shall only be done by a qualified licensed electrician.
- B. Understand Manufacturer’s Manual prior to installing and using Tap Box.

PART 2 PRODUCTS

2.1 GENERAL CONSTRUCTION

- A. All components shall be new and free of defects.
- B. Tap Box Amperage: 1200 Amps_
- C. Tap Box Voltage: 480V, 3 Ph, 4 wire plus ground
- D. Tap Box Mounting: Outdoor Mounted
- E. Powertron Series Tap Box: Breaker Series
- F. Enclosure Material: Stainless Steel

2.2 ENCLOSURE

- A. Enclosure shall be manufactured by Hoffman Enclosures
- B. Final finish shall be Stainless Steel.
 - 1. Stainless steel finish shall be clear coat brushed finish.
- C. Front door shall be hinged with appropriate weather rated gaskets.
- D. Trapper Cable Door

1. Trapper Cable Door shall be constructed within the bottom section of the main door. While generator cables are connected to tap box, main door shall be able to secure generator cables when locked.
2. UL tested {rain test} to NEMA 4X standards when trapped cable door is being used.
3. UL Verified and tested using a UL listed prosthetic finger
4. UL Verification Claim: “*Trapped cable door prevents cable disconnection by unauthorized personnel*”,
5. Trapped Cable Door shall be grounded to main door

2.3 BUS BAR

- A. Busing shall be used for “permanent” cable connections to the facility.
- B. Shall be copper material and tin plated

2.4 SINGLE POLE RECEPTACLES

- A. Single pole receptacles “Cam-Lock Connectors” shall be NEMA 3R rated
- B. Approved Manufacture, Hubbell Wiring Devices— No Substitute
- C. Color codes for voltage identification as follows:
 1. 120/208V, 120/240V, and 347/600V: Green {Ground}, White {Neutral}, Phase A/L1 {Black}, Phase B/L2 {Red}, and Phase C/L3 {Blue}
 2. 277/480V: Green {Ground}, White {Neutral}, Phase A/L1 {Brown}, Phase B/L2 {Orange}, and Phase C/L3 {Yellow}
- D. Ground receptacle shall be bonded to enclosure

2.5 ADDITIONAL L FEATURES

- A. Phase Rotation Monitor Kit shall be in separate packaging and “field Assembled” by a qualified licensed electrician. Assembly shall follow the installation instructions that have been verified by Underwriters Laboratory, Inc. {UL}
- B. The actual Phase Rotation Monitor kit has been tested and UL Listed as a completed assembled product and UL Verified - Claim: “*Phase rotation monitor integrated in startup procedure*”,
- C. KIRK® Key Interlock Kit
 1. Field assembled kit available in single barrel or double barrel KIRK Key. KIRK Key.
- D. Two (2) wire remote generator start wire terminals
 1. Field assembled and/or installed by factory at time of order.
- E. One (1) NEMA 5-20R duplex GFCI 20 Amp outlet for mobile generator block heater and battery charger

1. Installed by factory at time of order.

F. 30 Amp Twist Lock Kit

1. Installed by factory at time of order.

2.6 APPROVED TAP BOX MANUFACTURER(S)

A. Powertron Corp.

B. Penn Panel & Box Company.

C. Mac Power

D. Or approved equal.

PART 3 EXECUTION – NOT USED

END OF SECTION 262510

DIVISION 26 – ELECTRICAL
SECTION 262726 – WIRING DEVICES
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for furnishing, installing, connecting, energizing, testing, cleaning, and protecting wiring devices and cover plates.

B. Comply with the requirements and provisions of the following:

1. Division 00 – Procurement and Contracting Requirements
2. Division 01 – General Requirements
3. Section 260500 – Common Work Results for Electrical

C. Related Sections

1. Section 260500 – Common Work Results for Electrical
2. Section 260519 - Low-Voltage Electrical Power Conductors and Cables
3. Section 260526 – Grounding and Bonding for Electrical Systems
4. Section 260529 – Hangers and Supports Systems for Electrical Systems
5. Section 260533.13 – Conduits for Electrical Systems
6. Section 260533 – Boxes for Electrical Systems
7. Section 260553 – Identification for Electrical Systems
8. Section 260563 – Acceptance Testing of Electrical Systems

1.2 REFERENCES

A. National Electric Manufacturer's Association (NEMA):

1. NEMA WD 1 - General Color Requirements for Wiring Devices.
2. NEMA WD 6 - Wiring Devices - Dimensional Requirements.

B. National Fire Protection Association (NFPA):

1. NFPA 70 - National Electrical Code (NEC).

C. Underwriter's Laboratories, Inc. (UL):

1. UL 20 - Standard for Safety for General-Use Snap Switches.
2. UL 231 - Standard for Power Outlets.
3. UL 498 - Standard for Safety for Attachment Plugs and Receptacles.
4. UL 943 - Standard for Safety for Ground-Fault Circuit-Interrupters.
5. UL 1203 - Standard for Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations
6. UL 1449 - Standard for Transient Voltage Surge Suppressors.
7. UL 1472 - Solid-State Dimming Controls.

8. UL 1681 - Standard for Safety for Wiring Device Configurations.

D. U. S. General Services Administration (GSA):

1. Federal Specifications:

- a. W-C-596/40D - Connector, Receptacle, Electrical, General Purpose, Duplex, General Grade and Hospital Grade, Grounding, 2 Pole, 3 Wire, 20 Amperes, 125 Volts, 50/60 Hertz, Box Mount and Snap-In Mount.
- b. W-C-596/41D - Connector, Receptacle, Electrical, General Purpose, Single, Hospital Grade, Grounding, 2 Pole, 3 Wire, 20 Amperes, 125 Volts, 50/60 Hertz.
- c. W-C-596/107A - Connectors, Receptacle, Electrical, Special Purpose, Single, Grounding, 2 Pole, 3 Wire, 20 Amperes, 277 Volts, 50/60 Hertz.
- d. W-S-896F - Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification).

1.3 DEFINITIONS

- A. Definitions for all items are as stated in NFPA 70 and the other references listed unless otherwise stated, specified, or noted.
- B. SPDT: An acronym for single pole, double throw type electrical switches.
- C. Wiring Devices: Yoke mounted switches and receptacles with indicated line ratings of 300 Volts and 30 Amperes or less.

1.4 DESIGN REQUIREMENTS

- A. Provide electrical power outlets designed in accordance with the requirements of UL 231 and UL 1681.
- B. Product Data:
 1. Submit a list of the products and accessories proposed to satisfy the requirements of this Section.
 2. Submit Product Data and catalog cuts of the materials and equipment proposed to be used to satisfy the requirements of this Section.
 - a. Clearly indicate the usage of each product on the submittal.
 3. Include Product Data for the equipment and material provided under this Section with the Operation and Maintenance Manuals at project closeout.

1.5 SUBMITTALS

- A. Submit the following information to the Engineer for approval in accordance with the requirements of Section 260500:
 1. Product Data:
 - a. List of the proposed materials.
 - b. Catalog cuts
 2. Quality Assurance/Control Submittals:
 - a. Test Reports.
 - 1) Test reports for Site tests.

- b. Certificates.
 - 1) Testing agency/quality verification, listing, and labeling.
- c. Manufacturers Instructions.
 - 1) Manufacturer's printed installation instructions.
- d. Qualification Statements.
 - 1) Qualifications of the Electrical Testing Laboratory (ETL).

1.6 QUALITY ASSURANCE

A. Qualifications:

- 1. Electrical Testing Laboratory (ETL) Qualifications:
 - a. Employ an independent testing agency, qualified as specified in Section 260563, Electrical Testing, to perform testing required by this Section.
 - b. Submit information verifying the ETL's qualifications.

B. Regulatory Requirements:

- 1. Perform the Work of this Section in accordance with the requirements specified in NFPA 70, and to all other applicable state, local, and national governing codes and regulatory requirements.

C. Certifications:

- 1. Provide products that are listed and labeled by Underwriters Laboratory, approved by Factory Mutual, or certified as meeting the standards of UL by the Electrical Testing Laboratory (ETL) for the location installed in, and the application intended, unless products meeting the requirements of these testing laboratories are not available or unless standards do not exist for the products.
Provide copper conductors listed and labeled by UL for all wiring.
- 2. Submit evidence of testing agency/quality verification, listing, and labeling for each product with the submitted product data either by providing a printed mark on the data or by attaching a separate listing card.
 - a. For items without such evidence, submit a written statement from the product manufacturer that indicates why it does not have quality assurance verification.

1.7 MATERIAL DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling, and Unloading:

- 1. Pack, ship, handle, and unload products in accordance with the requirements of Section 260500.

B. Acceptance at Site:

- 1. Accept products at the Site in accordance with the requirements of Section 260500.

C. Storage and Protection:

- 1. Store products in accordance with the requirements of Section 260500.

PART 2 PRODUCTS**2.1 MANUFACTURERS**

A. Use of Trade Names:

1. The use of trade names within the Contract Documents is intended to establish the basis of design and to illustrate the constructability and level of quality required.
2. The use of trade names is not intended to exclude other manufacturers whose products are equivalent to those named, subject to compliance with Contract requirements.

B. Provide the switches and receptacles of the same kind provided under this Contract from the same manufacturer; a mixture of manufacturers products is unacceptable.

2.2 MANUFACTURED UNITS

A. Switches:

1. Provide UL listed specification grade switches meeting the requirements of W-S-896F, NEMA WD 1, and NEMA WD 6 for the voltage and current indicated, and having screw terminals.
2. Toggle Handle Snap Switches:
 - a. Provide quiet design, 20 Amp rated, single pole, 3-way or 4-way, toggle handle snap switches as indicated in the Contract Documents.
 - b. Control Switches:
 - 1) For control switches, provide SPDT switches with center OFF and maintained contacts, or SPDT with center OFF and momentary contacts, of the same basic type, construction, and rating as specified for other toggle handle snap switches.
 - 2) Provide switch with terminals rated for both solid and stranded wire.
 - 3) See the Contract Drawings for additional information.
 - c. Manufacturers:
 - 1) Hubbell
 - a) Heavy Duty Specification Grade Switches: HBL1220 Series.
 - 2) Pass & Seymour
 - 3) Leviton Manufacturing Co.
 - 4) Or Approved Equal

B. Receptacles:

1. Provide UL listed specification grade receptacles complying with the requirements of W-C-596/40D, W-C-596/41D, W-C-596/107A, NEMA WD 1, and NEMA WD 6 for the voltage and current indicated, and having screw terminals.
 - a. Provide receptacles complying with the terminal identification requirements of UL 498.
2. Standard Face Design Receptacles:
 - a. Heavy Duty Specification Grade Receptacles:
 - 1) Provide 2-pole, 3-wire, grounding type duplex receptacles rated for 125 Volts AC and 20 Amperes.
 - 2) Provide receptacles with terminals rated for both solid and stranded wire.
 - 3) Manufacturers:
 - a) Hubbell, HBL5352 Series

- b) Pass & Seymour
 - c) Leviton Manufacturing Co.
 - d) Or Approved Equal
3. Ground Fault Circuit Interrupter (GFCI) Receptacles:
- a. Heavy Duty Specification Grade GFCI Receptacles:
 - 1) Provide 2-pole, 3-wire, grounding type duplex GFCI receptacles rated for 125 Volts AC and 20 Amperes; having solid state circuitry; and that comply with the requirements of UL 498 and UL 943.
 - 2) Provide receptacles with terminals rated for both solid and stranded wire.
 - 3) Manufacturers:
 - a) Hubbell, GFR5362TR Series
 - b) Pass & Seymour
 - c) Leviton Manufacturing Co.
 - d) Or Approved Equal
4. Specification Grade Surge Suppression Receptacles:
- a. Provide receptacles rated for 125 Volts AC and 20 Amperes, and complying with the requirements of UL 1449 and UL 498.
 - b. Provide receptacles with terminals rated for both solid and stranded wire.
 - c. Manufacturers:
 - 1) Hubbell, HBL5362SA Series
 - 2) Pass & Seymour
 - 3) Leviton Manufacturing Co.
 - 4) Or Approved Equal
5. Power Outlet Receptacles:
- a. Provide heavy-duty, polarized, grounding type power outlet receptacles rated for the voltage and amperage indicated in the Contract Documents.
 - b. Provide receptacles with terminals rated for both solid and stranded wire.
 - c. Manufacturers:
 - 1) Hubbell, Twist-Lock and straight blade
 - 2) Pass & Seymour
 - 3) Leviton Manufacturing Co.
 - 4) Or Approved Equal

2.3 ACCESSORIES

A. Wall Plates:

1. Unless otherwise indicated in the Contract Documents, provide AISI Type 302/304 stainless steel wall plates.
 - a. For use with exposed stamped steel boxes and cast type boxes, provide heavy cadmium-plated steel wall plates whose edges are flush with the edges of the associated boxes.
 - b. For pushbutton or buzzer outlet boxes, provide wall plates having openings to suit the pushbuttons or buzzers.
 - c. For locations subject to wet or rain conditions, provide wet location wall plates marked with the words "Suitable for Wet Locations While in Use".
2. Thickness (Minimum): 0.040 inches thick (1mm).
3. Finish:
 - a. For finished areas, provide wall plates having a satin finish.

- b. For emergency circuits, provide either a red or Type 302/304 stainless steel wall plate engraved with the word “EMERGENCY” and with the panel designation and circuit number.
 4. Fasteners:
 - a. For installing wiring devices and wall plates, provide the following of fastener types:
 - 1) For affixing metal wall plates, provide stainless steel hardware.
 5. Manufacturers:
 - a. Hubbell
 - b. Pass & Seymour
 - c. EGS/Appleton Electric
 - d. EGS/O-Z/Gedney
 - e. Cooper Crouse-Hinds
 - f. Or Approved Equal
- B. Weatherproof Cast Covers:
 1. Provide with vertical cast construction, baked-on electrostatic polyester and powder paint for scratch/corrosion resistance.
 2. Provide toggle switch cover with On/Off position designation indicated on cover.
 3. Provide with heavy duty gasket that provides weatherproofing between cover plate and box.
 4. Manufacturers:
 - a. EGS/Appleton Electric
 - b. EGS/O-Z/Gedney
 - c. Hubbell
 - d. Pass & Seymour
 - e. Leviton Manufacturing Co.
 - f. Or Approved Equal
- C. Weatherproof While-In-Use Covers:
 1. Body, cover and plates shall be made of polycarbonate and be non-conductive and non-corrosive.
 2. A gasket shall be pre-applied that is constructed of closed-cell foam, neoprene blend regular density and UL rated HBF.
 3. Cover shall provide a water channel, which keeps water moving outside while cord flap keeps the inside dry.
 4. Cover shall be able to mount either vertically or horizontally.
 5. Must provide a NEMA 3R protection level.
 6. Manufacturers:
 - a. EGS/Appleton Electric
 - b. EGS/O-Z/Gedney
 - c. Hubbell
 - d. Pass & Seymour
 - e. Leviton Manufacturing Co.
 - f. Or Approved Equal

PART 3 EXECUTION**3.1 EXAMINATION**

- A. Inspect the surfaces of concrete foundations where wiring devices will be mounted to verify that the surface is level and complete.
 - 1. Verify that the required number of anchors of the correct type and size have been placed in the proper locations.
 - 2. Verify that there are no concrete spalls, honeycomb areas, or other concrete defects.
- B. Verify that the pull and junction boxes installed are the correct type and size, and are at the correct location.
 - 1. Verify that flush boxes are plumb and level to within 1/8-inches of vertical and horizontal; and are either flush with the finish surface or protrude no more than 1/16 inch.
 - 2. Verify that surface mounted boxes are plumb and level to within 1/16-inch of vertical and horizontal.
 - 3. Verify that the size of each box conforms to the requirements of Article 370 of NFPA 70.
- C. Verify that wiring pigtails within installed boxes are sufficiently long to re-terminate the wiring twice and still allow 6 inches of slack.
- D. Verify that ground wires are the correct type and size, and are at the correct location.

3.2 PREPARATION

- A. Correct defects discovered during the examination
 - 1. Remove any extraneous paint from the interior of boxes and from wiring.
 - 2. Clean the interior of boxes to remove dirt and debris.
- B. Provide outlet boxes and supports for wiring devices in accordance with the requirements of Sections 26 05 28 and 26 05 33.13.
 - 1. Mounting Locations and Heights:
 - a. Unless otherwise specified or shown on the Contract Drawings, locate wiring devices by measuring the mounting heights from the finished floor to the centerline of the wiring device.
 - 1) Emergency Power Shut-Off Switches:
 - a) Locate emergency power shut-off switches 5'- 0" above the finished floor on the hinge side of the exit door, or where shown on the Contract Drawings.
 - 2) Lighting Control Switches:
 - a) Locate lighting control switches on the strike side of doors, and at 48-inches above the finished floor to the centerline of the switch, unless indicated otherwise on the Contract Drawings.
 - b) Where it is not possible to mount lighting control switches side-by-side with a common device plate, mount them in tandem.

- 3) Electrical Duplex Convenience Outlets:
 - a) In Finished Areas:
 - (1) Locate electrical duplex convenience outlets 18 inches above the finished floor to the centerline of the outlet, unless indicated otherwise on the Contract Drawings.
 - (2) In concrete block walls, locate convenience outlets so they fall at the top of the second course, and at the top center of the respective block in which they are placed.
 - (3) Locate electrical duplex convenience outlets that are above counters or backsplashes horizontally 6 inches above the counter or backsplash.
 - b) In Unfinished Areas:
 - (1) Locate electrical duplex convenience outlets 36 inches above the finished floor, unless this interferes with equipment or another obstacle.
 - (2) If locating electrical duplex convenience outlets 36 inches above the finished floor interferes with equipment or another obstacle; then install the outlet above or below the obstruction as directed by the Engineer.

3.3 INSTALLATION

- A. Install wiring devices and accessories in accordance with the manufacturer's printed installation instructions.
 1. Submit the manufacturer's printed installation instructions to the Engineer for information.
 2. Make connections to the devices in accordance with the requirements of Sections 260519, 260533 and 260533.13.
 3. Ground the devices in accordance with the requirements of Section 260526.
- B. Provide a wall plate for each switch, receptacle, and special purpose outlet.
 1. If the Contract Drawings show two or more switches or receptacles at the same location, gang these devices together and cover them with a single wall or cover plate.
 2. For multi-gang boxes, provide multi-gang outlet plates; sectional gang plates are unacceptable.
- C. Identify the wiring devices in accordance with the requirements of Section 260553.
 1. Label emergency power shut-off switches appropriately.

3.4 REPAIR/RESTORATION

- A. Correct the defects that are found in wiring devices during the specified inspections and tests, and retest the devices after correcting the defects.

3.5 FIELD QUALITY CONTROL

- A. Site Tests:
 1. Test each receptacle with a plug-in tester that checks for reversed line and neutral wiring, reversed ground and neutral wiring, open ground wiring, and open neutral wiring.
 2. Verify that the GFCI receptacles work by using both the built-in integral tester and a plug-in tester which simulates a ground fault to test all receptacles.

3. Test the last receptacle in each branch circuit to ensure that the neutral and ground wiring resistance does not exceed 1 ohm between the receptacle and its panelboard.
4. Record and submit the results of the tests to the Engineer for approval in accordance with the requirements of Section 260563.

B. Inspection:

1. Inspect boxes to verify proper operation, for visual appearance, and to verify correct mounting height.

3.6 ADJUSTING

- A. Adjust the final position of switches and devices to be plumb and level, and set the final position of the wall plates for flush boxes flush to the wall.

3.7 CLEANING

A. Waste Management and Disposal:

1. Clear and dispose of waste materials in accordance with the requirements of Section 260500.

3.8 PROTECTION

- A. Mask electrical devices to protect them from paint overspray or over-brushing during painting operations.
- B. Protect electrical devices against damage from other work.

END OF SECTION 262726

DIVISION 26 – ELECTRICAL
SECTION 264113 – LIGHTNING PROTECTION FOR STRUCTURES
DPMC NO. A1346-00

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for an exterior, building lightning protection system, including equipment and related installations.

B. Related Sections:

1. Section 013300 - Submittal Procedures.
2. Section 260533.13 – Conduit for Electrical Systems

1.2 REFERENCES

A. Lightning Protection Institute (LPI):

1. LPI 175, Lightning Protection Institute Installation Code.

B. National Fire Protection Association (NFPA):

1. NFPA 780, Lightning Protection Systems.

C. Underwriters Laboratories (UL):

1. UL 96, Lightning Protection Components.
2. UL 96A, Installation Requirements for Lightning Protection Systems.

D. American Society for Testing and Materials (ASTM):

1. ASTM D5, Standard Test Method for Penetration of Bituminous Materials.
2. ASTM D149, Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies.
3. ASTM D257, Test Methods for DC Resistance or Conductance of Insulating Materials.
4. ASTM D570, Standard Test Method for Water Absorption of Plastics.

1.3 PERFORMANCE REQUIREMENTS

A. Provide a complete, functional, and unobtrusive lightning protection system as specified herein and as approved by the Engineer.

1. Provide the standard product of a manufacturer regularly engaged in the production of lightning protection systems.
 - a. Provide the manufacturer's latest approved design.
2. Observe the limitations on areas of usage for aluminum cables and for copper and aluminum materials together as outlined in NFPA 780 and LPI 175.

3. Install all systems in conformance with UL 96A requirements.
4. Protect equipment on stacks and chimneys from corrosion, and size the equipment in accordance with LPI and UL requirements.
5. Lightning Protection shall be provided on the following structures:

Outdoor Emergency Generator Housing

- B. Provide all equipment, labor, materials, and items of service required for the performance of the Work of this Section.
- C. Install all equipment in a neat workmanlike manner in the most inconspicuous manner possible.

1.4 SUBMITTALS

- A. Prior to the start of the work of this Section, submit the following information in accordance with the requirements of Section 013300:
 1. Product data for the materials and equipment used as a part the work of this Section.
 2. Shop drawings showing the type, size, and locations of all equipment, grounds, cable routings, and other items required to provide a complete and operational lightning protection system.
 3. Lightning protection system manufacturer's qualifications.
 4. Lightning protection system installer's qualifications.
- B. Upon completion of the installation, submit the following information in accordance with the requirements of Section 01780:
 1. As-built shop drawings for the lightning protections system.
 2. The LPI Certified System Application form.

1.5 QUALITY ASSURANCE

- A. Provide a lightning protection system that conforms to the requirements of the Lightning Protection Institute and Underwriter's Laboratories Standards for lightning protection systems.
 1. Provide LPI System Certification.
 2. Provide Underwriters' Laboratories, Inc. inspected, approved, and properly labeled equipment; and furnish a UL Master Label for the system.
- B. Provide a complete lightning protection system composed of new equipment, the product of a single manufacturer who is qualified as specified in Paragraph 1.05C, and of a design and construction to suit its application in accordance with accepted industry standards, UL requirements, LPI requirements, and NFPA Code requirements.
- C. Lightning Protection System Manufacturer's Qualifications:
 1. Provide products for the system from a manufacturer regularly engaged in the production of lightning protection systems.
 2. The system manufacturer must be a UL listed and approved manufacturer.
 3. The system manufacturer must be a fully certified manufacturer member in good standing of the Lightning Protection Institute.

4. The system design and installation shall be performed under the direct supervision of a Master Installer Designer, certified by LPI.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Provide lightning protection equipment manufactured by the one of the following manufacturers:
 1. Thompson Lightning Protection, Inc. (Basis of Design)
 2. Harger Lightning Protection, Inc.
 3. Erico Lightning Protection Co., Inc.
 4. East Coast Lightning Equipment, Inc.
 5. Or Approved Equal.

2.2 MATERIALS

- A. Provide copper or aluminum materials as described herein that conform to the requirements of UL 96; and of the size, weight, and construction to suit the application indicated in accordance with LPI and NFPA Code requirements for Class I structures.
- B. Conductors:
 1. Roof Conductors: Provide UL listed conductors consisting of 28 strands of 14 gauge aluminum wire weighing 114 pounds (51kg) per 1,000 feet (300m).
 2. Downlead Conductors from Roof to Ground: Provide conductors with [29 strands of 17 gauge copper wire] minimum.
- C. Air Terminals:
 1. Perimeter or Roof Ridge Air Terminals: 1/2 inch (13mm) by 18 inch (450mm) solid aluminum.
 2. Roof Center Area Air Terminals: 2 inch (13mm) by 48 inch (1.25m) solid aluminum with an approved brace.
 3. Air Terminal Bases: Cast aluminum with bolt pressure cable connections.
 - a. Crimp type connectors are not acceptable.
 - b. Surface Contact Area: 18.5 square inches (120 square cm) minimum.
 4. Air Terminal Flexible Springs: Provide flexible safety springs at the base of all air terminals.
 5. Air Terminal Personnel Protectors: Provide "safety tops" for air terminals. Protectors shall utilize a durable UV resistant material.
- D. Copper Ground Rods: Provide 3/4 inch (19mm) diameter by 10'-0" long rods, minimum.
- E. Hardware:
 1. Conductor Fasteners: Provide an approved type of non-corrosive metal fasteners having ample strength to support the conductors.
 2. Bonding Devices, Cable Splicers, and Miscellaneous Connectors: Provide cast aluminum devices with bolt pressure connections to cable.
 - a. Cast or stamped crimp fittings are not acceptable.
 3. Miscellaneous Fasteners: Provide stainless steel bolts, nuts and screws.

- F. Bimetal Transition Fittings: Provide an approved bimetal fitting to be used at the roof level minimum of 12" above grade for transitioning from aluminum conductor to copper cable.
- G. Conduit and Conduit Fittings: Provide Schedule 40 PVC conduit conforming to NEMA TC-2, with fittings conforming to NEMA TC-3, and both conforming to the requirements of Section 260533.23.
- H. Exo-Thermionic Welded Connectors:
 - 1. Provide molds, thermite packages, and other material for exo-thermionic welds that are full-rated to carry 100 percent of cable rating and which are letter-coded exo-thermionic welded type.
 - a. Provide the molds, thermite packages, and other material from a single manufacturer throughout the project.
 - b. Acceptable manufacturers, are as follows:
 - 1) Cadweld.
 - 2) Thermoweld.
 - 3) Hager
 - 4) Or Approved Equal.
 - 2. Provide items for connections of cable to ground-rod.
 - 3. All buried underground connections shall be exothermic.
- I. Provide additional materials to complete a functional system per the lightning protection system manufacturer's recommendations.

2.3 FINISHES

- A. Coating/Covering Material for the Grounding Clamps and Connectors:
 - 1. Provide a black, rubber based compound coating/covering material for the grounding clamps and connectors that is permanently pliable, moldable and un-backed, not less than 1/8 inch (3mm) thick, and which has the following properties:
 - a. Solids/Density: 100 percent/12 pounds per gallon. (1.5kg per 1 liter).
 - b. Penetration: 90-130 inches (2.3 - 3.3m) in accordance with ASTM D5.
 - c. Water Absorption: 0.10 percent maximum in accordance with ASTM D570.
 - d. Dielectric Strength: 500 volts/mil (19,685 volts/mm) in accordance with ASTM D149.
 - e. Volume Resistivity: 2000 megohms-inches in accordance with ASTM D257, and 5000 megohms-CM in accordance with ASTM D257.

PART 3 EXECUTION

3.1 ACCEPTABLE INSTALLERS

- A. Employ an experienced installer who is a Certified Master Installer recognized by UL and the LPI, or working under the direct supervision of an LPI manufacturer as listed above, or his authorized LPI Certified Master Installer representative.

3.2 INSTALLATION

A. Air Terminal Installation:

1. Locate and space air terminals according to LPI and NFPA requirements.
 - a. Do not space air terminals more than 20 feet (6m) apart around the outside perimeter or the ridge of the roof, and not over 50 feet (15m) apart through the center of flat roof areas unless approved by the Engineer.
2. Extend air terminals at least 18 inches (450mm) above the object to be protected.
3. Securely mount air terminal bases with stainless steel screws or bolts, except secure all air terminal bases in flat roof areas with adhesive in accordance with the roofing manufacturer's recommendations.

B. Conductor Installation:

1. Install conductors in accordance with the UL Code.
2. Install a perimeter cable around the entire main roof.
3. Connect each perimeter cable to at least two down leads to provide a two way path to ground from each air terminal.
4. Interconnect all center roof air terminals with conductors to the outside perimeter cable.
5. Conductors on flat roof areas may be run exposed.
6. Make ground connections both around the perimeter of each roof and to the main down conductor at 100'-0" (30m) on center, maximum.
7. Install conductor fasteners spaced not to exceed 3 feet (91cm) on center.
8. Conceal all down leads in 1-1/2 inch (4cm) Schedule 40 PVC conduit.
9. Seal all conduit openings with duct seal.
10. To run downlead cables through the roof, use through-roof connectors with solid rods or conduit through pitch pockets.
 - a. Do not run downlead cables directly through the roof.
11. Enclose single ground wires in conduit and conduit fittings without other circuit conductors:

C. Bond all metallic objects on the roof to the lightning protection system as required by NFPA 780.

D. Aluminum to Copper Downlead Connections:

1. Provide an approved transition bimetal fitting at the roof level to transition from aluminum roof conductor to copper downlead cable.

E. Ground Terminal Installation:

1. Locate grounding terminals at the base of the structure.
2. Check ground rod locations to verify that the following conditions have been met; and correct all discrepancies which may include relocating the ground rods if necessary:
 - a. Adequate compaction of soil.
 - b. Freedom from stones, organic-material, debris rubble, and corrosive material.
 - c. Adequate clearance from buildings, other work, and utility lines.
 - 1) Adequate clearance requires separation of 2'-6" (76cm), minimum, unless otherwise indicated.
 - d. Adequate distance between rods and other ground systems.
 - 1) Adequate distance requires separation of 6'-6" (198cm), minimum, unless otherwise indicated.

3. Make ground connections around the perimeter of the structure, but do not allow the average spacing between grounding terminals to exceed 100 feet (30m).
 4. Drive ground terminals to a depth of 10 feet (3m), minimum; drive the terminals deeper if necessary to reach permanent moisture.
- F. Ground Wire to Ground Rod Connections:
1. Exothermically weld ground wires to ground rods.
 2. Coat connections and the area around the connections with coating compound.
 3. Assure freedom from pin-holes and holidays in coating.
- G. Ground Wire to Equipment Connections:
1. Connect ground wires to equipment using two-hole compression type lugs.
 2. On ground lugs and studs, clean all paint, grease, and other similar insulating materials from contact points.
 3. Clean all wires to a bright finish prior to connection.

3.3 INTERFACE WITH OTHER WORK

- A. Coordinate installation of the lightning protection with other trades to insure a correct, neat, and unobtrusive installation.
- B. Verify that a sound bond to the main water service has been achieved, and that interconnection with other building ground systems, including both telephone and electrical grounding systems, has been properly made.

3.4 FIELD QUALITY CONTROL

- A. Secure and deliver the LPI System Certification to the Engineer upon completion of the installation.
- B. Furnish Underwriters Laboratories, Inc. Master Label as evidence that the installation has met with UL 96A code requirements.

END OF SECTION 264113

DIVISION 26 – ELECTRICAL
SECTION 264313 – SURGE PROTECTIVE DEVICES FOR LOW VOLTAGE
ELECTRICAL POWER CIRCUITS
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: The work specified in this Section consists of materials for furnishing, installing, connecting, energizing, testing, cleaning and protecting enclosed surge protective devices.
- B. Comply with the requirements and provisions of the following:
1. Division 00 – Procurement and Contracting Requirements
 2. Division 01 – General Requirements
 3. Section 26 05 00 – Common Work Results for Electrical
- C. Related Sections:
1. Section 26 05 00 – Common Work Results for Electrical
 2. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables
 3. Section 26 05 28 – Hangers and Supports Systems for Electrical Systems
 4. Section 26 05 53 – Identification for Electrical Systems
 5. Section 26 05 63 – Acceptance Testing of Electrical Systems

1.2 REFERENCES

- A. American National Standards Institute/Underwriters Laboratories (ANSI/UL):
1. ANSI/UL 1449 Surge Protective Devices (Fourth Edition)
 2. UL 1283 Electromagnetic Interference Filters
- B. National Fire Protection Association (NFPA):
1. NFPA 70 National Electrical Code (NEC) Article 285.
- C. Institute of Electrical and Electronic Engineers/American National Standards Institute (IEEE/ANSI):
- 1) ANSI/IEEE C62.41.1-2002 IEEE Guide on the Surge Environment in Low-Voltage (1000 V and Less) AC Power Circuits
 2. ANSI/IEEE C62.41.2-2002 IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits.
 3. ANSI/IEEE C62.45-2002 IEEE Recommended Practice on Surge Testing Equipment Connected to Low-Voltage (1000 V and Less) AC Power Circuits.

1.3 SUBMITTALS

- A. Make all submittals in accordance with Section 26 05 00.
- B. Testing Agency/Quality Verification: Provide with all product data evidence of testing agency/quality verification, listing, and labeling either by printed mark on the data or by a separate listing card. Provide from product manufacturers a written statement indicating why an item does not have a quality assurance verification. Such statements are subject to the approval of the Owner and the Engineer.
- C. Product Data and Catalog Cuts: Provide product data within 60 days of contract award for all products provided.
- D. Shop Drawings: Submit shop drawings for all Surge Protective Devices.
- E. Provide manufacturer's instructions for all Surge Protective Devices.
- F. Project Record Documents: Record actual installed elevation and locations of equipment and wiring on record contract and shop drawings as specified in Section 26 05 00.
- G. Project Closeout: Include record drawings, shop drawings and product data with Installation and Maintenance Manuals and submit at project closeout in accordance with Section 26 05 00.

1.4 QUALITY ASSURANCE

- A. Conform all quality control work to Section 26 05 00.
- B. Provide products that are listed and labeled by Underwriters Laboratory, approved by Factory Mutual or certified as meeting the standards of United Laboratories by the Electrical Testing Laboratory for the location installed in and the application intended unless products meeting the requirements of these testing laboratories are not available or unless standards do not exist for the products.
- C. Unless products meeting the requirements of nationally recognized testing laboratories are not readily available for a category of products, provide products that are:
 - 1. Listed and labeled by Underwriters Laboratory.
 - 2. Approved by Factory Mutual.
 - 3. Certified as meeting the standards of Underwriters Laboratory by the Electrical Testing Laboratory.
 - 4. Third party tested for longevity, filtering, and performance ratings. Third party test report shall be required for all SPD products
- D. Conform all work to regulatory requirements of all state, local, and national governing codes and requirements, NFPA 70, National Electrical Code, and the requirements of Section 26 05 00.

- E. Installer Qualifications: Firm specializing in installing work of this Section with minimum three years documented experience.
- F. Install work by or under supervision of licensed electricians.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Protect items from damage during delivery, storage and handling in accordance with Section 26 05 00 and as detailed below.
- B. Store all products indoors in heated warehouses on blocking or pallets.

1.6 WARRANTY

- A. SPD shall have a ten-year parts warranty with a 5 year in the field service warranty. Warranty shall be the responsibility of the electrical distribution equipment manufacturer and shall be supported by their respective field service division.

PART 2 PRODUCTS

2.1 SURGE PROTECTIVE DEVICES EQUIPMENT

A. General Requirements:

1. Provide only products satisfying the applicable requirements for testing and reporting as established herein. Devices proposed for use on this project shall be tested in accordance with ANSI/UL 1449 Fourth Edition, as prescribed by ANSI/IEEE C62.45 - 2002. The voltage protection rating (VPR) or "clamping" voltages shall be recorded for all applicable mode of operation and for each of the test standard waveforms referenced. The results of these tests shall be submitted to the Engineer with the product data sheets as outlined under in this Section.
2. Products furnished for use on this project are to incorporate protective elements in all applicable modes, unless specifically indicated otherwise.
3. Install SPD equipment where so indicated on the Drawings. Voltage class and type of unit to be compatible with distribution voltage being protected.

B. External Surge Protective Devices:

1. SPD shall be Listed in accordance with ANSI/UL 1449 Fourth Edition, Standard for Safety of Surge Protective Devices.
2. SPD shall be of Non Modular in design. Each protection SPD shall be a user replaceable surge current diversion module (MOV based). Each surge current diversion module shall have a short circuit current rating (SCCR) of 200 kA. Each surge current diversion module shall include solid state status indicator lights.

3. SPD shall provide redundant surge current diversion modules for each mode of Protection. Modes of Protection shall be L-N, L-G, N-G in WYE systems, and L-L, L-G in DELTA systems.
4. SPD shall incorporate copper bus bars for the surge current path. Small gauge round wiring or plug-in connections shall not be used in the path for surge current diversion. Surge current diversion modules shall use bolted connections to the bus bars for reliable low impedance connections.
5. Nominal Discharge Current (In) – SPD applied to the distribution system shall have a minimum 20kA In rating.
6. SPDs shall be tested and demonstrate suitability for application within ANSI/IEEE C62.41.2 - 2002 Category C (Type 1) environments
7. SPD shall meet or exceed the following criteria:
 - a. Minimum surge current rating per mode shall be:

120kA SPD's

L-N	60 kA
L-G	60 kA
N-G	60 kA
Per phase	120 kA

240kA SPD's

L-N	120 kA
L-G	120 kA
N-G	120 kA
Per phase	240 kA

8. UL 1449 Fourth Edition Listed voltage protection ratings (VPRs) shall not exceed the following:

<u>VOLTAGE</u>	<u>L-N</u>	<u>L-G</u>	<u>N-G</u>	<u>L-L</u>
480 DELTA	XXX	1800V	XXX	1800V
480Y/277	1200V	1200V	1200V	2000V
208Y/120	700V	700V	700V	1200V
120/240	700V	700V	700V	1200V

9. SPD shall be designed to withstand a maximum continuous operating voltage (MCOV) of not less than 125% of nominal RMS voltage for 208Y/120 V systems and not less than 115% of nominal RMS voltage for 480Y/277 V.
10. SPD shall be equipped with onboard visual and audible diagnostic monitoring. Red and green indicator lights shall provide full time visual diagnostic monitoring of the operational status of each phase. Audible diagnostic monitoring shall be by way of audible alarm. This alarm shall activate upon a fault condition. An alarm on/off switch shall be provided to silence the alarm. An alarm push to test switch shall be provided. The diagnostic monitoring circuits shall continually monitor the operational status of the

surge current diversion modules. No other test equipment shall be required for SPD monitoring or testing before or after installation.

11. SPD shall be connected to the power bus through a dedicated circuit breaker or disconnect.
12. SPD shall be mounted in a NEMA 12 enclosure.
13. SPD shall include Form C dry contacts to monitor the performance of each phase and provide a summary alarm.
14. SPD shall include an event surge counter. The counter shall be equipped with a manual reset and a battery or flash memory to retain memory upon loss of AC power. The surge counter display and reset switch shall be mounted on the front of the SPD enclosure.
15. Acceptable Manufacturers:
 - a. Square D
 - b. Eaton Electric
 - c. Advanced Protection Technologies Inc.
 - d. Approved equal

2.2 MATERIALS

- A. Grounding Materials: Conform to Section 26 05 26.
- B. Steel Supports and Anchors: Conform to Section 26 05 28.
- C. Wiring, External to Equipment and Connectors: Conform to Section 26 05 19.
- D. Conduit Materials: Conform to Section 26 05 34.

PART 3 EXECUTION

3.1 PREPARATION

- A. Painted surfaces, which will be covered by items of this Section, shall have a prime and finish coat of paint.
- B. Ensure that all indoor areas are enclosed from the weather.

3.2 INSTALLATION

- A. Space enclosures out from surfaces mounted on 1/4-inch spacers or u-channel supports. Provide supports as specified in Section 26 05 28.
- B. Install all Surge Protective Devices in accordance with the manufacturer's instructions.
- C. Ground all Surge Protective Devices in accordance with Section 26 05 26, and the manufacturer's instructions using wire as specified in Section 26 05 19, of size No. 6 AWG or larger if otherwise indicated, recommended, or specified.

- D. Connect all Surge Protective Devices in accordance with the manufacturer's instructions. For branch circuit Surge Protective Devices use No. 6 AWG or larger if otherwise indicated on the drawings, recommended, or specified. For instrument, communication, and data and telephone unit protectors use wire sized the same as the circuit, data-line that the Surge Protective Devices is connected to or larger if otherwise indicated, recommended, or specified.
- E. Install all SPD's with the straightest & shortest practical lead length, less than 24 inches.
- F. Set enclosure top 6-feet 6-inches above finished floor or grade unless otherwise indicated or specified. If other equipment is installed in an area, the top of the units may be set lower than 6-feet 6-inches but in no case set the bottom of the enclosure lower than 12-inches above the finish floor or grade.
- G. Make all holes for conduit entries with punches.
- H. In all areas except dry areas install conduit drain-fitting in punched hole in bottom of enclosure, conduit breather fitting in top of enclosure.
- I. Interface with other work:
 - 1. Connect conduits to enclosure with watertight hubs except in damp locations on the bottom of enclosures. A sealing locknut may be used in place of watertight hubs and in dry locations two locknuts and bushings may be used.
 - 2. Connect wiring to line and load terminals with lugs provided or approved by manufacturer in conformance with Section 26 05 19. Remove interior or protect interior components during wire pulling.
 - 3. Connect to conduit systems in conformance with Section 26 05 34.
 - 4. Connect to wiring systems in conformance with Section 26 05 19.

3.3 FIELD QUALITY CONTROL

- A. Site Testing:
 - 1. Prior to energizing:
 - a. Have insulation testing and setting made in conformance of Section 26 05 63.
 - b. Ensure that all load-side wiring is clear of shorts and has received and passed the insulation tests of Section 26 05 63.
 - c. Energize in presence of Owner and close circuit breaker for first time in presence of Owner.
 - d. Final testing after energizing:
 - 1) Perform thermographic test and record circuit parameters in conformity with Section 26 05 63.

3.4 PROTECTION

- A. During painting mask all nameplates, all plastic parts, pushbuttons, operating shafts and all items not to be painted.
- B. Protect all items during work of other trades including welding and cutting.
- C. Protect Surge Protective Devices against short circuits and improper operation.

END OF SECTION 264313

DIVISION 26 – ELECTRICAL
SECTION 265000 – LIGHTING
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for general and emergency egress lighting equipment, components, and related installation.

B. Comply with the requirements and provisions of the following:

1. Division 00 – Procurement and Contracting Requirements
2. Division 01 – General Requirements
3. Section 260500 – Common Work Results for Electrical

C. Related Sections:

1. Section 260519 – Low-Voltage Electrical Power Conductors and Cables
2. Section 260526 – Grounding and Bonding for Electrical Systems
3. Section 260529 – Hangers and Supports Systems for Electrical Systems
4. Section 260533.13 – Conduits for Electrical Systems
5. Section 260563 – Acceptance Testing of Electrical Systems
6. Section 262726 – Wiring Devices

1.2 REFERENCES

A. The Aluminum Association, Inc. (AA):

1. DAF-45, Designation System for Aluminum Finishes.

B. Federal Communications Commission (FCC)

1. FCC 47 CFR Part 15, Federal Code of Regulation (CFR) Testing Standard for Electronic Equipment

C. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

1. IEEE C62.41; Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits.

D. Illuminating Society of North America (IESNA)

1. IESNA LM-79, Electrical and Photometric Measurements of Solid-State Lighting Products
2. IESNA LM-80, Approved Method for Measuring Lumen Maintenance of LED Lighting Sources
3. IESNA TM-15, Luminaire Classification System for Outdoor Luminaires.

- E. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA 250, Enclosures for Electrical Equipment.
 - 2. NEMA SSL 3, High Power White LED Binning for General Illumination
- F. National Fire Protection Association (NFPA):
 - 1. NFPA 70, National Electrical Code (NEC).
- G. Underwriter's Laboratories, Inc. (UL):
 - 1. UL 924, Standard for Safety of Emergency Lighting and Power Equipment.
 - 2. UL 1598, Standard for Safety of Luminaires.
- H. U. S. Government:
 - 1. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR 1910 Occupational Health and Safety Standards.
 - b. 29 CFR 1926 Safety and Health Regulations for Construction.
 - 2. Federal Communications Commission (FCC):
 - a. 47 CFR 18 Industrial, Scientific, and Medical Equipment.
 - 3. Department of Energy (DOE):
 - 1) The Energy Policy of 2005, Public Law 109-58.

1.3 DESIGN REQUIREMENTS

- A. Design Criteria:
 - 1. The Lighting Fixture Schedule on the Contract Drawings constitutes the basis of the lighting design for this Contract, but may not indicate the special design details required.
 - a. The Lighting Fixture Schedule includes the lighting fixture descriptions, fixture manufacturers, and corresponding model numbers.
 - b. The lighting fixtures as scheduled meet the requirements of the lighting design for this Contract with respect to the visible style, number of lamps, and lenses desired.
 - 2. Provide lighting fixtures meeting the requirements of the basis of the lighting design for this Contract, and which have the special details specified in this Section.
 - a. Submit Shop Drawings and manufacturer's installation instructions to show details of assemblies and sub-assemblies, and specially-fabricated supporting and fastening devices.
 - b. Submit bills of material for the fixtures and their appurtenances.
 - 1) Reference the bills of material to the Shop Drawings.
 - 2) Provide bills of material consisting of itemized lists of the parts required (i.e. ballast capacitor igniter, and other similar item descriptions).
 - 3) Identify each part with a part number and/or manufacturer number.
 - c. Provide fixtures for exterior installation that are designed to be completely waterproof.
 - d. Provide luminaire brackets designed to be compatible with configuration of the luminaire.
- B. Prior to providing light fixtures substituted for the fixtures identified in the Lighting Fixture Schedule on the Contract Drawings, submit the following information to obtain the Engineer's approval to substitute the fixtures:
 - 1. The manufacturer's catalog cuts indicating the type, design, dimensions, mounting arrangement, and other industry standard lighting fixture information.

- a. Describe the lighting fixtures, exit signs, emergency battery units, and appurtenances.
2. Manufacturer's photometric data, distribution curves, isolux charts, glare factor data, and coefficient of utilization.
3. Complete photometric data for the fixture, including optical performance, completed by an independent testing laboratory developed according to the standards of the Illuminating Engineering Society of North America as follows:
 - a. For direct, direct/indirect and indirect lights used for general illumination:
 - 1) Coefficients of utilization.
 - 2) Candlepower data, presented graphically and numerically, in 5 degree increments (5 degree, 10 degree, 15 degree, etc.). Data developed for up and down quadrants of normal, parallel, and at 22-1/2 degree, 45 degree, 67-1/2 degree planes to lamp(s). If light output is asymmetric, provide additional planes as required to complete report.
 - 3) Zonal lumens stated numerically in 10 degree increments (5 degree, 15 degree, etc.) as above.
 - 4) Average luminaire luminance calculated in the lengthwise, crosswise, and 45 degree vertical planes.
 - b. For exterior roadway, area, or floodlighting luminaires, photometric data shall include isocandela charts, coefficient of utilization, IES roadway distribution classification (where applicable), and isofootcandle plots for the specific mounting heights, lamps, and conditions of the project.

1.4 SEISMIC REQUIREMENTS

- A. Refer to Section 260548.
- B. Seismic qualification for the installation shall be based upon testing of representative manufacturer's equipment.
- C. The following minimum equipment manufacturer requirements shall be met:
 1. Provide certification that the equipment can withstand the vertical and horizontal response spectra identified
 2. Provide installation guidelines and details for the field assembly of the equipment.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:
 1. The execution of work of this Section must satisfy the applicable requirements of the latest edition of NFPA 70 (NEC), the National Occupational Safety and Health Act as embodied in 29 CFR 1910 and 29 CFR 1926, and regulations of local jurisdictional authorities.
 2. Comply with the requirements of the Energy Policy Act (EPACT) of 2005 and the applicable version of the International Energy Conservation Code.
- B. Certifications:
 1. All products must be Underwriters' Laboratories (UL) listed; and each fixture, Emergency Battery Unit, and exit sign must bear the UL label.
 - a. The UL standards appropriate for the products specified are listed in Paragraph 1.02.E.

- b. Alternatively, Listing by an OSHA Nationally Recognized Testing Laboratory (NRTL) to the relevant UL standards is permitted.
2. Fixtures that are to be installed in areas subject to the weather must be UL listed as "Enclosed and gasketed suitable for wet locations".
3. Provide lighting fixture ballasts certified by the Certified Ballast Manufacturers Association (CBM) or its successor organization to be in accordance with standard ballast specifications established by ANSI as listed in Paragraph 1.02.A.

1.6 SUBMITTALS

- A. Submit the following information for approval in accordance with the requirements of Section 260500:
 1. Product Data:
 - a. Manufacturer's catalog cuts.
 - 1) Lighting fixtures catalog cuts
 - 2) Ballast catalog cuts that include specific ballast information with sufficient information to show compliance with Contract Documents.
 - 3) Lamp catalog sheets of each lamp type for approval, including specific lamp type, manufacturer, and all appropriate lamp criteria including but not limited to: life, initial and mean lumens, beam spread, candlepower, lamp envelope, base type, color temperature, and color rendering index
 - b. Manufacturer's photometric data, distribution curves, isolux charts, glare factor data, and coefficients of utilization for each lighting fixture type.
 2. Shop Drawings:
 - a. Shop Drawings.
 - b. Bills of material.
 3. Quality Assurance/Quality Control Submittals:
 - a. Design Data:
 - 1) Calculations demonstrating that substituted fixtures are equivalent to the named fixtures.
 - b. Certificates:
 - 1) Proof that equipment furnished has the required Underwriters' Laboratories (UL) listing.
 - 2) Ballast certifications.
 - c. Manufacturer's Instructions:
 - 1) Manufacturer's installation instructions.

1.7 EXTRA MATERIALS

- A. Maintenance Tools:
 1. Provide two each of the special maintenance tools as may be necessary for re-lamping fixtures and for fixture maintenance.
- B. As the equipment for which the extra materials can be used is substantially completed, turn the extra materials for that equipment over to the Owner.

PART 2 PRODUCTS**2.1 MATERIALS****A. Conduit and Raceway:**

1. Provide electrical conduit and raceway in accordance with the requirements of Section 26 05 34 indicated and as appropriate for the application per NFPA 70.

B. Control Devices:

1. Provide electrical lighting control devices in accordance with the requirements of Section 26 27 26, as applicable, and as also specified herein.

C. Fixture Support Devices and Fasteners:

1. In addition to the supporting devices and fasteners specified in Section 26 05 28, provide suspension accessories, canopies, casing, sockets, holders, reflectors, plaster frames, recessing boxes, and similar items required to support the lighting equipment and luminaries as specified or indicated.

D. Wire and Cable:

1. Provide electrical wire and cable in accordance with the requirements of Section 26 05 19.

2.2 MANUFACTURED UNITS**A. Light Fixtures:**

1. Provide those fixtures indicated on the Lighting Fixture Schedule on the Contract Drawings or approved substitutions.
 - a. The manufacturers' fixture descriptions and corresponding fixture model numbers are also listed in the Lighting Fixture Schedule.
 - b. Acceptable manufacturers for lighting fixtures are as follows.
 - 1) Lithonia
 - 2) Holophane
 - 3) Hubbell
 - 4) EPCO
 - 5) Philips
 - 6) Cree
 - 7) RAB
 - 8) Dialight
2. Fixture Grounding Device and Conductor:
 - a. Provide the housing of each fixture with a separate, factory-installed grounding device and ground conductor.
3. Exterior Fixtures:
 - a. Factory-equip fixtures intended for exterior installation with waterproof gaskets and anodized aluminum frames unless indicated otherwise on the Contract Drawings.
 - 1) Provide outlet boxes, neoprene gaskets, and stainless steel hardware to render the exterior fixture installation waterproof.

- b. Finish:
 - 1) Provide fixtures for exterior installation with a finish free of scratches and other surface blemishes.
- c. Brackets:
 - 1) Provide brackets of the type and style indicated or scheduled on the Contract Drawings and color matched to the light fixture.

B. LED Lighting Fixtures (excluding LED exit signs)

1. Color temperature of any substituted fixture shall be within 10% of the specified value shown on the drawings.
2. Power consumption of any substituted fixture shall not exceed the specified value shown on the drawings by more than 10%. If a substituted fixture is submitted and approved at an increased wattage (within 10% of the specified wattage), any power system modifications necessary to accommodate the fixtures will be the responsibility of the contractor (i.e. increased wire sizes, increased circuit breaker size, additional circuits/breakers, etc.)
3. LED Lumen Efficacy (Lumens/Watt) of a substituted fixture shall not be less than the specified fixture by more than 10%.
4. Characteristics of substituted fixtures shall have the same features as the specified LED fixtures (i.e. redundant drivers, driver protection, etc.) whether specifically noted on the lighting fixture schedule or not.
5. Drivers shall not exceed 350mA unless specifically noted otherwise on the lighting fixture schedule. Drivers shall have a Class A sound rating.
6. LED Light fixtures shall have a minimum expected life of 50,000 hours. The aforementioned life rating must be conducted with a 40 degrees Celsius ambient temperature.
7. Power Factor: The LED fixture shall have a power factor of 0.90 or greater.
8. Total Harmonic Distortion induced into the AC power line by the luminaire shall not exceed 20 percent.
9. Surge Suppression: The LED fixture on-board circuitry shall include surge protective devices to withstand high repetition noise transients as a result of utility line switching, nearby lightning strikes, and other interference. The SPD shall protect the luminaire from damage and failure for common mode transient peak voltages up to 10 kV (minimum) and transient peak currents up to 5 kA (minimum). SPD shall conform to UL 1449 depending of the components used in the design. SPD performance shall be tested per the procedures in ANSI/IEEE C62.41-1992 (or current edition) for category A (standard). The SPD shall fail in such a way as the Luminaire will no longer operate. The SPD shall be field replaceable.
10. Operational Performance: the LED circuitry shall prevent visible flicker.
11. Thermal Management: The thermal management (of the heat generated by the LED's) shall be of sufficient capacity to assure the proper operation of the luminaire over the expected useful life. Thermal management shall be by passive design – the use of fans or other mechanical devices is not allowed.

C. Lighting Contactors:

1. Comply with 26 29 13, and the following.
2. Provide the type of contactor scheduled on the Contract Drawings, with the number of poles per contactor and the amperage and load voltage ratings indicated.
 - a. For all types of lamp loads, provide single or multiple contact, continuous duty, electrically or mechanically held type contactors suited for non-inductive loads.
 - b. Provide contactors of the flush dead back design with arc shields and barriers to prevent pole-to-pole flashover.

- c. Provide contactors with all parts accessible for inspection and maintenance.
 - 1) Provide contacts that are readily replaceable from the front of their panels.
 3. Interrupting Capacity:
 - a. Provide contactors with an interrupting capacity of 150 percent of their rating with no derating for high inrush loads.
 4. Enclosure:
 - a. Provide a contactor enclosure designed to meet the requirements for NEMA 12 surface type enclosures as specified in NEMA 250 unless indicated otherwise on the Contract Drawings.
 - b. Provide enclosures complete, and with provisions for padlocking.
 5. Acceptable Manufacturers
 - a. Allen-Bradley
 - b. Square D Company
 - c. Eaton Electric
- D. Photocontrols:
 1. Provide cadmium sulphide, hermetically sealed photocells suitable for remote mounting.
 - a. For individual luminaires, provide plug-in, twist-to-lock-type photoelectric controls with voltage characteristics compatible with the luminaire.
 - b. For a group of luminaires and/or lighting fixtures, provide conduit mounted type photoelectric controls with the voltage characteristics indicated on the Contract Drawings.
 2. Provide fully temperature compensated photo controls designed with a 15 second time delay to prevent false switching.
 3. Acceptable Manufacturers:
 - a. Tork
 - b. Tyco Electronics
 - c. Paragon Electrical Products
 - d. Approved Equal
- E. Luminaire Brackets:
 1. Provide luminaire brackets of the type and style as indicated or scheduled on the Contract Drawings and color matched to light fixture.
 2. Provide luminaire brackets fabricated to be compatible with the configuration of the luminaire.
 3. Metal Pole Brackets: Provide pole adapters compatible with poles and as required to accommodate specified luminaires.
 - a. Finish: Match finish of pole/support structure for arm, bracket, and tenon mount materials.
- F. Boxes, Gaskets, Hardware, and Support Devices:
 1. Provide outlet boxes, neoprene gaskets, and stainless steel hardware to render the installation of the lighting waterproof.
 - a. Provide waterproof splice kits where required as specified in Section 26 05 19.
 2. Supply pendant stems, special mounting supports and hardware, and miscellaneous materials and incidentals required to install the lighting and emergency battery unit products in place.
 3. Provide neoprene spacers for maintaining clearance between lighting and emergency battery unit products and concrete, mortar, and other masonry surfaces.

2.3 OCCUPANCY SENSORS

A. One Way Directional Occupancy Sensor:

1. Occupancy sensor shall combine both ultrasonic and passive infrared sensing.
2. Occupancy sensor shall operate on 24VDC.
3. Occupancy shall have automatic timer and sensitivity features to prevent “false-offs” and “false ons”.
4. Occupancy sensor shall cover 1,000 square foot.
5. Occupancy sensor shall be provided with a mask to eliminate the coverage area for applications not requiring the full field of view of 360 degrees.

B. Multi-Directional Occupancy Sensor:

1. Occupancy sensor shall combine both ultrasonic and passive infrared sensing.
2. Occupancy sensor shall operate on 24VDC.
3. Occupancy shall have automatic timer and sensitivity features to prevent “false-offs” and “false ons”.
4. Occupancy sensor shall cover 2,000 square foot.
5. Occupancy sensor shall be provided with a mask to eliminate the coverage area for applications not requiring the full field of view of 360 degrees.

C. Power Pack for Occupancy Sensors:

1. Power Pack shall have a high impact, UL rated 94 – 5 V plastic construction case.
2. Power Pack shall be plenum rated.
3. Power Pack shall have a 120V primary input and a 24 VDC, 100 mA nominal, full-wave rectified and filtered output.
4. Power Pack shall have two isolated relays for the control of two circuits. Contact ratings shall be 20A for fluorescent ballasts and 1 HP for motor load.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Prior to ordering flush mounted or lay-in type lighting fixtures, verify their locations and clearances, and coordinate with other construction work to verify that the fixtures will fit without interferences.
 1. The Engineer assumes no responsibility for clearance, dimensions, tolerances, or exact hanging frame dimensions.
- B. Prior to beginning installation of the lighting fixtures and accessories, verify that all other work affecting the installation of the lighting fixtures and accessories is complete to the extent that the light fixtures may be installed over substrates or incorporated into integrated systems without adversely affecting the lighting or other construction.

3.2 INSTALLATION

- A. Assemble lighting fixtures if required; and install and wire the lighting fixtures, supports, brackets, and accessories at the locations and mounting heights indicated on the Contract Drawings.
 - 1. Wire the lighting fixtures and accessories as specified in Section 26 05 19.
 - 2. Ground the lighting fixtures in accordance with the requirements of Article 410 of NFPA 70 (NEC) and Section 26 05 26.
 - a. Use the fixture grounding device to connect a separate grounding conductor in compliance with requirements specified in Section 26 05 26.
 - 3. Install all photoelectric controls facing north for proper operation.
- B. Exposed Fixture Installation:
 - 1. Install surface mounted and exposed fixtures as indicated on the Contract Drawings.
 - a. Hang suspended fixtures plumb, with continuous rows of fixtures in alignment.
 - b. Mount suspended fixtures in each room or area at the same height regardless of varying clear height conditions unless otherwise indicated on the Contract Drawings.
 - c. Install surface mounted fixtures tight up against the substrate to eliminate gaps except where NFPA 70 (NEC) or local code restrictions require a separation between the fixtures and substrate.
 - 2. Exit Fixture Installation:
 - a. Install exit fixtures for doors directly over the doorways as indicated on the Contract Drawings
 - b. Center the fixtures over the doorways, and install the fixtures to clear the door and associated hardware.

3.3 INTERFACE WITH OTHER WORK

- A. Verify the locations and clearances of other installed or proposed work, and coordinate lighting fixture installations accordingly.
- B. Coordinate the installation of lighting fixtures with all building systems and components to avoid any installation conflicts.

3.4 FIELD QUALITY CONTROL

- A. Inspect, test, and certify lighting and the associated electrical distribution system and equipment in accordance with the requirements of Section 26 05 63.

3.5 CLEANING

- A. Clean new lighting fixtures by following the cleaning procedures as recommended by the fixture manufacturer:
 - 1. Use only those products for cleaning as recommended in the fixture manufacturer's literature.

3.6 AIMING AND FOCUSING

- A. Contractor shall notify the owner one week in advance and establish schedule for a night when final aiming will be done.
- B. Lock the aiming adjustments, set during final aiming, in position. Position must hold during relamping and normal maintenance.

END OF SECTION 265000

DIVISION 26 – ELECTRICAL
SECTION 265052 – AUTOMATIC TRANSFER SWITCH
DPMC No. A1346-00

PART 1 GENERAL

1.1 SCOPE

- A. Provide complete factory assembled power transfer equipment with field programmable digital electronic controls designed for fully automatic operation and including surge voltage isolation, voltage sensors on all phases of both sources, linear operator, permanently attached manual handles, positive mechanical and electrical interlocking, and mechanically held contacts for both sources.
- B. The generator set manufacturer shall warrant transfer switches to provide a single source of responsibility for all the products provided. Technicians specifically trained to support the product and employed by the generator set supplier shall service the transfer switches.
- C. Related Sections
 - 1. Section 260500 – Common Work Results for Electrical
 - 2. Section 260519 – Low-Voltage Electrical Power Conductors and Cables
 - 3. Section 260526 – Grounding and Bonding for Electrical Systems
 - 4. Section 260529 – Hangers and Supports Systems for Electrical Systems
 - 5. Section 260533.13 – Conduit for Electrical Systems
 - 6. Section 260533 – Boxes for Electrical Systems
 - 7. Section 260553 – Identification for Electrical Systems
 - 8. Section 260563 – Acceptance Testing of Electrical Systems
 - 9. Section 262510 – Portable Generator Tap Box
 - 10. Section 265051 – Emergency Standby Power System

1.2 CODES AND STANDARDS

- A. The automatic transfer switch installation and application shall conform to the requirements of the following codes and standards:
 - 1. CSA 282, Emergency Electrical Power Supply for Buildings
 - 2. NFPA70 – National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702.
 - 3. NFPA99 – Essential Electrical Systems for Health Care Facilities
 - 4. NFPA110 – Emergency and Standby Power Systems. The transfer switch shall meet all requirements for Level 1 systems.
 - 5. IEEE446 – Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications.
 - 6. NEMA ICS10-1993 – AC Automatic Transfer Switches.
- B. The transfer switch assembly shall comply with the following standards:
 - 1. CSA C22.2, No. 14 – M91 Industrial Control Equipment.
 - 2. EN55011, Class B Radiated Emissions
 - 3. EN55011, Class B Conducted Emissions

4. IEC 1000-4-5 (EN 61000-4-5); AC Surge Immunity.
 5. IEC 1000-4-4 (EN 61000-4-4) Fast Transients Immunity
 6. IEC 1000-4-2 (EN 61000-4-2) Electrostatic Discharge Immunity
 7. IEC 1000-4-3 (EN 61000-4-3) Radiated Field Immunity
 8. IEC 1000-4-6 Conducted Field Immunity
 9. IEC 1000-4-11 Voltage Dip Immunity.
 10. IEEE 62.41, AC Voltage Surge Immunity.
 11. IEEE 62.45, AC Voltage Surge.
 12. UL1008 – Transfer Switches. Transfer switches shall be UL1008 listed. UL1008 transfer switches may be supplied in UL891 enclosures if necessary to meet the physical requirements of the project.
- C. 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.

1.3 ACCEPTABLE MANUFACTURERS

- A. Only approved bidders shall supply equipment provided under this contract. Equipment specifications for this project are based on microprocessor-based transfer switches manufactured by ASCO or approved equal. Equipment by other suppliers that meets the requirement of this specification are acceptable, if approved not less than 2 weeks before scheduled bid date. Proposals must include a line-by-line compliance statement based on this specification.

PART 2 PRODUCTS

2.1 POWER TRANSFER SWITCH

- A. Ratings
1. Refer to the project drawings for specifications on the sizes and types of transfer switch equipment, withstand and closing ratings, voltage and ampere ratings, enclosure type, and accessories. Transfer switch shall be 4 poles. The operating voltage is 480V, 3 Phase and shall be rated 2000A.
 2. Main contacts shall be rated for 600 Volts AC minimum.
 3. Transfer switches shall be rated to carry 100 percent of rated current continuously in the enclosure supplied, in ambient temperatures of -40 to +60 degrees C, relative humidity up to 95% (non-condensing), and altitudes up to 10,000 feet (3000M).
 4. Transfer switch equipment shall have with stand and closing ratings (WCR) in RMS symmetrical amperes greater than the available fault currents shown on the drawings and at the specified voltage. The transfer switch and its upstream protection shall be coordinated. The transfer switch shall be third party listed and labeled for use with the specific protective device(s) installed in the application.
- B. Construction
1. Transfer switches shall be double-throw, electrically and mechanically interlocked, and mechanically held in the source 1 and source 2 positions. The transfer switch shall be specifically designed to transfer to the best available source if it inadvertently stops in a neutral position.

2. Transfer switches rated through 1000 amperes shall be equipped with permanently attached manual operating handles and quick-break, quick-make over-center contact mechanisms. Transfer switches over 1000 amperes shall be equipped with manual operators for service use only under de-energized conditions.
3. Main switch contacts shall be high-pressure silver alloy. Contact assemblies shall have arc chutes for positive arc extinguishing. Arc chutes shall have insulating covers to prevent inter-phase flashover.
4. Transfer switch internal wiring shall be composed of pre-manufactured harnesses that are permanently marked for source and destination. Harnesses shall be connected to the control system by means of locking disconnect plug(s), to allow the control system to be easily disconnected and serviced without disconnecting power from the transfer switch mechanism.
5. Power transfer switch shall be provided with flame retardant transparent covers to allow viewing of switch contact operation but prevent direct contact with components that could be operating at line voltage levels.
6. Transfer switches designated on the drawings as 4-pole shall be provided with a switched neutral pole. The neutral pole shall be of the same construction and have the same ratings as the phase poles. All poles shall be switched simultaneously using a common crossbar. Substitute equipment using overlapping neutral contacts is not acceptable.
7. Transfer switches that are designated on the drawings as 3-pole shall be provided with a neutral bus and lugs. The neutral bus shall be sized to carry 100% of the current designated on the switch rating.

C. Connections

1. Field control connections shall be made on a common terminal block that is clearly and permanently labeled.
2. Transfer switch shall be provided with AL/CU mechanical lugs sized to accept the full output rating of the switch. Lugs shall be suitable for the number and size of conductors shown on the drawings.

2.2 TRANSFER SWITCH CONTROL

- A. Operator Panel. Each transfer switch shall be provided with a control panel to allow the operator to view the status and control operation of the transfer switch. The operator panel shall be a sealed membrane panel rated NEMA 3R/IP53 or better (regardless of enclosure rating) that is permanently labeled for switch and control functions. The operator panel shall be provided with the following features and capabilities.
1. High intensity LED lamps to indicate the source that the load is connected to (source 1 or source 2); and which source(s) are available. Source available LED indicators shall operate from the control microprocessor to indicate the true condition of the sources as sensed by the control.
 2. High intensity LED lamps to indicate that the transfer switch is “not in auto” (due to control being disabled or due to bypass switch (when used) enabled or in operation) and “Test/Exercise Active” to indicate that the control system is testing or exercising the generator set.
 3. “OVERRIDE” pushbutton to cause the transfer switch to bypass any active time delays for start, transfer, and retransfer and immediately proceed with its next logical operation.
 4. “TEST” pushbutton to initiate a preprogrammed test sequence for the generator set and transfer switch. The transfer switch shall be programmable for test with load or test without load.
 5. “RESET/LAMP TEST” pushbutton that will clear any faults present in the control, or simultaneously test all lamps on the panel by lighting them.

6. The control system shall continuously log information on the number of hours each source has been connected to the load, the number of times transferred, and the total number of times each source has failed. This information shall be available via a PC-based service tool and an operator display panel.
7. Security Key Switch to allow the user to inhibit adjustments, manual operation or testing of the transfer switch unless key is in place and operated.
8. Analog AC meter display panel, to display 3-phase AC Amps, 3-phase AC Volts, Hz, KW load level, and load power factor. The display shall be color-coded, with green scale indicating normal or acceptable operating level, yellow indicating conditions nearing a fault, and red indicating operation in excess of rated conditions for the transfer switch.
9. Vacuum fluorescent alphanumeric display panel with push-button navigation switches. The display shall be clearly visible in both bright (sunlight) and no light conditions. It shall be visible over an angle of at least 120 degrees. The Alphanumeric display panel shall be capable of providing the following functions and capabilities:
 - a. Display source condition information, including AC voltage for each phase of normal and emergency source, frequency of each source. Voltage for all three phases shall be displayed on a single screen for easy viewing of voltage balance. Line to neutral voltages shall be displayed for 4-wire systems.
 - b. Display source status, to indicate source is connected or not connected.
 - c. Display load data, including 3-phase AC voltage, 3-phase AC current, frequency, KW, KVA, and power factor. Voltage and current data for all phases shall be displayed on a single screen.
 - d. The display panel shall allow the operator to view and make the following adjustments in the control system, after entering an access code:
 - 1) Set nominal voltage and frequency for the transfer switch.
 - 2) Adjust voltage and frequency sensor operation set points.
 - 3) Set up time clock functions.
 - 4) Set up load sequence functions.
 - 5) Enable or disable control functions in the transfer switch, including program transition.
 - 6) Set up exercise and load test operation conditions, as well as normal system time delays for transfer time, time delay start, stop, transfer, and retransfer.
 - e. Display Real time Clock data, including date, and time in hours, minutes, and seconds. The real time clock shall incorporate provisions for automatic daylight savings time and leap year adjustments. The control shall also log total operating hours for the control system.
 - f. Display service history for the transfer switch. Display source connected hours, to indicate the total number of hours connected to each source. Display number of times transferred, and total number of times each source has failed.
 - g. Display information for other transfer switches in the system, including transfer switch name, real time load in KW on the transfer switch, current source condition, and current operating mode.
 - h. Display fault history on the transfer switch, including condition, and date and time of fault. Faults to include controller checksum error, low controller DC voltage, ATS fail to close on transfer, ATS fail to close on retransfer, battery charger malfunction, network battery voltage low, network communications error.

B. Internal Controls

1. The transfer switch control system shall be configurable in the field for any operating voltage level up to 600VAC. Provide RMS voltage sensing and metering that is accurate to within plus or minus 1% of nominal voltage level. Frequency sensing shall be accurate to within plus or

- minus 0.2%. Voltage sensing shall be monitored based on the normal voltage at the site. Systems that utilize voltage monitoring based on standard voltage conditions that are not field configurable are not acceptable.
2. Transfer switch voltage sensors shall be close differential type, providing source availability information to the control system based on the following functions:
 - a. Monitoring all phases of the normal service (source 1) for under voltage conditions (adjustable for pickup in a range of 85 to 98% of the normal voltage level and dropout in a range of 75 to 98% of normal voltage level).
 - b. Monitoring all phases of the emergency service (source 2) for under voltage conditions (adjustable for pickup in a range of 85 to 98% of the normal voltage level and dropout in a range of 75 to 98% of pickup voltage level).
 - c. Monitoring all phases of the normal service (source 1) and emergency service (source 2) for voltage imbalance.
 - d. Monitoring all phases of the normal service (source 1) and emergency service (source 2) for loss of a single phase.
 - e. Monitoring all phases of the normal service (source 1) and emergency service (source 2) for phase rotation.
 - f. Monitoring all phases of the normal service (source 1) and emergency service (source 2) for over voltage conditions (adjustable for dropout over a range of 105 to 135% of normal voltage, and pickup at 95-99% of dropout voltage level).
 - g. Monitoring all phases of the normal service (source 1) and emergency service (source 2) for over or under frequency conditions.
 - h. Monitoring the neutral current flow in the load side of the transfer switch. The control shall initiate an alarm when the neutral current exceeds a preset adjustable value in the range of 100-150% of rated phase current for more than an adjustable time period of 10 to 60 seconds.
 3. All transfer switch sensing shall be configurable from a Windows PC-based service tool, to allow setting of levels, and enabling or disabling of features and functions. Selected functions including voltage sensing levels and time delays shall be configurable using the operator panel. Designs utilizing DIP switches or other electromechanical devices are not acceptable. The transfer control shall incorporate a series of diagnostic LED lamps.
 4. The transfer switch shall be configurable to control the operation time from source to source (program transition operation). The control system shall be capable of enabling or disabling this feature, and adjusting the time period to a specific value. A phase band monitor or similar device is not an acceptable alternate for this feature.
 5. The transfer switch shall incorporate adjustable time delays for generator set start (adjustable in a range from 0-15 seconds); transfer (adjustable in a range from 0-120 seconds); retransfer (adjustable in a range from 0-30 minutes); and generator stop (cooldown) (adjustable in a range of 0-30 minutes).
 6. The transfer switch shall be configurable to accept a relay contact signal and a network signal from an external device to prevent transfer to the generator service.
 7. The transfer switch shall provide a relay contact signal prior to transfer or retransfer. The time period before and after transfer shall be adjustable in a range of 0 to 50 seconds.
 8. The control system shall be designed and prototype tested for operation in ambient temperatures from -40C to +70C. It shall be designed and tested to comply with the requirements of the noted voltage and RFI/EMI standards.
 9. The control shall have optically isolated logic inputs, high isolation transformers for AC inputs, and relays on all outputs, to provide optimum protection from line voltage surges, RFI and EMI.

C. Control Interface

1. The transfer switch will provide an isolated relay contact for starting of a generator set. The relay shall be normally held open, and close to start the generator set. Output contacts shall be form C, for compatibility with any generator set.
2. Provide one set Form C auxiliary contacts on both sides, operated by transfer switch position, rated 10 amps 250 VAC.
3. The transfer switch shall provide relay contacts to indicate the following conditions: source 1 available, load connected to source 1, source 2 available, source 2 connected to load.
4. The transfer switch shall be provided with a network communication card, and configured to allow LonMark compliant communication with the transfer switch and other network system components. The network shall provide a redundant start signal to the generator set(s) in the system.

2.3 ENCLOSURE

- A. Enclosures shall be UL listed. The enclosure shall provide wire bend space in compliance to the latest version of NFPA70. The cabinet door shall include permanently mounted key type latches.
- B. Transfer switch equipment shall be provided in a NEMA 1 or better enclosure.
- C. Enclosures shall be the NEMA type specified. The cabinet shall provide code-required wire bend space at point of entry as shown on the drawings. Manual operating handles and all control switches (other than key-operated switches) shall be accessible to authorized personnel only by opening the key-locking cabinet door. Transfer switches with manual operating handles and/or non key-operated control switches located on outside of cabinet do not meet this specification and are not acceptable.

PART 3 OPERATION

3.1 OPEN TRANSITION SEQUENCE OF OPERATION

- A. Transfer switch normally connects an energized utility power source (source 1) to loads and a generator set (source 2) to the loads when normal source fails. The normal position of the transfer switch is source 1 (connected to the utility), and no start signal is supplied to the genset.
- B. Generator Set Exercise (Test) With Load Mode. The control system shall be configurable to test the generator set under load. In this mode, the transfer switch shall control the generator set in the following sequence:
 1. Transfer switch shall initiate the exercise sequence at a time indicated in the exercise timer program, or when manually initiated by the operator.
 2. The transfer switch shall issue a compatible start command to the generator set, and cause the generator set to start and run at idle until it has reached normal operating temperature.
 3. When the generator set has reached normal operating temperature or after an adjustable time period (whichever is shorter), the control system shall accelerate the generator set to rated voltage and frequency.
 4. When the control systems senses the generator set at rated voltage and frequency, it shall operate to connect the loads to the generator set by opening the normal source contacts, and closing the alternate source contacts a predetermined time period later. The timing sequence for the contact operation shall be programmable in the controller.

5. The generator set shall operate connected to the load for the duration of the exercise period. If the generator set fails during this period, the transfer switch shall automatically reconnect the generator set to the normal service.
 6. On completion of the exercise period, the transfer switch shall operate to connect the loads to the normal source by opening the alternate source contacts, and closing the normal source contacts a predetermined time period later. The timing sequence for the contact operation shall be programmable in the controller.
 7. The transfer switch shall operate the generator set unloaded for a cooldown period, and then remove the start signal from the generator set. If the normal power fails at any time when the generator set is running, the transfer switch shall immediately connect the system loads to the generator set.
- C. Generator Set Exercise (Test) Without Load Mode. The control system shall be configurable to test the generator set without transfer switch load connected. In this mode, the transfer switch shall control the generator set in the following sequence:
1. Transfer switch shall initiate the exercise sequence at a time indicated in the exercise timer program, or when manually initiated by the operator.
 2. The transfer switch shall issue a compatible start command to the generator set, and cause the generator set to start and run at idle until it has reached normal operating temperature.
 3. When the generator set has reached normal operating temperature or after an adjustable time period (whichever is shorter), the control system shall accelerate the generator set to rated voltage and frequency.
 4. When the control systems senses the generator set at rated voltage and frequency, it shall operate the generator set unloaded for the duration of the exercise period.
 5. At the completion of the exercise period, the transfer switch shall remove the start signal from the generator set. If the normal power fails at any time when the generator set is running, the transfer switch shall immediately connect the system loads to the generator set.

PART 4 OTHER REQUIREMENTS

4.1 FACTORY TESTING.

- A. The transfer switch manufacturer shall perform a complete operational test on the transfer switch prior to shipping from the factory. A certified test report shall be available on request. Test process shall include calibration of voltage sensors.

4.2 SERVICE AND SUPPORT

- A. The manufacturer of the transfer switch shall maintain service parts inventory at a central location which is accessible to the service location 24 hours per day, 365 days per year.
- B. The transfer switch shall be serviced by a local service organization that is trained and factory certified in both generator set and transfer switch service. The supplier shall maintain an inventory of critical replacement parts at the local service organization, and in service vehicles. The service organization shall be on call 24 hours per day, 365 days per year.
- C. The manufacturer shall maintain model and serial number records of each transfer switch provided for at least 20 years.
- D. The manufacturer shall supply to the facility owner a complete set of service and maintenance software for use in properly supporting the product. The software shall be provided at a training class attended by the user, to qualify the user in proper use of the software. The software shall have the following features and capabilities:
 - 1. The software shall be 32 bit and shall be Windows '95, Windows '98, XP, and NT compatible.
 - 2. The software shall use the Windows "Explorer" format, for ease of use and commonality with other software in use at the facility.
 - 3. The software shall allow adjustment of all functions described herein via the tool; adjustment of operating levels of all protective functions; and programming of all optional functions in the controller. Adjustments shall be possible over modem from a facility that is remote from the generator set.
 - 4. The software shall allow simulation of fault conditions, to verify operation of all protective devices
 - 5. The software shall include the ability to store and display data for any function monitored by the generator set control. This data shall be available in common file formats, and on graphical "strip chart" displays.
 - 6. The software shall automatically record all control operations and adjustments performed by any operator or software user, for tracking of changes to the control.
 - 7. The software shall display all warning, shutdown, and status changes programmed into transfer switch controller. For each event, the control shall provide information on the nature of the event, when it last occurred, and how many times it has occurred.
 - 8. The software shall include detailed operation and service information on the specific generator set supplied, so that no other documentation (other than schematic and wiring diagram drawings) is necessary for service of the product.
 - 9. The software shall have been developed under strict quality control guidelines, and comply with the requirements of ISO9001 and Mil Standard 498 for software development.
- E. After generator set installation, the generator set supplier shall conduct a complete operation, basic maintenance, and emergency service seminar for up to 10 persons employed by the facility owner. The seminar shall include instruction on operation of the transfer equipment, normal testing and exercise, adjustments to the control system, use of the PC based service and maintenance tools

provided under this contract, and emergency operation procedures. The class duration shall be at least 8 hours in length, and include practical operation with the installed equipment.

END OF SECTION 265052

DIVISION 27 – COMMUNICATIONS
SECTION 271013 – COPPER COMMUNICATIONS CABLING
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: The work specified in this Section consists of materials for furnishing, installing connecting, energizing, testing, cleaning and copper communications cabling.
- B. Comply with the requirements and provisions of the following:
 - 1. Division 00 – Procurement and Contracting Requirements
 - 2. Division 01 – General Requirements
 - 3. Section 260500 – Common Work Results for Electrical
- C. Related Section:
 - 1. Division 01 – General Requirements
 - 2. Section 260500 – Common Work Results for Electrical
 - 3. Section 260528 – Hangers and Supports for Electrical Systems
 - 4. Section 260533.13 – Conduit for Electrical Systems
 - 5. Section 260533– Boxes for Electrical Systems
 - 6. Section 337119 – Underground Ducts and Manholes

1.2 REFERENCES

- A. American National Standards Institute (ANSI)/Telecommunications Industry Association (TIA)/Electronics Industry Alliance (EIA):
 - 1. ANSI/TIA/EIA-568-B.1 Commercial Building Telecommunications Cabling Standard Part 1: General Requirements
 - 2. ANSI/TIA/EIA-568-B.2 Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted Pair Cabling Components
 - 3. ANSI/TIA/EIA-569-A Commercial Building Standard for Telecommunications Pathways and Spaces
 - 4. ANSI/TIA/EIA-606 Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
 - 5. ANSI/TIA/EIA-607 Commercial Building Grounding and Bonding Requirements for Telecommunications
- B. American Society for Testing Materials (ASTM):
 - 1. ASTM E 814 Standard Test Method for Fire Tests of Through- Penetration Fire Stops
- C. Code of Federal Regulations (CFR)
 - 1. RDUP 7 CFR 1755.390 RUS Specification for Filled Telephone Cables

- D. Institute of Electrical and Electronic Engineers (IEEE):
1. IEEE 802.3ab Physical Layer Parameters and Specifications for 1000 Mb/s Operation over 4 pair of Category 5 Balanced Copper Cabling, Type 1000BASE-T
- E. Insulated Cable Engineers Association (ICEA):
1. ICEA S-80-576 Communication Wire and Cable for Wiring of Premises
 2. ICEA S 84-608 Telecommunications Cable Filled, Polyolefin Insulated, Copper Conductor Technical Requirements
- F. National Electrical Manufacturers Association (NEMA):
1. NEMA WC 63.1 Telecommunications Cables
- G. Telecommunications Industry Association / Electronic Industries Alliance (TIA/EIA)
1. TIA/EIA 455 21 A Mating Durability for Fiber Optic Interconnecting Devices
 2. TIA/EIA 568 B 3 Standard for Premises Cabling
- H. Underwriters Laboratories (UL):
1. UL 444 Communications Cables
 2. UL 467 Grounding and Bonding Equipment
 3. UL 497 Standard for Protectors for Paired-Conductor Communications Circuits
 4. UL 1863 UL Standard for Safety for Communications-Circuit Accessories
- I. National Fire Protection Association (NFPA):
1. NFPA 70 National Electrical Code (NEC).

1.3 GENERAL REQUIREMENTS

- A. Provide copper communications cabling as shown on the plans.
- B. Communications system cabling, raceways, pathways, and spaces shall at minimum comply with ANSI/TIA/EIA-568-B.1, -568-B.2, -568-B.3, -569-A and -607.
- C. Provide grounding and bonding per, at minimum, ANSI/TIA/EIA-607, NFPA 70 and UL 467.

1.4 SUBMITTALS

- A. Testing Agency/Quality Verification: Provide with all product data evidence of testing agency/quality verification, listing, and labeling either by printed mark on the data or by a separate listing card. Provide from product manufacturers a written statement indicating why an item does not have a quality assurance verification. Such statements are subject to the approval of the Engineer.
- B. Third Party Performance Testing: Provide with all product data evidence of third party performance testing by a Nationally Recognized Independent Testing Laboratory.
- C. Product Data and Catalog Cuts: Submit product data for all products provided. Indicate clearly the usage of each product.

- D. **Installer Qualifications:** Prior to installation, submit data of installer's experience and qualifications. Installers shall be a Building Industry Consulting Service International (BICSI) Registered Cabling Installation Technician or have experience that shall include 3 years on projects of similar complexity. Include names and locations of two projects successfully completed using copper communications cabling systems. Include written certification from users that systems have performed satisfactorily for not less than 18 months. Include specific experience in installing and testing structured telecommunications distribution systems using Category 3 and Category 6 cabling systems.
- E. **Test Plan:** Provide a complete and detailed test plan for the telecommunications cabling system including a complete list of test equipment for the UTP and optical fiber components and accessories. Include procedures for certification, validation, and testing.
- F. **Submit Operation and Maintenance (O & M) Manuals** which shall include detailed parts lists, lists of recommended spare parts, circuit diagrams, maintenance procedures, and operating instructions.

1.5 QUALITY ASSURANCE

- A. Provide products that are listed and labeled by Underwriters Laboratory, approved by Factory Mutual, or certified as meeting the standards of UL by the Electrical Testing Laboratory unless products meeting the requirements of these testing laboratories are not readily available or unless standards do not exist for the products. Provide products that are listed and labeled or approved as stated above for the location installed in and listed and labeled or approved as indicated and specified for the applications the items are intended for.
- B. Provide products that have been third party performance tested by a Nationally Recognized Independent Testing Laboratory. Test results shall be provided upon request of the Engineer.
- C. **Manufacturer Qualifications:** Firm specializing in installing work of this Section with minimum five years documented experience in construction of similar equipment.
- D. Conform all work to NFPA 70, National Electrical Code.
- E. **Installer Qualifications:** Firm specializing in installing work of this Section with minimum three years documented experience.
- F. Install work under supervision of skilled licensed electricians.

1.6 BASIS OF DESIGN AND ACCEPTABLE MANUFACTURERS

- A. Where a specific manufacturer or product is identified as the Basis of Design or listed first in a list of acceptable manufacturers, the overall project design is based on the identified manufacturer or product. If the Contractor elects to utilize a manufacturer or product which differs from the identified Basis of Design, the Contractor shall bear all efforts and costs of any design changes necessary in order to achieve finished work which is equal in character, performance, and quality to the original design depicted in the Contract Documents. Such changes shall include, but not necessarily be limited to: changes to ratings and/or features of other equipment, changes to material sizes and/or types, new material and/or equipment, and changes to structural and/or architectural features (including room sizes). Approval by the Engineer of a proposed item shall not relieve the Contractor of this responsibility.

- B. The listing of specific manufacturers is solely intended to identify reputable manufacturers who are known to provide quality products of the general type specified. Such listing is in no way intended to imply that the identified manufacturers product(s) have been verified to satisfy the specified requirements, or to be equivalent to any identified Basis of Design manufacturer. Nor does such a listing imply acceptance of products which do not meet the specified requirements, ratings, features, dimensions, and functions as indicated.

PART 2 PRODUCTS

2.1 CONNECTORS - VOICE AND DATA

- A. UTP Copper Cable (Data):
1. Connectors shall comply with FCC Part 68.5, and ANSI/EIA/TIA-568-B. UTP outlet/connectors shall be UL 1863 listed, non-keyed, 4-pair, constructed of high impact rated thermoplastic housing and shall comply with Category 6 requirements and be 1000BASE-T compliant. Connectors shall be terminated using a 110-style PC board connector, color-coded for both T568A and T568B wiring. Each jack shall be wired T568B. UTP connectors shall comply with EIA-455-21A for 500 mating cycles.
 2. Color for data connectors shall be determined by owner.
- B. Acceptable Manufacturers:
1. The Siemens Company.
 2. Leviton Voice and Data Division.
 3. Hubbell Premise Wiring.
 4. Or Approved Equal.

2.2 OUTLETS

- A. Outlets consisting of box, fiber storage/spacer ring, wallplate and connectors.
- B. Outlets shall include provisions for storage and bend radius protection of cabling.
- C. Acceptable Manufacturers:
1. The Siemens Company.
 2. Leviton Voice and Data Division.
 3. Hubbell Premise Wiring.
 4. Or Approved Equal.

2.3 COPPER CABLE

- A. Category 6 Horizontal Cable (Data) for Indoor/Dry Locations:
1. Comply with NFPA 70, NEMA WC 63.1, ANSI/ICEA S-80-576 and performance characteristics in ANSI/TIA/EIA-568-B.
 2. Shall conform to Category 6 requirements and be 1000BASE-T compliant.
 3. UTP (unshielded twisted pair), 100 ohm.

4. Provide four each individually twisted pair, 24 AWG conductors, NFPA 70 CMP (plenum) rated. Individual pairs shall be constructed to contain a minimum two twists per foot per each pair.
5. Overall diameter of four pair cable shall not exceed 0.25 inches. Four pair cable shall withstand a bend radius of one inch minimum at a temperature of minus 20 degrees C maximum without jacket or insulation cracking.
6. Conductors shall be color coded and polarized in accordance with ANSI/TIA/EIA-568-B. Jacket sequentially marked at two-foot intervals.
7. Jacket color(s) shall be black, or as otherwise indicated on the Drawings.
8. Acceptable Manufacturers:
 - a. Superior Essex
 - b. Belden
 - c. CommScope
 - d. General Cable
 - e. Hubbell Premise Wiring
 - f. HCM (Hitachi Cable Manchester, NH)
 - g. Or Approved Equal

B. Category 5e Horizontal Cable (Data) for Outdoor/Underground/Wet Locations.

1. Comply with NFPA 70, NEMA WC 63.1, ANSI/ICEA S-80-576 and performance characteristics in ANSI/TIA/EIA-568-B.
2. Shall conform to Category 5e requirements and be 100BASE-T compliant.
3. UTP (unshielded twisted pair), 100 ohm.
4. Provide four each individually twisted pair, 24 AWG conductors, NFPA 70 CMP (plenum) rated. Individual pairs shall be constructed to contain a minimum two twists per foot per each pair.
5. Gel waterblocked. Suitable for direct burial.
6. Industrial grade, oil- and UV-resistant polyethylene or PVC jacket.
7. Overall diameter of four pair cable shall not exceed 0.25 inches. Four pair cable shall withstand a bend radius of one inch minimum at a temperature of minus 20 degrees C maximum without jacket or insulation cracking.
8. Conductors shall be color coded and polarized in accordance with ANSI/TIA/EIA-568-B. Jacket sequentially marked at two-foot intervals.
9. Jacket color(s) shall be black, or as otherwise indicated on the Drawings.
10. Acceptable Manufacturers:
 - a. Superior Essex
 - b. Belden
 - c. CommScope
 - d. General Cable
 - e. Hubbell Premise Wiring
 - f. HCM (Hitachi Cable Manchester, NH)
 - g. Or Approved Equal

PART 3 EXECUTION

3.1 PREPARATION

- A. Ensure that painted surfaces that will be covered by items of this Section have a prime and finish coat of paint.

- B. Ensure that all indoor areas are enclosed from the weather.

3.2 INSTALLATION

- A. Inside and outside wire and cable shall be installed in conduit conforming to Section 26 05 33.13.
- B. Cable Installation in Conduits and Ducts: During the installation of cables in conduits and ducts, the cable manufacturer's recommended pulling tension shall not be exceeded. A suitable lubricating medium, harmless to the cable jacket, shall be used when pulling cables into conduits, pipes or duct banks. No oil or grease substances not specifically manufactured for cable installation will be permitted for such use on this project.
- C. Strain Relief: Provide sufficient strain relief (slack) in all cables, cable conductors, and wiring to avoid stress on all cables, wires, and wiring connections.
- D. Bends: Cables shall not be bent to a radius less than ten (10) times the diameter of the cable, or less than the manufacturer's recommended minimum bending radius, during installation or as finally installed.
- E. Continuous Cable Sections: All cable runs shall be continuous without splices between cable terminating locations.
- F. Conduit/Cable Entrances to Facilities: All conduit and cable entrance openings into equipment rooms and huts shall be sealed with a pliable sealing compound after the cable is in place. Sealing compounds for rooms, huts, walls, or other partitions shall be fire retardant per ASTM E 814. Sealing compound shall be used to seal the area around the cable where the cable emerges from the end of a conduit, pipe, or ductbank. All spare conduits shall be sealed or plugged in an approved manner.
- G. Fire retardant pliable sealing compound shall be an intumescent firestop putty, reusable and repenetrable, conforming to ASTM E 814 and UL 1479, Nelson FSP Firestop Putty, or Approved Equal.
- H. Conduit Bushings: At all transition points where a cable runs from inside a conduit into a cable trough; or onto a cable tray or plywood backboard, the end of the conduit shall be fitted with a plastic bushing to prevent abrasive damage to the cable.
- I. Cable Dress: Cable installed in trays or troughs shall be laid therein and not pulled in place. Cables installed in trays and troughs shall have a minimum amount of crossover and shall not be pulled tightly around bends.
- J. Protection of Cables: Provide appropriate special protection for cables in areas where the cables are unavoidably exposed to hazardous conditions, such as sharp corners on equipment. Cables damaged due to neglect by the Contractor, during installation, shall be replaced by the Contractor, at no additional cost to the Owner.
- K. Cable Continuity and Integrity: All cables shall be continuous and without splices between the specified termination locations. The cable termination points shall be located within communication interface cabinets, equipment enclosures, splice cases, and equipment termination boxes as shown on the Drawings and as described in the Specifications.

- L. Cable Shield Continuity and Integrity: The shield of each section of communication cable shall be electrically continuous for the entire cable length.
- M. Cable and Wiring Identification: All cables shall be terminated in standard order, according to the EIA/TIA and ICEA color codes. Individual cables shall be identified at each cable termination with self-adhesive labels. All spare pairs in each cable shall be terminated and identified.
- N. Provide pull rope in all empty conduit runs with not less than 12 inches of slack both ends.
- O. Conduits shall be restricted to no more than two 90-degree bends or equivalent without a pull box.
- P. Maintain minimum bending radius of changes in direction as follows:
 - 1. 10 times diameter of 4" and larger conduits.
 - 2. 6 times diameter of smaller conduits.
- Q. Avoid bends in conduits from pull boxes.
- R. Except as noted hereinafter for telecommunications cabling and pathways with copper media, keep conduit a minimum 6 inches away from parallel runs of electrical power equipment, flues, steam, and hot water pipes.
- S. Telecommunications cabling and pathways with copper media shall be installed in accordance with the following criteria to avoid potential electromagnetic interference between power and telecommunications equipment.
 - 1. The interference ceiling shall not exceed 3.0 volts per meter measured over the usable bandwidth of the telecommunications cabling.
 - 2. Pathways shall be installed in accordance with the following minimum clearance distances of 4 feet from motors, generators, frequency converters, transformers, x-ray equipment or uninterruptible power system, 12 inches from power conduits and cable systems, 5 inches from fluorescent or high frequency lighting system fixtures.
- T. Install telecommunications cabling and pathway system as detailed in ANSI/TIA/EIA-568-B and -569-A. Screw terminals shall not be used except where specifically indicated on plans. Use an approved insulation displacement connection (IDC) tool kit for copper cable terminations. Do not untwist Category 6 UTP cables more than one half inch from the point of termination to maintain cable geometry. Provide service loop on each end of the cable.
- U. Provide outlet box and jack at each voice/data/fiber outlet. Depth of outlet boxes shall be sufficient to allow manufacturer's recommended conductor bend radii.
 - 1. Terminate UTP cable in accordance with ANSI/TIA/EIA-568-B and wiring configuration as specified.
- V. Terminate UTP cable in accordance with ANSI/TIA/EIA-568-B and wiring configuration as specified.
- W. Telecommunications Grounding: Provide per ANSI/TIA/EIA-607. Run grounding conductors with the backbone cable plant. Bond racks, conduits, raceways cable trays, etc. in accordance with ANSI/TIA/EIA standards, NFPA 70 and Section 16060. Grounding conductors shall be compatible with raceways. Protect all grounding and bonding conductors from physical damage. Contractor shall individually and properly ground all relay racks, ladder rack, equipment cabinets and inside and outside plant cable shields, wherever the cables leave the sheaths, to ground bars shown on Contract

Drawings. Contractor shall individually and properly ground all voice punch-down cable frames and other supplied hardware to the ground bars shown on the Contract Drawings. Daisy-chaining of equipment grounding is not permitted. Grounding shall conform to EIA/TIA 607 and NEC articles 250 and 800.

- X. Provide identification and labeling of communications cables, outlets and equipment per ANSI/TIA/EIA-606.
1. All cables shall be labeled at least at each end of each cable section, using cable tags or labels. Inside plant cables shall be labeled using self adhesive waterproof labels; outside plant cables shall be labeled using approved waterproof cable tags.
 2. Proposed Plan
 - a. Each work area outlet shall be labeled with the Rack, Patch Panel, Port Number (i.e. Rack No. 01, Patch Panel No. 03, Port No. 14 would be labeled as 01-03-14)
 - b. Each Patch Panel port shall be labeled with the Room and Jack Number (i.e. Room 127, Jack Number 016 would be labeled as 127-016)
 3. A cable labeling table shall be developed based on this project. The table shall be submitted for approval by the Owner prior to cable installation.
 4. Cable Tags
 - a. Attach to cable using two nylon cable ties through holes in the tag.
 - b. Use pre-printed plastic tags marked with a durable, abrasion resistant, waterproof ink.

3.3 CLEANING

- A. After wiring, vacuum out interior and wipe clean of all foreign material.
- B. After painting in areas, remove all over paint, drips and splashes.

3.4 FIELD QUALITY CONTROL

- A. Perform telecommunications cabling inspection, verification, and performance tests in accordance with ANSI/TIA/EIA-568-B.
- B. Inspection: Visually inspect cabling jacket materials for UL or third party certification markings. Visually inspect jacket materials for UL or third party certification markings. Inspect cabling terminations in telecommunications rooms and at workstations to confirm color code for tip and ring pin assignments, and inspect cabling connections to confirm compliance with ANSI/TIA/EIA-568-B. Visually confirm Category 6 marking of outlets, wallplates, connectors, and patch panels.
- C. Perform testing after cables are terminated, but not cross connected.
- D. Verification Tests:
 1. UTP backbone copper cabling shall be tested for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors, and between conductors and shield, if cable has overall shield. Test operation of shorting bars in connection blocks. Test cables after terminated but not cross connected. Perform 1MHz to 100MHz scan attenuation test for Category 6 systems installations.

E. Performance Tests:

1. Category 6 Links (Voice, Data): Perform UTP permanent link tests in accordance with ANSI/TIA/EIA-568-B. Tests shall include wire map, length, attenuation, NEXT, Power Sum NEXT, ELFEXT, Power Sum ELFEXT, return loss, propagation delay and delay skew. Each and every link shall be tested and shall pass the requirements of ANSI/TIA/EIA-568-B for Category 6. Any failing link shall be diagnosed and corrected. The corrective action shall be followed by a new test to prove that the corrected link meets the performance requirements. The final and passing result of the tests for all links shall be provided in the test results documentation.
2. Voice Links: In addition to Category 6 tests, test each pair for short circuit, continuity, short to ground, crosses, and reversed polarity. Include operational and ringback, and dial tone tests.

3.5 PROTECTION

- A. During painting, mask all nameplates, all plastic parts, and all items not to be painted.
- B. Protect all items during work of other trades including welding and cutting.

END OF SECTION 271013

**DIVISION 31 – EARTHWORK
SECTION – 311000 SITE CLEARING
DPMC No. A1346-00**

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cleaning site of debris, grass, trees and other plant life in preparation for site or building excavation Work.
2. Protection of existing structures, trees or vegetation indicated to remain.
3. Stripping topsoil from areas indicated.

B. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

C. Related Sections:

1. Division 02 Section 024113 “Selective Site Demolition” for demolition and removal of site structures.

1.2 PROJECT CONDITIONS OR SITE CONDITIONS

A. Existing Conditions:

1. Notify the Contracting Officer of variations to conditions or discrepancies in actual site conditions prior to start of site preparation Work.
2. Traffic: Conduct operations and removal of debris with minimum interference to roads, streets, walks, and other adjacent facilities. Do not close or obstruct streets, walks or other facilities without permission from authorities having jurisdiction.
3. Protections: Provide protection for safe passage of persons around area of site preparation. Take precautions and conduct operations to prevent injury to adjacent buildings, structures, other facilities, and persons.
 - a. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement or collapse of structures to be demolished and adjacent facilities to remain.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

1. Locate existing utilities.
 2. Verify that survey benchmark and intended elevations for the Work are as indicated and are not located in an area that may be damaged.
 3. Verify that existing plant life and clearing limits are clearly tagged, identified and marked in such a manner as to ensure their safety throughout construction operations.
- B. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION

- A. Provide temporary erosion control systems as indicated on Drawings or as directed by Contracting Officer to protect project site and adjacent properties and water resources from erosion and sedimentation.

3.3 CLEARING

- A. Clear areas required for access to site and execution of Work.
- B. Remove trees, shrubs, grass, other vegetation, improvements, or obstructions interfering with installation of Work as indicated on Drawings. Removal includes digging out stumps and roots. Fill depressions caused by clearing and grubbing operations to subgrade elevation. Prevent water ponding. Place suitable fill material in horizontal layers not exceeding eight inches (8") loose depth and compact as specified herein and in Division 31.

3.4 REMOVAL

- A. Remove debris, rock, extracted plant life, paving, curbs, and other structures indicated on Drawings as specified in Division 02 Section 024113 "Selective Site Demolition".

3.5 PROTECTION

- A. Protect existing streets, structures, and utilities.
- B. Protect trees, plant growth, and features indicated to remain.

END OF SECTION 311000

**DIVISION 31 – EARTHWORK
SECTION 312300 – EXCAVATION AND FILL
DPMC No. A1346-00**

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Excavating and backfilling for structures, utilities, and pavement.
 - 2. Pipe bedding.
 - 3. Compacting fill materials.

- B. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

- C. Related Sections:
 - 1. Division 31 Section 311000 “Site Clearing”.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM D698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort.
 - 2. ASTM D1557 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.

- B. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO T 180 - Moisture-Density relations of Soils Using a ten (10) Pound Rammer and an eighteen-inch (18”) Drop.

- C. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electric code.

1.3 QUALITY ASSURANCE

- A. Qualifications: Earthwork company specializing in performing the Work of this Section with minimum five (5) years documented experience.

- B. Regulatory Requirements: Perform earthwork in accordance with applicable requirements of governing authorities having jurisdiction.

1.4 PROJECT CONDITIONS OR SITE CONDITIONS

A. Existing Conditions:

1. Geotechnical Data:

- a. Soils investigation reports will be provided upon request to supplement the Contract Documents as a provision to the SOE plan and submittal.
- b. Soil and subsurface investigations were conducted at site by an Independent Testing Laboratory and a report with log of borings prepared. Report was obtained for Architect and Engineer design use only.
- c. Soils investigation data is not warranted to indicate actual conditions. Owner, and Engineer do not assume responsibility for variations in kind, depth, quantity and condition of soils. Owner and Engineer disclaim responsibility for accuracy, true location, and extent of soils investigation prepared by others; and further disclaim responsibility for interpretation of data by Contractor such as projecting soil bearing values, rock profiles, soil stability, and presence, level, and extent of underground water.
- d. Contractor may make additional test borings and other exploratory operations at no additional cost to Owner.

B. Existing Utilities:

1. Contact local utility companies and make arrangements to obtain utility company location and marking service prior to start of excavation operations.
 - a. Locate existing underground utilities in areas of Work. If utilities are to remain in place, provide means of support and protection during excavation operations.
 - b. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility company and Engineer immediately for directions.
 - c. Coordinate with Engineer and utility companies to keep existing utility services and facilities in operation.
 - d. Repair damaged utilities to satisfaction of utility company, at no additional cost to Owner.
 - e. Do not interrupt existing utilities serving facilities occupied and used by Owner or others, during occupied hours, except when permitted in writing by Engineer and then only after acceptable temporary utility services have been provided and approved by Engineer.
2. Demolish and completely remove from site existing underground utilities indicated on Drawings to be removed. Coordinate with utility companies for shut-off of services if lines are active.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Stockpiled on-site fill and backfill material shall be stored appropriately with consent of the owner for proper location and amount to be stored on site, tested by Testing Laboratory and approved by Engineer.
- B. Imported off-site fill and backfill material shall be approved and tested by Testing Laboratory and approved by Engineer.

- C. Conduit Bedding Material: Processed sand and gravel free from clay lumps, organic, or other deleterious material complying with the following gradation requirements:

SIEVE SIZE	PERCENT PASSING
1 Inch	100
3/4 Inch	90 to 100
3/8 Inch	20 to 55
No. 4	0 to 10
No. 8	0 to 5

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, and conditions are as required, and ready to receive Work.
- B. Report in writing to Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to Owner.

3.2 PREPARATION

- A. Identify required lines, elevations, levels, contours, grades, and datum necessary to perform excavation operations as indicated on Drawings.
- B. Verify that survey benchmark and intended elevations for the Work are as indicated on Drawings.
- C. Locate, identify, and protect existing utilities to remain and previously installed utilities that may be damaged by construction operations.
1. Notify Engineer, municipality, and utility company immediately of utilities, not indicated on Drawings, encountered.
 2. Maintain existing utilities, active utilities, and drainage systems in operating condition.
 3. Comply with utility company requirements and directions of Construction Manager to keep utilities in operation.
 4. Repair damage to utilities as directed by Engineer.
- D. Protect plant life, lawns, fences, existing structures, sidewalks, paving and curbs from earthwork operations, excavating equipment, and vehicular traffic.
- E. Protect benchmarks, property corners, and other survey monuments from damage or displacement. Where markers are required to be removed, provide removal and reinstallation by licensed land surveyor licensed in New Jersey where project is located.

- F. Over-excavate areas of subgrade found consisting of unsuitable materials as determined by Testing Laboratory and Engineer. Prepare, fill with suitable material, and compact as specified.

3.3 EXCAVATION

- A. Excavation for filling and grading shall comply with Division 31.
- B. Rock excavation:
1. Perform rock excavation in a manner that will produce material of such size as to permit it being placed in embankments in accordance with Section 312300 "Excavation and Fill". Remove rock to limits indicated. Remove loose or shattered rock, overhanging ledges and boulders which might dislodge.
 2. Rock Excavation - Mechanical Method:
 - a. Excavate for and remove rock by mechanical method. Drill holes and utilize expansive tools and wedges to fracture rock.
 - b. Cut away rock at excavation bottom to form level bearing. Remove shaled layers to provide sound and unshattered base for foundations.
 - c. In utility trenches, excavate to 6 inches below invert elevation of pipe and 24 inches wider than pipe diameter.
 - d. Remove shaled layers to provide sound unshattered base for footings and foundations.
 - e. Re-use excavated rock materials on-site in accordance with Section 312300 "Excavation and Fill".
 - f. Remove excavated rock materials not re-used off-site.
 3. Use lean concrete or suitable materials to replace rock over-blast or over-excavation in project area and in expansion area to facilitate placement of utilities and future footings.
- C. Excavation for Structures:
1. Excavate subbase for equipment foundations, slabs-on-grade and site structures to width and depth indicated on Drawings.
 - a. Cut excavation banks vertically.
 - b. Remove rocks, loose soil, and debris from bottom of excavation.
 - c. Over-excavate wet or unsuitable soil from bottom of excavation.
 - d. Provide stable base for concrete reinforcing installation and concrete placement.
 - e. Hand trim to indicated lines and grades just prior to concrete reinforcing installation.
 2. Provide protection for workers within trench areas in accordance with local, state, and national Occupational Safety and Health requirements and regulations.
 - a. Trenches minimum four feet (4') in depth.
 3. During excavation, stockpile materials suitable for backfilling away from excavation to prevent overloading, slides, or cave-ins.
 4. Remove material encountered in excavating operations that is unsuitable for backfilling, subgrade or foundation purposes as determined by Testing Laboratory and Engineer. Dispose of materials off-site in an approved manner in accordance with requirements of authorities having jurisdiction.
 5. Prevent surface water from flowing into excavations by temporary grading and other approved methods described in Section 024010 – Dewatering.
 - a. Do not allow water to accumulate in excavations.
 - b. Remove accumulated water in excavations.
 - c. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components required to remove water from excavations.

D. Excavation for Utilities:

1. Excavate trench width and depth required for laying pipe, conduit, or cable. Cut trench banks vertical. Remove stones from bottom of trench as required to avoid point bearing. Over excavate wet or unstable soil, if encountered, from trench bottom as required to provide suitable base for continuous and uniform bedding.
2. During excavation, stockpile materials suitable for backfilling away from trench bank to prevent overloading, slides, or cave ins.
3. Remove material encountered in trenching operations that is unsuitable for backfilling, subgrade or foundation purposes as determined by Testing Laboratory and Engineer. Dispose of materials off-site in an approved manner in accordance with requirements of authorities having jurisdiction.
4. Prevent surface water from flowing into trenches or other excavations by temporary grading and other approved methods described in Section 024010 – Dewatering.
 - a. Do not allow water to accumulate in excavations.
 - b. Remove accumulated water in excavations.
 - c. Provide and maintain pumps, well points, sumps, suction and discharge lines and other dewatering system components required to remove water from excavations.
5. Open cut excavation using trenching machine or backhoe. Do not use dirt clods for backfill created by use of machines other than ladder or wheel type trenching machines.
6. Grade trench bottom to provide uniform bearing and support for each section of pipe on bedding material along entire trench length, except where necessary to excavate for bell holes, proper sealing of pipe joints, or other required connections. Dig bell holes and depressions for joints after trench bottom has been graded. Do not excavate trench deeper, longer, or wider than required to make proper joint connection.
7. Excavate trench width below the top of pipe minimum 12 inches wide and maximum 18 inches wider than outside surface of pipe or conduit installed to elevations and grades indicated on Drawings. Excavate trench width for other pipe, conduit, or cable to least practical width allowing for proper compaction of trench backfill.
8. Excavate trench depth measured from finished grade or paved surface to the following requirements or applicable codes and ordinances:
 - a. Electrical Conduits: 24 inches minimum to top of conduit or as required by NFPA 70, or local utility company requirements, whichever is deeper.
9. Provide shoring, sheeting, and bracing, as required, in trenches and other excavations where protection of construction personnel is required. Sheeting may be removed after sufficient backfilling to protect against damaging or injurious caving.

E. Excavation: Suitable Fill

1. Any sampled soil exhibiting contaminate levels above the NJDEP Soil Remediation Standards shall be subject to off-site regulated management at a facility permitted to accept the material and/or otherwise remediated under the purview of a New Jersey Licensed Site Remediation Professional (LSRP).

F. Excavation for Filling and Grading

1. Provide dewatering, drainage, and ground water management to control moisture of soils when performing grading operations during periods of wet weather.
2. Shore, brace, and drain excavations to maintain excavations safe, secure, and free of water at all times.
3. Provide protection for workers within trench areas in accordance with local, State, and Federal Occupational Safety and Health requirements and regulations.

4. Unacceptable Fill Material for project area: Excavated material containing rock or stone greater than 6 inches in largest dimension.
5. Acceptable Fill Material:
 - a. Rock or stone less than 6 inches in largest dimension as fill to within 24 inches of surface of proposed subgrade when mixed with suitable material.
 - b. Rock or stone less than 2 inches in largest dimension mixed with suitable material as fill within the upper 24 inches of proposed subgrade.

3.4 PIPE BEDDING

- A. Excavate trenches, for pipe or conduit installed to elevations indicated on Drawings, 4 inches (4") below bottom of pipe and to width as specified. Place four inches (4") of bedding material, compact in bottom of trench, and shape to conform to lower portion of pipe barrel. After pipe installation, backfill and compact to top of trench.
- B. Place geotextile fabric as indicated on Drawings.

3.5 BACKFILLING AND SUBGRADE PREPARATION

- A. Backfilling:
 1. Verify that imported off-site fill and stockpiled on-site fill is tested and approved.
 2. Verify that foundation perimeter drainage installation is inspected and approved.
 3. Verify that foundation or below grade structure walls are braced to support surcharge forces imposed by backfilling operations.
 4. Verify that backfill areas are free of debris, snow, ice, or water, and that ground surfaces are not frozen.
- B. Prepare project area subgrade pad in accordance with foundation subsurface preparation information indicated on Drawings and specified herein. Do not use rock larger than six inches (6") for subgrade fill.
- C. Areas Exposed by Excavation or Stripping:
 1. Scarify areas exposed by excavation or stripping on which subgrade preparations are to be performed to minimum eight inches (8") depth.
 2. Compact to minimum 95 percent optimum density in accordance with ASTM D1557 (Modified Proctor) at minimum moisture content 1 percent (1%) below and maximum three percent (3%) above optimum moisture content.
 3. Proof roll to detect any areas of insufficient compaction by making minimum of 2 complete passes with fully loaded tandem-axle dump truck, or Engineer approved equivalent, in each of two (2) perpendicular directions under supervision and direction of Engineer.
 4. Excavate and recompact areas failing to meet specified requirements.
- D. Fill Material Placement:
 1. Place in twelve inch (12") maximum lifts compacted minimum 95 percent (95%) optimum density in accordance with ASTM D1557 (Modified Proctor) at minimum moisture content of one percent (1%) below and maximum moisture content three percent (3%) above optimum moisture content.

3.6 MAINTENANCE OF SUBGRADE

- A. Verify finished subgrades for elevations indicated on Drawings and specified conditions for construction above subgrade.
- B. Protect subgrade from excessive wheel loading during construction, including concrete trucks and dump trucks.
- C. Remove areas of finished subgrade found to have insufficient compaction density. Replace in a manner that will comply with compaction requirements as directed by Engineer. Provide hard, uniform, smooth, stable surface, true to grade and cross section after completion of compaction.

3.7 FIELD QUALITY CONTROL

- A. Division 01 Section 014000 "Quality Requirements" for field testing and inspection.
- B. Excavation: Notify Testing Laboratory and Engineer for visual inspection of bearing surfaces,
- C. Site Tests:
 - 1. Tests for Equipment Subgrade Pad:
 - a. Cut Areas: Minimum one compaction test for every 2500 square feet.
 - b. Fill Areas: Minimum one compaction test for every 2500 square feet for each twelve inch (12") lift measured loose.
- D. If tests indicate the Work does not meet specified requirements, remove Work, replace, compact and retest at no additional cost to Owner.

3.8 PROTECTION

- A. Protect subgrade and related earthwork from damage by construction operations and erosion.
- B. Prohibit vehicles from entering project site subgrade pad area. Vehicles not permitted.
- C. Scarify surface, reshape, and compact areas damaged by construction operations or weather erosion.

END OF SECTION 312300

DIVISION 31 – EARTHWORK
SECTION 312500 – EROSION AND SEDIMENTATION CONTROLS
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Temporary and permanent erosion control systems.
 - 2. Slope protection systems.
- B. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.2 SUBMITTALS

- A. Division 01 Section 013300 “Submittal Procedures” for procedures for Quality Assurance/Control submittals.
 - 1. Material Source: Submit name of material suppliers.
 - 2. Provide materials from same source throughout Work. Change of source requires Engineer approval.

1.3 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Environmental Requirements: Protect adjacent properties and water resources from erosion and sediment damage throughout Work.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Straw Bales: Free of weed seed.
- B. Fencing for Siltation Control: Indicated on Drawings.
- C. Erosion Control Blankets and/or Erosion Control Geotextiles.
- D. Bale Stakes:
 - 1. Minimum four feet (4') length.
 - 2. Two (2) No. 4 steel reinforcing bars or,
 - 3. Two (2) steel pickets or,
 - 4. Two (2) – two-inch by two-inch (2"x2") hardwood stakes driven eighteen inches (18") to 24 inches into ground.
- E. Metal Fence Stakes: Minimum eight-foot (8') length.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Division 01 Section 017300 “Execution” for verification of existing conditions before starting Work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to Owner.

3.2 EROSION CONTROL AND SLOPE PROTECTION IMPLEMENTATION

- A. Engineer may direct Contractor to limit surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and embankment operations and may direct Contractor to provide immediate permanent or temporary pollution control measures.
- B. Provide permanent erosion control measures at earliest practical time to minimize requirement for temporary erosion controls. Permanently seed and mulch cut slopes as excavation proceeds.
- C. Maintain temporary erosion control systems installed by Contractor as directed by Engineer to control siltation at all times throughout Work. Provide maintenance or additional Work directed by Engineer within 48 hours of notification by Engineer.
- D. Apply soil stabilization or seed slopes that may be easily eroded with wheat, rye or oat grasses.

END OF SECTION 312500

DIVISION 33 – UTILITIES
SECTION 337119 UNDERGROUND DUCTS AND MANHOLES
DPMC No. A1346-00

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for underground electrical work, materials and products and raceway systems.
- B. Comply with the requirements and provisions of the following:
 - 1. Division 00 – Procurement and Contracting Requirements
 - 2. Division 01 – General Requirements
 - 3. Section 260500 – Common Work Results for Electrical
- C. Related Sections:
 - 1. Division 03 – Concrete
 - 2. Division 31 - Earthwork
 - 3. Section 260500 – Common Work Results for Electrical
 - 4. Section 260519 – Low-Voltage Electrical Power Conductors and Cables
 - 5. Section 260526 – Grounding and Bonding for Electrical Systems
 - 6. Section 260528 – Hangers and Supports Systems for Electrical Systems
 - 7. Section 260533.13 – Conduits for Electrical Systems
 - 8. Section 260563 – Acceptance Testing of Electrical Systems

1.2 QUALITY CONTROL

- A. Equipment Manufacturer:
 - 1. In cases where the Contractor contemplates using equipment not made by the first named manufacturer of these specifications, refer to Section 26 05 00 of these specifications for special requirements and/or substitution requirements.

1.3 GENERAL REQUIREMENTS

- A. Section 260500, with the following additions and modifications.
- B. Factory Tests:
 - 1. Determine applicable soil-density relationships for underground electrical installation bedding per applicable soil tests as defined in Division 31.
 - 2. Determine soil-density relationships for compaction of backfill material as defined in Division 31.

1.4 SUBMITTALS

- A. Submit the following information for approval:
 - 1. Catalog Information:
 - a. Conduit (All Types)
 - b. Precast Concrete Manholes, Including Frames and Covers
 - c. Precast Concrete Handholes, Including Frames and Covers
 - d. Polymer Concrete Handholes
 - e. Cable Racking/Supports

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Basic Electrical Materials: Those products such as building wire, connectors, fittings and similar devices as required for work of this Section are as specified in other Sections of these Specifications.
- B. Provide materials and equipment listed by UL, when such equipment is listed or approved.
- C. Conduit and Conduit Spacers: Conform to Section 260533.13.
- D. Wire and Cable: Conform to Section 260519.
- E. Grounding Material: Conform to Section 260526.
- F. Hangers and Supports: Conform to Section 260528.

2.2 WATERPROOFING OF CONDUIT JOINTS

- A. General: Ensure that equipment and materials for waterproofing conduit joints complies with the following manufacturers for quality, installation procedures and guaranteed end results.
 - 1. PVC Coated Rigid Metal Conduit:
 - a. Thread sealant: As recommended and approved by the conduit manufacturer.
 - b. Cleaning solvent: As recommended and approved by the conduit manufacturer.
 - 2. Non-Metallic Conduit:
 - a. All weather, quick-set joint cement: Approved by the conduit manufacturer.
 - b. Cleaning solvent: As recommended and approved by the conduit manufacturer.

2.3 PRECAST CONCRETE MANHOLES AND HANDHOLES

- A. Provide precast concrete, watertight manholes/handholes as indicated on the Contract Drawings. Provide manholes/handholes complete with necessary, required and specified appurtenances such as covers, cable racks, pulling-in irons and ladder.

2.4 POLYMER CONCRETE HANDHOLES

- A. Provide polymer concrete handholes as indicated on the Contract Drawings. Provide handholes complete with necessary, required and specified appurtenances such as watertight locking type covers, cable racks, ground rods and water drainage provisions. Handholes shall be open-bottom type.
- B. Provide polymer concrete handholes constructed of sand-gravel aggregate bonded together with a matted fiberglass-reinforced polymer concrete. In no assembly can the cover design load exceed the design load of the box. All covers are required to have a minimum coefficient of friction of .50 in accordance with ASTM C 1028 and the corresponding Tier Level embossed on the top surface.
- C. Provide enclosures, boxes and covers to conform to all test provisions of the latest version of the ANSI/SCTE 77 “Specification For Underground Enclosure Integrity” for Tier 22.
- D. Provide handhole with the following identification cast into the cover as appropriate for the service.
- E. Acceptable Manufactures
 - 1. Quazite
 - 2. Strongwell
 - 3. Hubbell Enclosures
 - 4. Or Approved Equal

2.5 CABLE RACKS

- A. Cable racks shall be comprised of stanchions and arms made from 50% glass reinforced nylon or a non-metallic material having equal mechanical strength, thermal resistance, chemical resistance, dielectric strength and physical properties.
- B. The stanchion shall be a minimum of 36 inches long, shall incorporate multiple arm mounting holes that are 4 inches apart and recessed bolt mounting holes.
- C. Slots shall be provided in the arms for cable wire ties.
- D. The load capacity of the cable racks and arms shall meet or exceed the weight of the cables to be installed on them.
- E. Acceptable Manufactures
 - 1. Underground Devices Inc.
 - 2. SJF Material Handling Inc.
 - 3. Acme Wire Products Co., Inc.
 - 4. Or Approved Equal

2.6 WATERSTOP MATERIALS

- A. Surface Applied Hydrophilic Waterstop
 - 1. Non-bentonite, modified chloroprene rubber which expands to 8 times its original volume when exposed to water. Expansion delay coating to allow concrete cure prior to expansion.

2. 100 year service life.
3. Greenstreak Group Hydrotite.

B. Water Swelling Sealant

1. Single component water swelling sealant which increase in volume not less than 50% when exposed to water, while retaining rubberlike elasticity.
2. Adheres to concrete, metal, glass, etc. when applied.
3. Suitable for waterproofing irregular shaped joints, rough surfaces, and odd penetrations.
4. Greenstreak Group Leakmaster LV-1, or approved equal.

2.7 WATERPROOFING PRECAST CONCRETE MANHOLES AND HANDHOLES

A. Provide asphalt compound coating of either the solvent type or the emulsion type. However, mixtures of the two types in the Project is not permitted.

1. Solvent Type: Brush or spray-on asphalt compound, cold-applied.
2. Emulsion-Type: Brush or spray-on asphalt-base, clay emulsion with fibers, cold-applied.
3. Acceptable Manufacturers:
 - a. W. R. Meadows, Inc.; SEALMASTIC.
 - b. Coopers Creek; Coopers Black.
 - c. Tnemec; 46-465.
 - d. Or Approved Equal

2.8 UNDERGROUND DETECTABLE WARNING TAPE

A. Metal detectable polyester material, with minimum one-inch high lettering. Overcoated graphics to read, "CAUTION-BURIED ELECTRIC LINE" for electric lines, "CAUTION - BURIED TELEPHONE" for telephone lines and/or "CAUTION - BURIED FIBER-OPTIC CABLES" for fiber-optic lines. APWA color to be red for electric lines and orange for telecommunication or fiber-optic lines.

B. Acceptable Manufacturers:

1. Brady
2. LEM Products, Inc
3. Seton
4. Or Approved Equal

2.9 GROUNDING

A. Ground rods are to be copper clad steel with diameter adequate to permit driving full length of the rod minus 6 inches, which extends above the finished concrete slab. Conform to Section 26 05 26 of these Specifications.

B. Ground Wires: 600 Volt, size as indicated or required by code minimum #6.

2.10 DUCT PLUGS

- A. Provide non-metallic, compressed seal type duct plugs. Plugs shall be sized to match the conduit being plugged. Plug shall expand to provide full contact with the inside walls of the conduit being plugged; non-expanding (push in) type plugs are not acceptable.
- B. Acceptable manufacturers
 - 1. Innerduct
 - 2. TE Connectivity / Jack Moon
 - 3. Cal Am
 - 4. TVC Inc.
 - 5. Or Approved Equal

PART 3 EXECUTION

3.1 INSTALLATION

- A. General Requirements: (For Underground Work)
 - 1. Install underground conduit systems in accordance with Article 300-5 of the NEC, in accordance with previous requirements of this Section, and the following requirements exceeding NEC:
 - a. Perform earthwork for buried conduit as specified previously for electrical work under Division 31.
 - b. Install Concrete Encasement as indicated and detailed. Concrete as previously specified in Division 03.
 - c. Install Concrete Reinforcement as indicated and detailed. Concrete Reinforcement as specified in Division 03.
 - d. Where detailed on the Contract Drawings, underground conduits, both single and banked, concrete encase and reinforce using steel reinforcing rods as indicated on the Contract Drawings.
 - e. Bank concrete encased conduits to the extent indicated and secure same in place with install separators at 5-foot intervals. Provide separators with sufficient strength to prevent displacement of conduits when placing backfill or pouring concrete encasement.
 - f. Use of separators for direct buried conduits is prohibited. Maintain required separation of direct buried conduits with screening materials and removable placement forms.
 - g. Lay conduit lines to grade a minimum of three inches per 100 feet. Grade conduit lines away from buildings, except conduit lines running between buildings, without intervening handholes or manholes shall be level.
 - h. Where conduit lines run to manholes, handholes or similar underground structures, grade conduits to drain to such.
 - i. Construct underground conduit lines to be watertight. Stagger conduit couplings in banks of conduits.
 - j. Unless otherwise indicated on drawing or details, where conduits change direction or turn up at equipment, transformers, buildings, terminal poles, etc., use long sweep PVC coated rigid galvanized steel conduit elbows.
 - k. Provide two feet minimum cover over conduits and over concrete encasement of conduit, unless indicated otherwise or specified.

- l. Where conduits are to be turned up into equipment or transformer pads, extend the concrete encasement for the conduits up to the top of the concrete pad and provide a 3/4" chamfer around exposed top edges. Isolate the concrete encasement for the conduits from the concrete pad for the equipment or transformer pad. Provide 2" high crushable fiber materials around duct bank encasement.
 - m. Extend PVC Coated RGS conduits 6 inches above concrete slab surface. Install insulating grounding bushing on all conduits. Perform concrete work as specified in Division 3 "Cast-In-Place Concrete".
 - n. Where conduits are to be turned up at terminal poles, extend the concrete encasement for the conduits up pole to grade and be provided with a 3/4" chamfer around all exposed top edges. Perform concrete work as specified in Division 03 "Cast-In-Place-Concrete".
 - o. Provide underground conduit of the types indicated in Section 26 05 33.13.
- B. Underground Duct Bank with Concrete Encasement: Construct underground duct bank lines of individual conduits encased in concrete as indicated. Except where rigid galvanized steel conduit is indicated or specified, use only one kind of conduit in any one duct bank. Use ducts no smaller than 4 inches in diameter unless otherwise indicated. Provide concrete encasement rectangular in cross-section surrounding the bank and provide at least 3 inches of concrete cover for ducts. Separate conduit by a minimum concrete thickness of 2-inches, and maintain a separation, between conduit centerlines, of seven and one-half inches. Separate power conduits from telephone, communication and/or data highway conduits a minimum of 24 inches of earth or concrete thickness of 8 inches, unless otherwise indicated.
- C. Place duct bank lines with a continuous slope downward toward manholes, handholes and away from buildings with a pitch of not less than 3 inches in 100 feet. Except at conduit risers, change direction of bends in runs exceeding a total of 10 degrees, either vertical or horizontal, by long sweep bends having a minimum radius of curvature of 25 feet. Sweep bends may be made up of one or more curved or straight sections or combinations thereof. Use only manufactured bends with a minimum radius of 18 inches for use with conduits of less than 3 inches in diameter and a minimum radius of 36 inches for conduits of 3 inches in diameter and larger. Terminate conduits in end-bells where duct bank lines enter manholes and handholes as indicated on the Contract Drawings.
- D. Provide separators compatible with the conduit utilized and conforming to those specified in other Sections of these Specifications. Stagger the joints of the conduits by rows and layers so as to provide a duct bank line having the maximum strength. During construction, protect partially completed duct bank lines from the entrance of debris such as mud, sand, and dirt by means of suitable conduit plugs. As each section of a duct bank line is completed from manhole to manhole, from manhole to building or structure and/or from handhole to handhole, draw a testing mandrel not less than 12 inches long with a diameter 1/4 inch less than the size of the conduit, through each conduit, after which draw a brush having the diameter of the duct bank and stiff bristles through until the conduit is clear of particles of earth, sand, and/or gravel; immediately install conduit plugs. Provide a plastic pull rope, having a minimum of 3 additional feet at each end, in telephone and spare duct banks.
- E. Conform concrete to that specified in Division 03 of this Specification.
- F. Backfilling: Provide a continuous plastic warning tape centered above the top of the underground duct bank about 12 inches below grade. Conform concrete to that specified in Division 03 of this Contract. Progress backfilling as rapidly as the construction, testing and acceptance of the work

permits. Ensure backfill is free from roots, wood, scrap material, and other vegetable matter and refuse. Install and compact backfill as specified in Division 31.

- G. Install duct plugs at both ends of all empty spare conduits. Attach the required pull string to each duct plug, with not less than 5 ft of slack inside the conduit at each end. Hand tighten only.

3.2 PRECAST CONCRETE MANHOLES

- A. Provide steel bar pulling-in irons bent in the configuration of a deformed "Z" and cast in the walls and floors. Pocket pulling-in irons in the floor and center directly under the manhole cover. Locate pulling-in irons in the wall not less than 6 inches above or below, and opposite the conduits entering the manhole. Locate the pulling-in-irons such as not to interfere with the cable distribution racks. Project pulling-in-irons into the manhole approximately 4 inches. Zinc-coat irons after fabrication.
- B. Ensure cable racks, including hooks and insulators, are sufficient to accommodate the cables and spaced not more than 24 inches horizontally. Supports cabling racking system from manhole wall in accordance with manufactures recommendations.
- C. Provide FRP ladder.

3.3 CONCRETE MANHOLE AND HANDHOLE INSTALLATIONS

- A. Where openings into manholes and handholes are below final finished grade, extend openings to the required elevation with concrete suitably arranged to support or anchor the frames and covers. Obtain engineer approval of the construction method and procedure before any work is done.
- B. Where required for pulling cables, furnish and install in the walls of the manholes and handholes, a sufficient number of inserts for the proper attachment of cable supports.
- C. In general, properly dress and rack cable/or wire on the support arms and insulators around the walls of the manholes and handholes, providing slack where required for future rearrangements. Install cable support brackets, along with the support arms and porcelain insulators, on each wall of the manhole and handhole. Secure cables within manholes and handholes to the insulators by marlin rope. Use proper regard for neat and orderly appearance and location, and provide accessibility for future connections. Take care not to damage the walls of the manholes and handholes during cable pulling.
- D. Conform manhole frames and covers to requirements as outlined above in these Specifications; and ensure Engineer approval.
- E. Where required, make final adjustment of frame to elevation using materials grade rings.
 - 1. Set precast grade rings in Waterproof Mortar. Do not exceed 3/4-inch maximum and 3/8-inch minimum mortar thickness. Wet, but do not saturate precast grade rings immediately before laying.
 - 2. Precast grade ring: Pre-set to proper plane and elevation using wedges or blocks of cementation material not exceeding one spare inch wide on each side. Permit no more than four wedges or blocks per grade ring. Incorporate wedges or blocks in fresh mortar in a manner to completely encase each. Crown fresh mortar to produce squeeze-out between grade rings. Tool exposed

joints with appropriately shaped tool and compact mortar edge into joints. Clean off excess mortar prior to initial mortar set.

3. Bolt manhole frames in place on manhole top section, or on leveling units if required, after installing 2 inch thick preformed plastic sealing compound on bearing surface of manhole frame. Remove excess sealing compound squeeze-out after manhole frame is bolted in place.
4. Use bolts of sufficient length to properly pass through leveling units, if used, engage full depth of manhole top section inserts and allow enough threaded end to pass through manhole frame to properly tighten nut and washer. Tighten manhole frame bolts after mortar has cured.

3.4 PRECAST CONCRETE MANHOLES AND HANDHOLES FIELD COATING

- A. Clean cast-iron or steel frames, covers and gratings not buried in masonry of mortar, rust, grease, dirt and other deleterious materials by an approved blasting process, and give a coat of bituminous coating material. Clean surfaces that cannot be cleaned satisfactorily by blasting to bare metal, by wire brushing, or other mechanical means. Wash surfaces contaminated with rust, dirt, oil, grease or other contaminants with solvents until thoroughly cleaned. Immediately after cleaning, coat surface with a pretreatment coating or give a crystalline phosphate coating. As soon as practicable after the pretreatment coating has dried, prime treated surfaces with a coat of zinc chromate primer and coat with synthetic exterior gloss enamel.

3.5 WATERPROOFING PRECAST CONCRETE MANHOLES AND HANDHOLES

- A. Apply a specified protective coal-tar-based coating of two applied coats, minimum, to surfaces in direct contact with in ground cover to obtain a minimum 12.0 dry mil total applied surface thickness. Apply coating in strict conformance with manufacturer's requirements.
- B. Application: The coating may be either shop or field applied. Apply coating to the exterior of manhole components.
- C. Apply waterstop materials in strict accordance with the manufacturer's recommendations. In case of conflict between the manufacturer's instructions and the details shown on the drawings, contact the Engineer for direction.

3.6 CONNECTIONS TO MANHOLES

- A. Construct concrete encased duct bank lines connecting to manholes or handholes to have a tapered section adjacent to the manhole or handhole to provide shear strength. Construct manholes and handholes to provide for keying the concrete envelope of the duct bank line into the wall of the manhole or handhole. Use vibrators when this portion of the envelope is poured to assure a seal between the envelope and the wall of the manhole or handhole.

3.7 CONDUIT END BELLS

- A. Provide nonmetallic end bells, compatible with the conduit used, where conduits enter and exit manholes.

3.8 POLYMER CONCRETE HANDHOLES

- A. Install polymer concrete handholes in accordance with the details shown on the drawings, and with the manufacturer's instructions.
- B. Provide a drainage system as indicated on the Contract Drawings.

3.9 EARTHWORK

- A. Excavate to depths as required for handholes. Excavation for manholes and handholes shall conform to the requirements stipulated in Division 31.
- B. Remove waste excavated materials not required or suitable for backfill on the project from the site as directed. Provide sheeting and shoring as necessary for protection of work and safety of personnel. Remove water from excavation by pumping or other approved method.

3.10 GROUNDING

- A. Provide non-current carrying metallic parts associated with electrical equipment with a maximum resistance to solid "earth" ground not exceeding the values indicated in Section 260526 of these Specifications.

3.11 TEST

- A. Field Tests: Field test of electrical equipment and conform systems to those specified in Section 260563 of these Specifications.

END OF SECTION 337119

Attachment 1

SUBSURFACE SOIL AND FOUNDATION INVESTIGATION REPORT DATED NOVEMBER 2021

REPURPOSE MOD LAB GENERATOR

DPMC PROJECT NO. A1346-00

**LABOR & WORKFORCE DEVELOPMENT BUILDING
1 JOHN FITCH WAY & SOUTH WARREN STREET
TRENTON, NEW JERSEY**

SUBSURFACE SOIL AND FOUNDATION INVESTIGATION

**Prepared For: Division of Property Management and Construction
DPMC Bureau of Design and Construction
20 West State Street, 3rd Floor
Trenton, New Jersey 08626-0235**

**Prepared By: SUBURBAN CONSULTING ENGINEERS, INC.
96 U.S. Highway 206, Suite 101
Flanders, New Jersey 07836**

File No.: SCE-R12340.011

NOVEMBER 2021

MICHAEL K. MCALOON, PE
NJPE LICENSE #24GE05346500
11/10/2021
Date

ANDREW S. HOLT, PE
NJPE LICENSE #24GE03855400
11/10/2021
Date

SUBURBAN CONSULTING ENGINEERS, INC.
96 U.S. Highway 206, Suite 101, Flanders, New Jersey 07836
P: (973) 398-1776 | www.suburbanconsulting.com

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APPENDICES

APPENDIX A – Soil Boring Logs

1.0 INTRODUCTION

SUBURBAN CONSULTING ENGINEERS, INC. (SCE) has prepared this Engineer's Report for the Subsurface Soil and Foundation Investigation for the proposed Mod Lab Generator. The purpose of this study was to determine the nature and engineering properties of the subsurface soil and the groundwater conditions for the new construction, to recommend a practical foundation scheme, and to determine the allowable bearing capacity of the site soils.

2.0 SITE DESCRIPTION

The project site is located at 1 John Fitch Way & South Warren Street in Trenton, New Jersey. The location of the generator and auxiliary fuel tank is proposed to the southeast of the existing Department of Labor and Workforce Development (DLWD) Building. The site is generally flat, but slope toward a stormwater catch basin and range from +24.5' to +28.50' in the vicinity of the proposed generator and auxiliary fuel tank. The New Jersey Flood Hazard Area Design Flood Line is Elevation 24.5'. The area is grassy surrounded by concrete sidewalk to the north and east. There is an existing satellite dish to the south, as well as the water storage tank/helipad for this facility. The Delaware River is located approximately 1,000 linear feet to the west of the site.

3.0 PROPOSED CONSTRUCTION

The scope of this project would involve the relocation of an existing 600-kW generator and appurtenant 3,000- gallon auxiliary diesel fuel tank to the northeast corner of the south lawn of the DLWD Building. A new concrete foundational structure would be constructed to support both structures in addition to installation of approximately 300 LF of conduit running east from the foundation site, then northwest to where it would enter the DLWD Building through an existing air tunnel at the eastern side of the building. Utilizing information from the geotechnical subsurface inspections and ground penetrating radar (GPR) completed on August 27, 2021, SCE can provide additional recommendations regarding the final proposed location of the generator and auxiliary fuel tank.

The proposed construction will consist of a new generator and auxiliary fuel tank support structure, with an anticipated footprint of approximately 43' by 18' constructed of steel reinforced, cast-in-place concrete in accordance with the proposed design. Due to limitations on net fill of the Flood Hazard Area, the foundation will displace less than five (5) cubic yards of the flood hazard area.

4.0 SUBSURFACE CONDITIONS

To determine the subsurface soil and groundwater conditions at the site, two (2) borings were advanced by Craig Test Boring – LLC. at the locations shown on the enclosed Boring Location Plan.

The borings were completed using a geo-probe, which is a track/truck-mounted rig with rubber tracks and utilizing hollow stem augers and split spoon sampling and boring up to 14 ft below grade surface (BGS). Please see enclosed **Appendix A** for inspection logs for both borings. The borings were complete on August 27, 2021, under inspection by SCE personnel. Detailed boring logs have been prepared and are included in this report.

5.0 GROUNDWATER

No specific observations of groundwater were encountered during sampling and upon completion of boring at the two (2) locations. However, moisture was noted throughout all geotechnical inspection sample results received. It is believed this is due to the heavy rainfall which occurred within a week prior to the samples being taken. It should be noted to assist in drainage of this site, a stormwater drainage inlet is present in a low elevation point immediately west of the proposed foundation site.

Groundwater may be encountered during construction. In addition, perched or trapped water may be encountered within the existing fill and/or within the silty site soils, especially during wet periods. Proper groundwater control measures will be required in the event that water is encountered in the site excavations.

In addition, the Delaware River runs along the west side of the project site. Variations in the location of the long-term water table may occur as a result of changes in precipitation, evaporation, surface water runoff, and other factors not immediately apparent at the time of this study.

6.0 SUMMARY OF DESIGN RECOMMENDATIONS

- **Foundation Subgrade Preparation**
 - Surface materials must be stripped from the proposed construction areas.
 - Existing fill is not suitable for support of the new foundations
 - Exposed subgrade shall be densified with several passes of a vibratory roller prior to placing compacted fill
 - In the event that water infiltrates the building excavations, preparation of wet and sensitive subgrades with geotextile fabric and clean stone may also be necessary.
 - New backfill shall be compacted to at least 95% of its Maximum Modified Dry Density (ASTM D-1557)
- **New Foundation Recommendations**
 - The Existing fill is not suitable for support of the proposed building foundations.
 - The foundations shall be lowered to bear on virgin soil below the existing fill.
 - Alternatively, where lowering the footing becomes impractical, the existing fill can be completely removed from below foundations and replaced with new compacted fill to planned subgrade elevation.
 - The new foundations may be designed as spread footing type foundations bearing on virgin soil or approved fill
 - Net design bearing pressure is 2,500 psf.
 - Minimum depth for frost protection is 42 inches
 - Seismic Site Class is D or Stiff Soil Profile

7.0 HANDLING GROUNDWATER AND SENSITIVE SUBGRADES

Where required, temporary groundwater control measures shall consist of one (1) or more sumps(s) and pump(s). The sump(s) shall consist of perforated pipe at least eight (8) inches in diameter, surrounded by crushed stone and filter fabric. The sump pit(s) must be installed just outside the planned excavation area and at least two (2) feet below the lowest anticipate subgrade elevation. The sump and pumps must be set and in operation prior to excavation below the water table. The pump(s) shall be used to temporarily lower the surrounding groundwater level and keep the building excavation relatively dry.

In addition, silty clayey soils are presentation at the foundation bearing elevation will be moisture sensitive and may become destabilized when exposed to rain or groundwater. In the event that the exposed subgrade soil within the planned building area becomes wet or soft, stabilizing the subgrade surface may be required in order to construct the foundation. The subgrade may be stabilized with geotextile filter fabric and crushed stone. The geotextile filter fabric shall consist of Mirari 500X or equivalent. Adjacent layers of geotextile filter fabric should be overlapped a minimum of 6-inches. As necessary, approximately 12-inches of 3/4-inch clean crushed stone can be installed on top of the filter fabric layer to provide a firm working surface, provide protection for the geotextile filter fabric, minimize pumping, and to stabilize subgrade soil.

8.0 NEW GENERATOR AND AUXILIARY FUEL TANK FOUNDATION

The generator and auxiliary fuel tank foundation will be designed to bear on virgin soils. Existing fill was encountered through the site to depths ranging from 4.0' to 6.0' below the existing ground surface.

Where lowering the footings to bear on virgin soil is not practical, the existing fill can be completely removed from beneath the "zone of influence" of the new building foundations and placed with new engineer-approved compacted fill to the planned subgrade elevation. At the bottom of the excavation, the removal of the existing fill shall extend horizontally beyond the foundation footprint a minimum distance equal to the depth of the excavation below the planned foundation bearing elevation on each side of the foundation. Once the existing fill is completely removed, it can then be backfilled to the planned subgrade elevation.

All of the exterior footings shall bear at the minimum depth listed below for protection from frost.

Description	Value
Foundation Bearing Material	Virgin Soil or New Compacted Fill
Net Design Bearing Pressure	2,500 psf
Minimum Frost Depth	42-inches
Minimum Column Dimension	12-inches
Minimum Wall Dimension	12-inches

Prior to the installation of the reinforcement steel and concrete, the bottoms of the foundation excavations should be cleaned of all loose material. The foundation subgrade shall be compacted with a small vibratory drum trench compactor, a heavy vibratory plate tamper, or a "jumping jack" sytel tamper.

APPENDIX A
Soil Boring Logs



Engineering & Design

5439 Harding Highway, Mays Landing, NJ 08330

PROJECT: Craig Test Boring - Accurate Drilling, LLC - 1 John Fitch Way, Trenton, NJ

LOCATION:

PROJECT NO. 21005297A

TEST BORING: B-1
PAGE 1 OF 1

GROUND ELEVATION (ft):
ELEV. FROM:

GROUNDWATER ELEV. (ft):

CONTRACTOR: Craig Test Boring Co., Inc.
 DRILLER:
 DRILLING EQUIPMENT:
 METHOD: HSA _____ Mud Rotary _____ Other _____
 HAMMER: CH _____ Safety _____ Automatic _____
 RODS: AW _____ NW _____ Other _____

GROUNDWATER: DEPTH (ft) DATE
 FIRST ENCOUNTERED ∇ _____
 END OF DRILLING (0 hrs.) ∇ _____

DATE STARTED
 DATE FINISHED
 FIELD OBSERVER:
 CHECKED BY:

ASTM D-1586

DEPTH BELOW SURFACE (ft.)	SAMPLE NUMBER	BLOWS PER 6 INCHES				RECOVERY (in)	POCKET PENETROM. (bf)	MOISTURE (%)	WATER SYMBOL	PROFILE		IDENTIFICATION OF SOILS / REMARKS
		DEPTH (ft.)	0-6"	6-12"	12-18"					18-24"	DEPTH	
5	1	2	2	2	4	NA						1: Brown, (SM), silty SAND, very loose, moist
	0'0"-2.0'											2: Brown, (SC), clayey SAND, very loose, moist
	2	2	1	1	1	NA						3: Brown, (SC), silty SAND, loose, moist
	2'0"-4.0'											4: Brown, (CL), CLAY, medium stiff, moist, tr.gravel
	3	1	2	3	6	NA						5: Brown, (SM/SC), silty/clayey SAND, very dense, moist
10	4'0"-6.0'					NA						
	4	4	3	3	4	NA						
	6'0"-8.0'											
10	5	5/100				NA						
	8.0'-10.0'								10.0			
												END OF TEST BORING AT 10.0 FEET
15												
20												
25												
30												
35												
40												

NOTES:

TEST BORING: B-1

PAGE 1 OF 1



Engineering & Design

5439 Harding Highway, Mays Landing, NJ 08330

PROJECT: Craig Test Boring - Accurate Drilling, LLC - 1 John Fitch Way, Trenton, NJ

LOCATION:

PROJECT NO. 21005297A

TEST BORING: B-2

PAGE 1 OF 1

GROUND ELEVATION (ft):
ELEV. FROM:

GROUNDWATER ELEV. (ft):

CONTRACTOR: Craig Test Boring Co., Inc.
 DRILLER:
 DRILLING EQUIPMENT:
 METHOD: HSA _____ Mud Rotary _____ Other _____
 HAMMER: CH _____ Safety _____ Automatic _____
 RODS: AW _____ NW _____ Other _____

GROUNDWATER: DEPTH (ft) DATE
 FIRST ENCOUNTERED ∇ _____
 END OF DRILLING (0 hrs.) ∇ _____

DATE STARTED
 DATE FINISHED
 FIELD OBSERVER:
 CHECKED BY:

ASTM D-1586

DEPTH BELOW SURFACE (ft.)	SAMPLE NUMBER	BLOWS PER 6 INCHES				RECOVERY (in)	POCKET PENETROM. (bf)	MOISTURE (%)	WATER SYMBOL	PROFILE		IDENTIFICATION OF SOILS / REMARKS
		DEPTH (ft.)	0-6"	6-12"	12-18"					18-24"	DEPTH	
5	1	1	2	2	5	NA						1: Brown, (CL), CLAY, soft, moist
	0 0'-2.0'											
	2	6	4	4	3	NA						2: Brown, (SC), clayey SAND, loose, moist, tr. gravel
10	2 0'-4.0'											
	3	2	1	1	1	NA						3: Brown, (CL) CLAY, soft, moist
	4 0'-6.0'											
15	4	1	2	2	3	NA						4: Brown, (CL), CLAY, soft, moist
	6 0'-8.0'											
	5	2	14	33	34	NA						5: Brown, (SC), clayey SAND, dense, moist, w/gravel
20	8.0'-10.0'											
	6	49	64	4	5	NA						6: Brown,(SC), clayey SAND, very dense, moist, w/gravel
	10 0'-12.0'											
25	7	5	35	5/10		NA						7: Brown, (SC), clayey SAND, very dense, moist, w/gravel
	12 0'-14.0'											
14.0											END OF TEST BORING AT 14.0 FEET	
20												
25												
30												
35												
40												

NOTES:



LEGEND

	BENCHMARK		STRIPING
	FLAG POLE		MAJOR CONTOUR
	MANHOLE		MINOR CONTOUR
	DRAINAGE MANHOLE		ELECTRIC LINE
	UTILITY BOX		STORM LINE
	STRUCTURE		WALL
	TRACT BOUNDARY LINE		DOORWAY
	CURB LINE		FENCE SWING GATE (SINGLE)
	METAL FENCE		LIGHT POLE
	METAL HAND RAIL		DECIDUOUS TREE

100.00

30 0 30

SCALE: 1"=30'

SCS SUBURBAN CONSULTING ENGINEERS, INC.

COA NO.: 24GA28037500
21MH00004200

- Civil Engineers - Municipal Engineers -
- Landscape Architects -
- Planners - Environmentalists - Land Surveyors -

96 US Highway 206, Suite 101 2430 Highway 34, Bldg. A Suite 1R
Flanders, NJ. 07836 - 973.398.1776 Wall, NJ. 08736 - 732.282.1776

EXCELLENCE ♦ ECONOMY ♦ ENVIRONMENT

**DPMC PROJECT NO. A1346-00
REPURPOSE MOD LAB GENERATOR
SOIL BORING EXHIBIT**

DRAWN BY: HDR	CHECKED BY: MKM	SCALE 1"=30'	DATE: 03/02/2022	PROJECT NO. SCE-12340.011
-------------------------	---------------------------	------------------------	----------------------------	-------------------------------------



State of New Jersey

DEPARTMENT OF TREASURY
DIVISION OF PROPERTY MANAGEMENT & CONSTRUCTION
P O Box 034
TRENTON NJ 08625-0034

PHILIP D. MURPHY
Governor

ELIZABETH MAHER MUOIO
State Treasurer

SHEILA Y. OLIVER
Lt. Governor

CHRISTOPHER CHIANESE
Director

May 1, 2023

SUBJECT: Bulletin "B" Dated May 1, 2023
PROJECT #: #A1346-00 Re-Bid
DESCRIPTION: Repurpose Mod Lab Generator
Division of Labor & Workforce Development Building
Trenton, Mercer County, NJ

To Whom It May Concern:

WE ARE FORWARDING A COPY OF THE ABOVE REFERENCED BULLETIN. PLEASE ACKNOWLEDGE RECEIPT BY RETURNING THIS FORM TO:

By Email: anthony.mangine@treas.nj.gov or

By Mail: Division of Property Management and Construction
Attention: A. Mangine
Contracts & Procurement
DPMC, PO Box 034
Trenton NJ 08625-0034 or

By Fax: 609-777-1970

Sincerely,
[Signature]
Christopher R. Geary
Assistant Deputy Director
Contracts and Procurement

Date Received

Firm Name

Address

Signature

Title

Project #A1346-00 Re-Bid
Bulletin B

STATE OF NEW JERSEY
DEPARTMENT OF TREASURY
DIVISION OF PROPERTY MANAGEMENT AND CONSTRUCTION
PO BOX 034, TRENTON, NJ 08625-0034

PROJECT #: A1346-00 Re-Bid
Repurpose Mod Lab Generator
Division of Labor & Workforce Development Building
Trenton, Mercer County, NJ

A/E: Suburban Consulting Engineers, Inc.

DATE: May 1, 2023

BULLETIN "B"

Bidder must acknowledge receipt of this Bulletin on bid form in the space provided therefor.

This Bulletin is issued for the purpose of amending certain requirements of the original Contract Documents, as noted hereinafter, and is hereby made part of and incorporated in full force as part of the Contract Documents. Unless specifically noted or specified hereinafter, all work shall comply with the applicable provisions of the Contract Documents.

A) AMENDMENTS TO THE INSTRUCTIONS TO BIDDERS OF THE CONTRACT

IB 1 BID PROPOSALS

Replace IB 1.11, Item a in its entirety with the following:

- a. RESTRICTIONS ON POLITICAL CONTRIBUTIONS - Pursuant to P.L.2023, c.30 (recently signed into law and retroactive to January 1, 2023) is known as the Elections Transparency Act. In addition to other changes, the law creates a new exception to its Chapter 51 or Pay-to-Play application requirement for Executive Branch contracts awarded through a "fair and open process". The new law defines "fair and open process" as follows - "fair and open process" means, at a minimum, that the contract shall be: publicly advertised in newspapers or on the Internet website maintained by the public entity in sufficient time to give notice in advance of the contract; awarded under a process that provides for public solicitation of proposals or qualifications and awarded and disclosed under criteria established in writing by the public entity prior to the solicitation of proposals or qualifications; and publicly opened and announced when awarded. A contract awarded under a process that includes public bidding or competitive contracting shall constitute a fair and open process. The decision of a public entity as to what constitutes a fair and open process shall be final.

Project #A1346-00 Re-Bid
Bulletin B

As such, for contracts awarded through a “fair and open process” (such as this contract), the “Two Year Vendor Certification and Disclosure of Political Contributions” Chapter 51 Form will no longer be required to be submitted to the Division of Purchase and Property’s Chapter 51 Review Unit for review and approval prior to contract award.

IB 8 BULLETINS AND INTERPRENTATIONS

Replace IB 8.2 in its entirety with the following:

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.

B) REVISIONS TO PROJECT REQUIREMENTS WITHIN BULLETIN A:

1. Within Bulletin A, Item G, #7 - “DPMC Notice dated March 9, 2022 to All Contractors and Project Personnel on DPMC Construction Projects” shall be deleted.

C) BIDDING INFORMATION

1. Contractors are advised that bids are due on **Tuesday, May 9, 2023 by 2:00 PM at the DPMC Plan Room**. Firms planning to submit a bid can drop off the bid to the DPMC Plan Room or use an overnight delivery service. However, bids not received by the bid deadline will be deemed non-responsive. **Bidders are permitted to attend the bid opening in person (limit one representative per firm to ensure proper social distancing measures) but are strongly urged due to the current COVID-19 pandemic emergency to view the bid opening via the ZOOM videoconferencing app instead of attending in person. The bid results will be posted on the DPMC website promptly after the opening.**

a) To Join the Bid Opening via the Zoom app:

- You can connect with a PC/laptop or with an iOS or Android phone.
 - Download and Launch the app on your computer or smart phone. Select the JOIN A MEETING blue bar (you do not need to create an account). Then enter the meeting ID number at the top of the next page. You can edit your name, then select “Join”. You will be permitted to allow the app to access your camera and mic. You will

Project #A1346-00 Re-Bid
Bulletin B

also be permitted to select internet audio or call. You can select internet call/audio.

- The bid opening meeting ID# for Zoom is 496-704-7177 for this project.
- The password to join the meeting is 195286.

1. Or use the following link to access the meeting:

<https://us04web.zoom.us/j/4967047177>

- Tutorials on how to join the opening can be found at the following link:
<https://support.zoom.us/hc/en-us/categories/200101697>

****Please note that setting up Zoom before the meeting will be helpful.****

b) Overnight Delivery:

- **The address for overnight delivery (UPS, Fedex, etc) is as follows:**

**Division of Property Management and Construction
33 West State Street, 9th Floor
Trenton, NJ 08608
ATTN: Michael Cifrodelli**

****Firms are encouraged to hand deliver their bids to the DPMC Plan Room on the bid due date. The Plan Room will be open for walk-in drop-off on the bid due date.****

D) CLARIFICATIONS

1. This project is Federally funded, therefore the prime bidder and sub-contractors identified on the bid proposal form shall be registered with the Federal System for Award Management (SAM) prior to Contract Award. In order to comply with this requirement, firms must register in SAM at <http://www.sam.gov>. In addition, the prime bidder and sub-contractors identified on the bid proposal form will be required to submit a certification of non-debarment form to the DPMC prior to contract award. (Form is attached to Bulletin A)

For more information on N.J.S.A. 52:32-44.1 and the Federal System for Award Management (SAM) please review Bulletin A, Item C.

E) CONTRACTOR QUESTIONS

Altec Building Systems Corp.:

1. Regarding the Pre-Bid Meeting notes from April 25, 2023, item #15 states that Prime and Subcontractors must be registered with SAM and to refer to Bulletin A, Item C. When referring to

Project #A1346-00 Re-Bid
Bulletin B

Bulletin A, Item C, there is no mention of subcontractors. It only states the firm to be awarded the contract must be registered with SAM. We would like to clarify that subcontractors who are listed on the proposal form, in addition to being DPMC registered, also need to be registered with SAM as well?

Answer: See clarification #1 above.

2. Please provide the serial number from the owner furnished generator.

Answer: Picture of the serial number is attached to this Bulletin.

F) NEW POST BID MEETING DATE

A Post Bid review meeting with Apparent Low bidder is tentatively scheduled for **Thursday, May 11, 2023 at 10:00 AM**. Venue or Teleconference details to be provided at a later date to the successful bidder.

ATTACHMENTS:

1. Print Shop Generator Serial Number Photograph
2. Mandatory Pre-Bid Meeting Minutes and Mandatory Pre-Bid Meeting Sign-in Sheet dated April 25, 2023

END OF BULLETIN "B"

Model No. **DFGB-5702789**
Modele

Serial No. **L040729204**
Serie

Spec. **J**

IMPORTANT!

Model & Serial No. Required When Ordering Parts.

Modele & No. Serie Requis Pour Commander Des Pieces.

99-2433

CUMMINS POWER GENERATION

1400 73RD AVE. N.E.

MINNEAPOLIS, MN 55432 U.S.A.

MADE IN U.S.A.

FREQUENCY SERVICE RATING PHASE	60 HZ			
	STANDBY		PRIME	
	1PH	3PH	1PH	3PH
RATED KW	0.0	600.0	0.0	0.0
POWER FACTOR	0.0	0.8	0.0	0.0
RATED KVA	0.0	750.0	0.0	0.0
I2 CAPABILITY CONNECTION	8pct WYE			

BATTERY	VOLTS	AMPS	AMPS
24 VDC	110/ 190	2279.1	
	110/ 220	1968.3	
	115/ 200	2165.1	
ROTATING SPEED	115/ 230	1882.7	
	120/ 208	2081.9	
	1800RPM	120/ 240	1804.3
NOMINAL RATED	127/ 220	1968.3	
	139/ 240	1804.3	
	220/ 380	1139.5	
INSUL: CLASS H	230/ 400	1082.6	
	240/ 416	1040.9	
	255/ 440	984.1	
AMB 40C	266/ 460	941.4	
	277/ 480	902.1	
FUEL: Diesel			

WIRING DIAGRAM 0612-6675

For Electrical Equipment Only



**NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT
TRENTON REPURPOSE MOD LAB GENERATOR
MANDATORY PRE-BID MEETING MINUTES**

Job Name: Trenton – Repurpose Mod Lab Generator

DPMC Project No. A1346-00 Re-Bid

SCE Job No: SCE-R12340.011

Meeting Date: April 25, 2023, at 10:00am

I. SIGN-IN & INTRODUCTIONS

Project Staff

DPMC – OFFICE OF DESIGN & CONSTRUCTION

- Michael Cifrodelli – (Michael.cifrodelli@treas.nj.gov)
- Joseph Polizzi – (Joseph.Polizzi@treas.nj.gov)
- Michael Debnarik – (Michael.Debnarik@treas.nj.gov)
- Vincent Campanella – (Vincent.campanell@treas.nj.gov)
- Andres Osorio-Sanders – (andres.osorio-sanders@treas.nj.gov)
- Jerry Mcclure – (Jerry.mcclure@treas.nj.gov)

SUBURBAN CONSULTING ENGINEERS, INC. (SCE)

- Michael K. McAloon, PE – (mmcaloon@suburbanconsulting.com)
- Vinnie Khetarpal, PE – (vinniekhetarpal@gmail.com)

II. INTRODUCTION OF PROJECT AND CONSTRUCTION ADMINISTRATION

1. **Bids are due Tuesday, May 9, 2023 by 2:00pm** to the DPMC Plan Room located on the 9th floor of 33 West State Street, Trenton, NJ unless modified by bulletin.
 - a. Bids by Mail: by US Postal Service the address is:
Division of Property Management and Construction
P.O. Box 034
Trenton, NJ 08625-0034
 - b. Bids by Delivery Service (UPS, FedEx, etc.)
Division of Property Management and Construction
33 West State Street, 9th Floor
Trenton, NJ 08608

*Bidders are encouraged to walk their bids in to the DPMC Plan Room on the bid due date.



2. Bid is a single bid (lump sum all trades).
3. All prime bidders must be DPMC Classified in General Construction (C008) or General Construction / Alterations & Additions (C009).
4. Prime Contractor must also identify a DPMC Classified Subcontractor in Structural Steel & Ornamental Iron (C029), Plumbing (C030) and Electrical (C047) on the bid proposal form. If bidder is self-performing the required Sub trades and is classified with DPMC in those sub trades they must list their name as the subcontractor on the Bid Proposal form. Do not leave it blank.
5. Any questions regarding contractor classification contact Katie Karr at **Katie.karr@treas.nj.gov**.
6. Bid is lump sum with no alternates, unit prices or allowances.
7. Contract performance period is 180 calendar days.
8. Contractors bid must be good for 60 days.
9. **A bid bond in the amount of 50% is required for this project.**
10. If submitting a bid, only a completed, signed and executed bid proposal form and 50% bid bond are needed within the pink Bid Envelope that is provided with the bid documents.
11. Bulletins "A" and "B" are included in the bid package for purchase at 33 West State Street, Trenton, NJ. Contact Anthony Mangine at **Anthony.Mangine@treas.nj.gov** for the bid package.
12. Bulletin "B" will be issued after the meeting and question/answer period with any necessary revisions or clarifications to the project and responses to bidder questions. Only Prime bidders may submit questions.
13. Email all questions to Joseph Polizzi at **joseph.polizzi@treas.nj.gov**; Michael McAloon at **mmcaloon@suburbanconsulting.com** and Michael Cifrodelli at **Michael.Cifrodelli@treas.nj.gov**
 - a. Questions are due Friday, April 28, 2023 no later than 12 PM
14. The Post Bid Meeting is tentatively scheduled for Thursday, May 11, 2023 at 10:00am at 20 W. State Street, Trenton, NJ 08608 or via Microsoft Teams.
 - a. The low bid contractor and their subcontractor(s) are required to attend.
15. Bulletin A, Item G - REVISIONS AND/OR CLARIFICATION TO THE DRAWINGS, SPECIFICATIONS AND/OR PROJECT REQUIREMENTS
 - a. Working hours are Monday to Friday, 7:00am to 3:30pm. Facility shutdowns require a written request with a minimum of 48-hour notice and DPMC and Engineering approval. No work is permitted on NJ state holidays.
 - b. The generator was operational and service was performed prior to its relocation to the Carroll Street storage area. Maintenance is to be performed in accordance with the Contract Documents prior to start-up by the contractor.



- c. EMR Power Systems, LLC is the firm that services the generator prior to storage. The contractor is not obligated to use a specific firm to service the generator as part of this project.
 - d. The day tank and the generator sub base tank are empty.
16. Bulletin A, Item H – CLIENT PROVIDED GENERATOR AND DAY TANK
- a. Contractors are advised to review and familiarize themselves with Specification Section 260551- Emergency Standby Power System.
 - i. The Cummins 600KW diesel generator and 3,000 gallon day tank shall be furnished by the owner. The generator and day tank are currently stored offsite at the Treasury Print Shop at 101 Carrol Street, Trenton, NJ 08609 and shall be relocated to the proposed location at DLWD Building at 1 John Fitch Way, Trenton, NJ 08611.
 - ii. The Contractor shall provide, install, and perform an acceptance test of the complete owner furnished generator and day tank.
 - iii. The Contractor shall rig the generator and day tank from the existing storage location to the new proposed location as shown on the design drawings. The contractor shall arrange all necessary permits, permit fees, scheduling with the local Police Department for necessary road closure, and cost of Police Officer(s).
17. Site access to the Carroll Street storage area was made available following the walk through. All bidders were encouraged to visit the location.
18. Overview of the project Scope of Work.
- a. The project scope includes exterior site improvements including the construction of a new elevated generator and auxiliary fuel tank foundation to elevate the generator above the flood hazard area, relocation of the generator and auxiliary fuel tank from storage and installation on foundation, outdoor lighting on generator, fuel transfer pumps and piping, mezzanine and access stairs for maintenance, exploratory test pits, underground conduits, handholes, DGA firebreak ground cover, bollards and site restoration to existing conditions.
 - b. Electrical improvements include furnish and install new 2000 AMP Automatic Transfer Switch, new power panels (PP-PD & PP-PG), stepdown transformers (for UPS & CRAC Unit & Other), lightning protection, furnish and install circuit breakers in existing HPIV Panel, remote annunciator, battery charger, 1200 AMP generator tap box and related accessories, grounding and bonding, all conductors, signal and ground wires and rods.
 - c. The Contractor shall perform generator commissioning, startup and load bank testing, as well as auxiliary fuel tank certification. If necessary, the cost for Generator Maintenance and overhaul will be handled through a bid allowance.
19. Site Specific Requirements
- a. The facility serves a critical function, particularly the 2nd floor data center which contains important servers necessary for several operating systems by State



employees and the public. Interruptions to the electrical service for this equipment is to be limited and restricted to nighttime working hours on Saturday nights which server traffic is reduced; any work not interrupting the electrical service can commence during normal working hours identified. The scheduling and coordination of this shutdown is to be performed well in advance.

20. Walk through

21. Adjourn

Meeting Ended at: 11:05am

Prepared by **SUBURBAN CONSULTING ENGINEERS, INC.:**


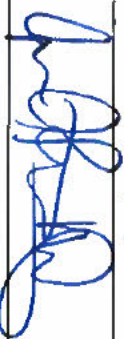




MANDATORY PRE-BID MEETING SIGN-IN SHEET

PROJECT #: A1346-00
(Re-bid)

TRADES: General Construction (C008) or
General Construction/Alterations &
Additions (C009)

PROJECT TITLE: Repurpose Mod Lab Generator -
Department of Labor & Workforce
Development Building
Trenton, Mercer County, NJ

DATE & TIME: April 25, 2023

COMPANY NAME (PRINT)	REPRESENTATIVE (PRINT)	SIGNATURE	TELEPHONE NUMBER	Email Address
DPMC	Michael Cifrodelli		609-292-8715	<u>Michael.cifrodelli@treas.nj.gov</u>
DPMC	Joe Polizzi		609-984-1656	<u>Joseph.Polizzi@treas.nj.gov</u>
DPMC	Vince Campanella		609-943-4831	<u>Vincent.Campanella@treas.nj.gov</u>
DPMC	Mark Dore		609-984-9991	Mark.Dore@treas.nj.gov
Suburban Consulting Engineers, Inc.	Michael McAloon		973-398-1776	<u>mmcaloon@suburbanc consulting.com</u>
NSBA	Andres Osuna-Sanders			<u>Andres.Osuna-Sanders@treas.nj.gov</u>

MANDATORY PRE-BID MEETING SIGN-IN SHEET

PROJECT #:

A1346-00
(Re-bid)

TRADES:





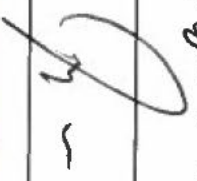


General Construction (C008) or
General Construction/Alterations &
Additions (C009)

PROJECT TITLE:

Repurpose Mod Lab Generator -
Department of Labor & Workforce
Development Building
Trenton, Mercer County, NJ

DATE & TIME:

April 25, 2023

COMPANY NAME (PRINT)	REPRESENTATIVE (PRINT)	SIGNATURE	TELEPHONE NUMBER	Email Address
BRYAN ELECTRIC Co.	Bill Wozniak		609-393-8325	estimating@bryanelectric.com
SUBURBAN CONSULTING	NETTE MITRA		973-997-4119	MANROUCE@SUBURBANCONSULTING.COM
Suburban Consulting	VINIE Khetarpal		973-830-0211	viniekhetarpal@subc.com
Meridian Services	Wayne Robinson		609-920-4800	teran@conslci.com
DPAC	Jerry McClure		609-331-8326	jerymcclure@treas.gov
ATEC	Buddy Amore		732-277-0270	TERNIRE@ATECBUSINESSYSTEMS.COM
DPAC	Michael Reberich		609-252-1163	Michael.Reberich@tran.us.gov


MANDATORY PRE-BID MEETING SIGN-IN SHEET

PROJECT #:
 A1346-00
 (Re-bid)

TRADES:
 General Construction (C008) or
 General Construction/Alterations &
 Additions (C009)

PROJECT TITLE:
 Repurpose Mod Lab Generator -
 Department of Labor & Workforce
 Development Building
 Trenton, Mercer County, NJ

DATE & TIME:
 April 25, 2023

COMPANY NAME (PRINT)	REPRESENTATIVE (PRINT)	SIGNATURE	TELEPHONE NUMBER	Email Address
Seawalk, DBA Imperial Constr.	Dennis Calvero		908-296- 3331	dennis@ImperialCM.com

Project #A1346-00 Re-Bid

Bulletin A

Revised March 20, 2023

STATE OF NEW JERSEY DEPARTMENT OF TREASURY
DIVISION OF PROPERTY MANAGEMENT AND
CONSTRUCTION PO BOX 034, TRENTON, NJ 08625-0034

PROJECT#: A1346-00 Re-Bid

A/E: Suburban Consulting Engineers, Inc.

DATE: March 30, 2023

BULLETIN A

Bidder must acknowledge receipt of this Bulletin on bid form in the space provided therefor.

This Bulletin is issued for the purpose of amending certain requirements of the original Contract Documents, as noted hereinafter, and is hereby made part of and incorporated in full force as part of the Contract Documents. Unless specifically noted or specified hereinafter, all work shall comply with the applicable provisions of the Contract Documents.

A) DIANE B. ALLEN EQUAL PAY ACT

Pursuant to N.J.S.A. 34:11-56.14(b), any employer, regardless of the location of the employer, who enters into a contract with a public body to perform any public work for the public body shall provide to the Commissioner of the New Jersey Department of Labor and Workforce Development, through certified payroll records required pursuant to P.L.1963, c.150 (N.J.S.A. 34:11-56.25 et seq.), information regarding the gender, race, job title, occupational category, and rate of total compensation of every employee of the employer employed in the State in connection with the contract. The employer shall provide the commissioner, throughout the duration of the contract or contracts, with an update to the information whenever payroll records are required to be submitted pursuant to P.L.1963, c.150 (N.J.S.A. 34:11-56.25 et seq.).

Information regarding the Diane B. Allen Equal Pay Act and its requirements may be obtained from the New Jersey Department of Labor and Workforce Development (LWD) web site at:

<https://nj.gov/labor/equalpay/equalpay.html>

LWD forms may be obtained from the online web site at: https://nj.gov/labor/forms_pdfs/equalpayact/MW-562withoutfein.pdf

B) NOTICE OF EXECUTIVE ORDER 166 REQUIREMENT

Pursuant to Executive Order No. 166, signed by Governor Murphy on July 17, 2020, the Office of the State Comptroller ("OSC") is required to make all approved State contracts for the allocation and expenditure of COVID-19 Recovery Funds available to the public by posting such contracts on an appropriate State website. Such contracts will be posted on the New Jersey transparency website developed by the Governor's Disaster Recovery Office (GDRO Transparency Website).

The contract resulting from this [RFP/RFQ] is subject to the requirements of Executive Order No. 166. Accordingly, the OSC will post a copy of the contract, including the [RFP/RFQ], the winning bidder's proposal and other related contract documents for the above contract on the GDRO Transparency website.

In submitting its proposal, a bidder/proposer may designate specific information as not subject to disclosure. However, such bidder must have a good faith legal or factual basis to assert that such designated portions of its proposal: (i) are proprietary and confidential financial or commercial information or trade secrets; or (ii) must not be disclosed to protect the personal privacy of an identified individual. The location in the proposal of any such designation should be clearly stated in a cover letter, and a redacted copy of the proposal should be provided. A Bidder's failure to designate such information as confidential in submitting a bid shall result in waiver of such claim.

The State reserves the right to make the determination regarding what is proprietary or confidential and will advise the winning bidder accordingly. The State will not honor any attempt by a winning bidder to designate its entire proposal as proprietary or confidential and will not honor a claim of copyright protection for an entire proposal. In the event of any challenge to the winning bidder's assertion of confidentiality with which the State does not concur, the bidder shall be solely responsible for defending its designation.

C) IMPORTANT CONTRACTOR INFORMATION – FEDERAL SYSTEM FOR AWARD MANAGEMENT (SAM REGISTRATION):

In accordance with N.J.S.A. 52:32-44.1, any firm seeking to be awarded a contract shall provide a written certification to DPMC that neither the firm nor the firm's affiliates are debarred at the federal level from contracting with a federal government agency. Please see the attached Certification of Non-Debarment Form to be submitted prior to Contract Award.

In addition, any firm seeking to be awarded a contract must register with the Federal System for Award Management (SAM) prior to contract award. In order to comply with this requirement, firms must register in SAM at <http://www.sam.gov> and DPMC will verify the firm's registration in SAM prior to contract award.

D) EMPLOYEE MISCLASSIFICATION

In accordance with [Governor Murphy's Executive Order #25](#) and the [Task Force's July 2019 Report](#), employers are required to properly classify their employees. Workers are presumed to be employees and not independent contractors, unless the employer can demonstrate all three factors of the "ABC Test" below:

- A. Such individual has been and will continue to be free from control or direction of the performance of such service, but under his or her contract of service and in fact; and
- B. Such service is either outside the usual course of business for which such service is performed, or that such service is performed outside of all places of business of the enterprise for which such service is performed; and
- C. Such individual is customarily engaged in an independently established trade, occupation, profession or business.

Project #A1346-00 Re-Bid

Bulletin A

Revised March 20, 2023

These factors have been adopted by New Jersey under its Wage & Hour, Wage Payment and Unemployment Insurance Laws to determine whether a worker is properly classified. Under N.J.S.A. 34:1A-1.17 to 1.19, the Department of Labor and Workforce Development has the authority to investigate potential violations of these laws and issue penalties and stop work orders to employers found to be in violation of the laws.

E) NOTICE OF POST-BID MEETING:

- a. After the bids are received and opened, the Apparent Low Bidder is required to attend a Post- Bid meeting at the State's offices at the date, time and location listed herein.
- b. The Apparent Low Bidder must bring the following to the Post-Bid meeting concerning the work they are performing by their own forces:
 - i. The itemized estimate used in preparation of the bid submission; and
 - ii. The estimator, or other authorized person who can discuss the itemized estimate; and
 - iii. An employee of the company who is authorized to sign the Post-Bid Review meeting minutes.
- c. Each of the Apparent Low Bidder's "Named Sub-Contractors" must attend the meeting and bring the following concerning the work they are performing by their forces:
 - i. The itemized estimate used in preparation of the bid submission; and
 - ii. The estimator, or other authorized person who can discuss the itemized estimate;
- d. A Post-Bid meeting will be held (tentative and to be confirmed after bids are reviewed):

DATE: TBD

TIME: 10:00 AM

LOCATION: DPMC, 20 W State St, Trenton, NJ or Teleconference

F) AMENDMENTS TO THE INSTRUCTIONS TO BIDDERS & GENERAL CONDITIONS OF THE CONTRACT

Amend the Instructions to Bidders of the Contract as follows:

IB 1 BID PROPOSALS

Replace IB 1.5 in its entirety with the following:

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 bidder 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.

Replace IB 1.8 in its entirety with the following:

The bidder must include in the bid envelope: (1) the proposal signed by the bidder, (2) the executed affidavit of non-collusion and (3) bid security as further described in Section IB6.

Replace IB 1.11 Procurement Reform in its entirety with the following:

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. This form 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 contributions 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 will be required to provide a Chapter 51 Certification and Disclosure of Political Contributions form. 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. MacBride Principles - Pursuant to N.J.S.A. 52:34-12.2, a bidder must certify 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 certify, 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. Upon signing the contract, the bidder certifies that it abides by the MacBride Principles.

c. 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 provide, prior to the time a contract is awarded or renewed, a certification 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. 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. This form must be submitted by the bidder prior to contract award.

IB 2 BID MODIFICATIONS

Replace IB 2.1 in its entirety with the following:

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, Fedex, UPS, etc. 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.

Replace IB 2.2 in its entirety with the following:

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 modification is not received within two working days after the scheduled closing time, no consideration will be given to the modification.

IB 3 CONSIDERATION OF BIDS

Replace IB 3.1, Item c in its entirety with the following:

c. The Director reserves the right to waive any bid requirements where such waiver is permitted by law. Such waiver shall be at the sole discretion of the Director.

Replace IB 3.1, Item d in its entirety with the following:

d. The Director reserves the right to reject any and all bids, in accordance with applicable law, 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 4 AWARDS

Replace IB 4.5, in its entirety with the following:

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. and N.J.A.C. 17:27 et seq., regarding Equal Employment Opportunity in Public Works Contracts.

IB 5 QUALIFICATION OF BIDDERS

Replace IB 5.1 in its entirety with the following:

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 and Enterprise Services. No award of contract will be made until the Division of Revenue and Enterprise Services confirms this authorization.

Replace IB 5.2 in its entirety with the following:

IB 5.2 The DPMC 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.

Replace IB 5.5 in its entirety with the following:

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 &
Workforce Development
Division of Wage & Hour Compliance
P O Box 389
Trenton NJ 08625-0389
Telephone: 609-292-9464
FAX: 609-633-8591

Replace IB 5.6 in its entirety with the following:

IB 5.6 In accordance with N.J.S.A. 52:32-44 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 the Treasury, Division of Revenue and Enterprise Services. 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. The bidder and subcontractors must submit a valid Business Registration Certificate prior to contract award.

Pursuant to N.J.S.A. 54:49-4.1, firms who fail to provide a copy of a Business Registration or who provide false information of business registration under the requirements of N.J.S.A. 52:32-44, shall be liable for a penalty of \$25 for each day of violation, not to exceed \$50,000 for each business registration

copy not properly provided under a contract with DPMC.

IB 8 BULLETINS AND INTERPRENTATIONS

Replace IB 8.2 in its entirety with the following:

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 should 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 12 OFFER OF GRATUITIES

Replace IB 12.1, Items a, b and f in their entirety with 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 N.J.S.A. 52:13D-13b. and e., in the Department of the 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 N.J.S.A. 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 N.J.S.A. 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 State Ethics Commission.

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 may promulgate under paragraph IB12.1.c. above.

Amend the General Conditions of the Contract as follows:

ARTICLE 1 – GENERAL PROVISIONS

1.5 ASSIGNMENTS

Delete 1.5 in its entirety and replace with the following:

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.

ARTICLE 4 – THE CONTRACTOR

4.1 REVIEW OF THE CONTRACT DOCUMENTS AND FIELD CONDITIONS

Delete 4.1.1 in its entirety and replace with the following:

The Contractor shall thoroughly examine and be familiar with all of the Contract Documents and the 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.

4.3 PERMITS, LAWS, AND REGULATIONS

Delete 4.3.1 in its entirety and replace with the following:

The DPMC will 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.

Delete 4.3.7 in its entirety and replace with the following:

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

Delete 4.3.9 in its entirety and replace with the following:

Consistent with section 4.4 and 4.5 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.

Delete 4.3.13 in its entirety and replace with the following:

The Contractor shall 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

Delete 4.4.2 in its entirety and replace with the following:

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 at no cost to the State.

4.9 EXCAVATIONS, CUTTING AND PATCHING

Delete 4.9.1 in its entirety and replace with the following:

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.

4.11 EQUIPMENT AND MATERIALS

4.11.5 Delete the second sentence - *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.*

4.12 TEMPORARY FACILITIES

Delete 4.12.5, Item a in its entirety and replace with the following:

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 roadway and pedestrian ways in serviceable condition.

4.15 PROTECTION/SAFETY

Delete 4.15.2, Item c in its entirety and replace with the following:

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.

4.18 PROJECT SIGN

Delete 4.18 in its entirety

Add the following paragraphs and sub-paragraphs:

4.18.1 SIGNS AT THE PROJECT SITE

4.18.1.1 The Contractor is not required to provide a project sign.

4.18.1.2 Signs provided by others will not be permitted at the site.

4.20 DPMC FIELD OFFICE

Delete 4.20.1 in its entirety and replace with the following language:

A separate on-site field office for the use of DPMC personnel is not required for this project.

Delete 4.20.2 in its entirety and replace with the following language:

If required, a separate on-site field office for the use by the Contractor is specified elsewhere in the construction documents.

4.21 PHOTOGRAPHS

Delete 4.21.1 in its entirety and replace with the following language:

The Contractor shall submit pre-construction photographs and videos and 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.

ARTICLE 5 - SUBCONTRACTORS

5.1 SUBCONTRACTORS AND MATERIAL SUPPLIER APPROVALS

Delete 5.1.1 in its entirety and replace with the following:

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 and Workforce Development Public Works Contractor Registration and New Jersey Business Registration Certificate are required for all Subcontractors.

Delete 5.1.2 in its entirety and replace with the following:

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

5.2 CONTRACTOR-SUBCONTRACTOR RELATIONSHIP

Delete 5.2.3 in its entirety

ARTICLE 6 - CONSTRUCTION PROGRESS SCHEDULE

Revise Article 6 as follows:

6.1 GENERAL

Delete 6.1 in its entirety and replace with the following:

The Contractor shall be required to provide Graphic Format progress schedules, as defined in section 6.4 below.

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

Delete 6.2 in its entirety:

6.3 CONSTRUCTION PROGRESS SCHEDULING PROVIDED BY THE CONTRACTOR. Delete

6.3.1 in its entirety and replace with the following language:

6.3.1 *Schedule Format: The contractor shall be responsible for preparing, updating and distributing a Gantt chart progress schedule constructed using either Microsoft Project or a Microsoft Project compatible software ["Schedule"] for the project work in accordance with this Sub- paragraph.*

6.3.1.1 The Schedule must be furnished as a Microsoft Project file and in paper format if required.

6.3.2 *Requirements for what is included in the Schedule: The Schedule shall fully describe the project work in sufficient detail to satisfy the architect/ engineer and the Director.*

6.3.2.1 The Schedule must be accurate in its depiction of all project activities.

- 6.3.2.2 *The Schedule shall, at a minimum, indicate in suitable detail, all significant features of the work or work activities to be performed, including the placing of orders and anticipated delivery dates for critical items, dates for submissions and approvals of submittals and shop drawings, all change order work, all necessary inspections, the beginning and time duration for all tasks, predecessors and successors for each task, contract milestones, the NTP, the dates of substantial and final completion of the work and significant Agency or State milestones, when applicable.*
- 6.3.2.3 *The Schedule must show the project's critical path.*
- 6.3.2.4 *The contractor may be required to add other information to the Schedule including, but not limited to, costs and resources.*
- 6.3.2.5 *The Schedule must show the durations in calendar day and acknowledge weekends and State holidays as non-working days, unless otherwise required by the contract.*
- 6.3.2.6 *The Schedule must show the date of Substantial Completion occurring on or before the contract duration end date unless otherwise approved by the architect / engineer and the Director.*
- 6.3.3 *The Schedule as the project record: The contractor agrees that the Schedule shall constitute the official historical record of project's progress.*
- 6.3.4 *Approved Schedule: All references herein to the Schedule shall mean a Schedule that is approved by the Project Team including, but not limited to the architect/engineer and the Director.*
- 6.3.4.1 *The architect/engineer or Director can request the addition of information to the schedule when it is, in their opinion, necessary to better describe the contractor's work effort prior to granting their approval.*
- 6.3.5 *Complying with the Schedule: The contractor shall furnish sufficient labor, materials and equipment to ensure the prosecution of the work in accordance with the Schedule.*
- 6.3.6 *Recovery Schedule: The contractor is required to provide a recovery schedule if the completion time for any task deemed necessary for Substantial Completion is not scheduled to be complete prior to the contract duration allotted in the contract.*
- 6.3.6.1 *To create the recovery schedule the contractor shall, among other things, revise the sequence of tasks and /or the time for performance of tasks through concurrent operations, additional manpower or, when allowable, overtime or additional shifts etc. until it is assured that Substantial Completion will occur on or before the contract completion date.*
- 6.3.6.2 *The State will not allow any additional charges for work performed or made necessary in order for the contractor to comply with the dates shown in the recovery schedule i.e. no additional charges will be allowed the contractor for overtime, additional manpower, equipment, additional shifts, etc., except as provided for elsewhere in the contract.*
- 6.3.6.3 *The contractor is required to perform in accordance with the tasks and durations as shown in the recovery schedule including meeting the dates shown for Substantial and Final Completion.*

- 6.3.3.4 *The recovery schedule must comply with all requirements of this section and all references to and requirements for the Schedule shall also apply to the recovery schedule.*
- 6.3.7 *Submission and review requirements for the project schedule:*
- 6.3.7.1 *The contractor must submit and obtain approval of the initial schedule within 30 days after the Notice to Proceed, but in no case later than the first application for payment.*
- 6.3.7.2 *Subsequently the contractor must update and submit the project schedule immediately upon the occurrence of a change in an activity or event that may, in the architect's/engineers/s opinion, significantly change the current approved schedule, but at a minimum the schedule must be updated every two weeks and submitted at the bi-weekly progress meeting.*
- 6.3.7.3 *The updated schedule must include any activities that were added for any reason including, but not limited to change order work approved to date.*
- 6.3.7.4 *The updated progress schedule shall include the progress achieved for each activity that was scheduled including the actual dates the work was started and completed.*
- 6.4.7.5 *The project schedule shall be reviewed in detail at every bi-weekly progress meeting.*
- 6.3.7.6 *The absence of bi-weekly meetings does not relieve the contractor of his obligation to provide a schedule every two weeks.*
- 6.3.7.7 *The architect/engineer or Director reserves the right to cancel or reschedule the bi-weekly meeting or otherwise take preemptive action if the contractor does not have an approved progress schedule ready for submission as described herein.*
- 6.3.8 *Schedules and payments or extensions of time:*
- 6.3.8.1 *The contractor will make no claim for, and have no right to, additional payment or extension of time for completion of the work in accordance with the schedule, or any other concession because of any misinterpretation or misunderstanding on the contractor's part of the project schedule, or 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 contractor's failure to properly participate in the development of a schedule or to perform the contract in accordance with the schedule.*
- 6.3.8.2 *A copy of the current, updated and approved schedule is a required attachment to each application for payment.*
- 6.3.8.3 *Failure to include a copy of the current, updated and approved schedule with the payment request shall be cause for rejection of the progress payment request.*
- 6.3.9 *Two week look ahead/look behind work plan: In addition to the project schedule requirements, the contractor is required to submit a two week look ahead/look behind work plan at every bi-weekly project meeting.*

- 6.3.9.1 *The work plan shall focus on the activities that have been completed in the last two weeks and those planned for the next two weeks.*
- 6.3.9.2 *The work plan shall be in greater depth than the overall project schedule.*
- 6.3.9.3 *The work plan shall identify the contractor's activities that impact the operations and occupants of the State building or facility of the subject project.*
- 6.3.9.4 *The work plan shall be a subset of the current schedule and all activities shall coordinate between them.*
- 6.3.9.5 *The absence of a bi-weekly meeting shall not relieve the contractor of his responsibility to provide this work plan.*
- 6.3.9.6 *This work plan is in addition to and not in lieu of the schedule requirements described in Sub-paragraph 6.4 et al.*
- 6.3.10 *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.*
- 6.3.11 *The "Construction Duration" identified on the Bid Proposal Form shall be from the Notice to Proceed to Substantial Completion.*

ARTICLE 7 – TIME OF COMPLETION

7.5 DELAY, DISRUPTION AND INTERFERENCE

Delete 7.5.2, Contractor's Damage for Delay, Disruption or Interference in its entirety and replace with the following:

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 tortious 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).

ARTICLE 9 – PAYMENTS

9.1 INVOICES

Delete 9.1.5, Item a in its entirety and replace with the following:

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);

Delete 9.1.6 in its entirety and replace with the following:

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

Delete 9.2.2 in its entirety and replace with the following:

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.

Delete 9.2.3 in its entirety and replace with the following:

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.

9.8 MISCELLANEOUS

Delete 9.8.1 in its entirety and replace with the following:

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 Liability Act, N.J.S.A. 59:13-1, et seq., which governs claims against the DPMC.

ARTICLE 13 – OTHER REQUIREMENTS

13.1 PREVAILING WAGE

Delete 13.1.1, Item a, 2 in its entirety and replace with the following:

(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 and Workforce Development
Division of Wage & Hour Compliance
P O Box 389
Trenton NJ 08625-0389
Telephone: 609-292-9464
FAX: 609-633-8591

13.4 INSURANCE

Rename 13.4.1, Item b: "Business/Commercial Automobile Liability":

G) REVISIONS AND/OR CLARIFICATIONS TO THE DRAWINGS, SPECIFICATIONS AND/OR PROJECT REQUIREMENTS;

1. UCC Permits have been paid by the State.
2. All Technical Sections that reference manufacturers and products are hereby revised to include "Or Approved Equal." Technical Sections of the Specifications have not been reissued as part of this Bulletin A.
3. "Approved Equal" requests must be presented in writing during the Question and Answer period of the Bid Phase, after which they will not be considered. The Question and Answer period will be provided by the DPMC during the bid phase or announced at the Pre-Bid Meeting. A response will be provided by the Consultant via Bulletin.
4. As it relates to testing and inspections, all testing and inspections indicated in the specifications shall be performed by a DPMC prequalified firm and arranged and paid for by the Contractor and in no situation by the Owner.
5. INSTALLER, MANUFACTURER & FABRICATOR QUALITY ASSURANCE & QUALIFICATIONS: Eliminate any and all references to "Installer" and/or "Fabricator" quality assurance requirements which specifically pertain to stated minimum required experience in years and number of previous projects. All other requirements for QA/QC, including but not limited to compliance with relevant codes, standards, and manufacturer installation instructions remain applicable.
6. Delete any and all references to "Supplemental General Conditions" and "Special Conditions".
7. All businesses engaged in construction projects in the State must adopt policies that include, at a minimum, the requirements as per all Executive Orders, NJDOH and CDC recommendations regarding COVID. Please see the attached DPMC Notice dated March 9, 2022 to All Contractors and Project Personnel on DPMC Construction Projects.
8. Pursuant to N.J.S.A. 52:32-60.1, the Bidder must certify prior to contract award that the Bidder is not identified on the Department of the Treasury's list of Vendors engaged in prohibited activities in Russia or Belarus and that neither the Bidder nor any of the its parents, subsidiaries, or affiliates is engaging in prohibited activities in Russia or Belarus as defined by N.J.S.A. 52:32-60.1(e). If the Bidder is unable to

so certify, the Bidder shall provide a detailed and precise description of such activities.

***Contractors are advised that the firm to be awarded the project will be required to submit a signed certification that the firm complies with all requirements of P.L. 2022, c.3 prior to contract award. Please see the attached Certification of Non-Involvement in Prohibited Activities in Russia or Belarus form to be issued prior to Contract Award.**

9. The Investment Activities in Iran Form is attached to this Bulletin. The apparent low bidder will be required to submit this form prior to Contract Award.
10. Working hours are Monday to Friday, 7:00am to 3:30pm. Facility shutdowns require a written request with a minimum of 48-hour notice and DPMC and Engineering approval. No work is permitted on NJ state holidays.
11. The generator was operational and service was performed prior to its relocation to the Carroll Street storage area. Maintenance is to be performed in accordance with the Contract Documents prior to start-up by the contractor.
12. The day tank and the generator sub base tank are empty.
13. EMR Power Systems, LLC is the firm that serviced the generator prior to storage. The contractor is not obligated to use a specific firm to service the generator as part of this project.
14. Contractor is directed to Specification (page 360-369) Division 26, section 260551.03 paragraph 1.2, bullet number 9. "Fuel piping contractor shall submit shop drawings showing the piping and pumping schematic to the Engineer for approval." The fuel oil piping system is specified on a performance basis and shall conform to all applicable codes and industry standards. The requirement is placed on the contractor to specify and design the fuel delivery system, no different than if this was a new complete furnish and install contract. In this project case, the owner furnished generator and fuel tank are to be fitted with new fuel delivery and management system, designed by the contractor, submitted for approval by the engineer of record.
15. Contractor to provide a new fuel pump controller as part of the new fuel delivery and management system.
16. Contractor is directed to (page 360-369) Division 26, section 260551.05 which provides the full specification on Heat Tracing for Diesel Fuel Piping. Heat tracing of the fuel oil piping is required.
17. Access to the work location will be through the newly installed parking lot to the east of the proposed generator.
18. Contractor is to install a depressed curb as part of this project.

H) CLIENT PROVIDED GENERATOR AND DAY TANK:

1. Contractors are advised to review and familiarize themselves with Specification Section 260551 – Emergency Standby Power System, Items 1.1, A and 1.2, A & B. These items provide specific details with regard to the Client Agency provided Generator and Day Tank to be used on this project.

Project #A1346-00 Re-Bid

Bulletin A

Revised March 20, 2023

ATTACHMENTS:

1. DPMC Notice dated March 9, 2022 to All Contractors and Project Personnel on DPMC Construction Projects.
2. Certification of Non-Involvement in Prohibited Activities in Russia or Belarus form
3. Certification of Non-Debarment Form
4. Investment Activities in Iran Form

END OF BULLETIN A



State of New Jersey

DEPARTMENT OF TREASURY
DIVISION OF PROPERTY MANAGEMENT & CONSTRUCTION
P O BOX 034
TRENTON NJ 08625-0034

PHILIP D. MURPHY
Governor

ELIZABETH MAHER MUOIO
State Treasurer

SHEILA Y. OLIVER
Lt. Governor

CHRISTOPHER CHIANESE
Director

March 9, 2022

To All Contractors and Project Personnel on DPMC Construction Projects:

All businesses engaged in construction projects in the State must adopt policies that include, at minimum, the following requirements as per all active Executive Orders, NJDOH and CDC recommendations regarding COVID. **With EO 283 and revised by EO 290, certain project facilities require full vaccination (including booster shots) prior to entrance into a covered Health Care facility or high-risk congregate facility. These requirements and the associated revised effective dates for workers at covered facilities per EO 290 are outlined below.**

For Design and Construction Contracts involving certain DOH, DHS, DOC and JJC facilities:

Pursuant to Executive Order No. 283 ("EO283"), Contractors and Consultants working in "health care settings" such as in-patient, rehabilitative and psychiatric hospitals and long-term care residential facilities, and in "high-risk congregate settings" including State and County Adult and Juvenile correctional facilities, secure care facilities, and residential facilities for individuals with disabilities (see EO283 Paragraph 6, page 8-9 for additional examples of each type of facility), are **required to become fully vaccinated, including booster shots.**

For covered workers entering certain Health Care facility settings (subject to the CMS Rule) in accordance with EO 283 paragraph 1, page 6-7, the first dose of the vaccine shall be obtained by January 27, 2022 and per EO 290 paragraph 1, page 6) workers must provide proof they are up-to-date with their COVID-19 vaccinations (including booster shots) by April 11, 2022, or within 3 weeks of eligibility for a booster shot, whichever is later.

For covered workers entering certain Health Care facility settings (not subject to the CMS Rule) and those workers in high-risk congregate settings (EO 283 paragraph 2, page 7), the first dose of the vaccine shall be obtained by February 16, 2022 and per EO 290 workers must provide proof they are up-to-date with their COVID-19 vaccinations (including booster shots) by May 11, 2022, or within 3 weeks of eligibility for a booster shot, whichever is later.

All covered workers must remain up to date with their COVID-19 vaccinations and provide proof of same.

Further details are found at pages 6-11 of EO283 and pages 6-8 of EO290 and it is recommended that all affected consultants and contractors review them carefully.

COVID Policies on DPMC Construction Projects

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For all projects at facilities covered by EO's 283 and 290 and also those not covered by them, the following policies and procedures continue to apply for businesses engaged in construction projects in the State:

- a. Prohibit non-essential visitors from entering the worksite;
- b. Engage in appropriate social distancing measures when picking up or delivering equipment or materials;
- c. For indoor gatherings require individuals to maintain six feet or more distance between them to the maximum extent possible with all individuals wearing cloth face coverings;
- d. Stagger work start and stop times where practicable to limit the number of individuals entering and leaving the worksite concurrently;
- e. Identify congested and "high-traffic areas," including but not limited to lunchrooms, breakrooms, portable rest rooms, and elevators, and limit the number of individuals at those areas concurrently where practicable and require individuals to wear cloth face coverings;
- f. Stagger lunch breaks and work times where practicable to enable operations to safely continue while utilizing the least number of individuals possible at the site;
- g. Require workers and visitors to the worksite to wear cloth face coverings while on the premises, in accordance with CDC recommendations, except where it is impracticable for an individual to wear a face mask, such as when the individual is eating or drinking or where a service being provided by the employer cannot be performed by an individual wearing a mask, and require workers to wear gloves while on the premises. Businesses must provide, at their expense, such face coverings. If a visitor refuses to wear a cloth face covering for non-medical reasons and if such covering cannot be provided to the individual by the business at the point of entry, then the business must decline entry to the individual. Nothing in the stated policy should prevent workers or visitors from wearing a surgical-grade mask or other more protective face covering if the individual is already in possession of such equipment, or if the businesses is otherwise required to provide such worker with more protective equipment due to the nature of the work involved. Where an individual declines to wear a face covering on the premises due to a medical condition that inhibits such usage, neither the business nor its staff shall require the individual to produce medical documentation verifying the stated condition;
- h. Require infection control practices, such as regular hand washing, coughing and sneezing etiquette, and proper tissue usage and disposal;
- i. Limit sharing of tools, equipment, and machinery and any shared equipment should be cleaned between uses;
- j. Where running water is not available, provide portable washing stations with soap and/or alcohol-based hand sanitizers that contain at least 60% alcohol and sanitizing wipes that are approved by the United States EPA for SARS0CoV-2 virus to employees and visitors at no cost to the individuals. Employers may also adopt policies that require employees to wear gloves while at the worksite;
- k. Routinely clean and disinfect all high-touch areas particularly in spaces that are accessible to employees or other individuals, including but not limited to restrooms, hand rails, door knobs, breakrooms, machinery, safety equipment and other frequently touched surfaces including employee used equipment, and ensure cleaning procedures following a known or potential exposure are in compliance with CDC recommendations;

COVID Policies on DPMC Construction Projects

Page 3

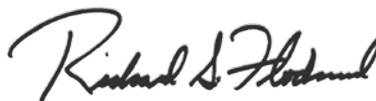
- l. When the worksite is an occupied residence, require workers to sanitize work areas and keep a distance of at least six feet from the occupants; and
- m. Place conspicuous signage at entrances and throughout the worksite detailing the above mandates.

Additionally, Contractors and Project Personnel on DPMC construction projects must continue to:

- a. Prior to each shift, conduct daily health checks of employees, such as temperature screenings, visual symptom checking, self-assessment checklists, and/or health questionnaires, consistent with CDC guidance including latest CDC guidance regarding COVID-19 symptoms, consistent with the confidentiality requirements of the ADA, NJLAD and any other applicable laws, and consistent with any guidance from the Equal Employment Opportunity Commission (“EEOC”) and the New Jersey Division on Civil Rights;
- b. Immediately separate and send home workers who appear to have symptoms, as defined by the CDC, consistent with COVID-19 illness upon arrival at work or who become sick during the day;
- c. Promptly notify workers of any known exposure to COVID-19 at the worksite, consistent with the confidentiality requirements of the Americans with Disabilities Act and any other applicable laws and consistent with the guidance from the EEOC;
- d. Clean and disinfect the worksite in accordance with current CDC guidelines when a worker at the site has been diagnosed with COVID-19 illness; and
- e. Continue to follow guidelines and directives issued by the New Jersey Department of Health, the CDC and the Occupational Health and Safety Administration, as applicable, for maintaining a clean, safe and healthy work environment.

These COVID-related protections, policies and directives issued in accordance with all current Executive Orders and CDC recommendations shall remain in effect until revoked or modified by the Governor or as amended or clarified by the State Director of Emergency Management.

Respectfully,



Richard Flodmand
Deputy Director, Contract Administration
Division of Property Management
and Construction



CERTIFICATION OF NON-INVOLVEMENT IN PROHIBITED ACTIVITIES IN RUSSIA OR BELARUS

CONTRACT / BID SOLICITATION TITLE _____

CONTRACT / BID SOLICITATION No. _____

Pursuant to N.J.S.A. 52:32-60.1, et seq. (P.L. 2022, c.3) any person or entity (hereinafter "Vendor"¹) that seeks to enter into or renew a contract with a State agency for the provision of goods or services, or the purchase of bonds or other obligations, must complete the certification below indicating whether or not the Vendor is engaged in prohibited activities in Russia or Belarus². If the Department of the Treasury finds that a Vendor has made a certification in violation of the law, it shall take any 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.

CERTIFICATION

I, the undersigned, certify that I have read the definition of "Vendor" below, and have reviewed the [Department of the Treasury's list](#) of Vendors engaged in prohibited activities in Russia or Belarus, and having done so certify:

(Check the Appropriate Box)

- A. That the Vendor is not identified on the Department of the Treasury's list of Vendors engaged in prohibited activities in Russia or Belarus and is not engaged in prohibited activities in Russia or Belarus.
- OR**
- B. That I am unable to certify as to "A" above, because the Vendor is identified on the Department of the Treasury's list of Vendors engaged in prohibited activities in Russia and/or Belarus.
- OR**
- C. That I am unable to certify as to "A" above, because the Vendor, though not identified on the Department of the Treasury's list of Vendors engaged in prohibited activities in Russia or Belarus, is engaged in prohibited activities in Russia or Belarus. A detailed, accurate and precise description of the Vendor's activity in Russia and/or Belarus is set forth below.

Description of Prohibited Activity (Attach Additional Sheets If Necessary.)

Additional Certification of Federal Exemption and/or License

(Complete only if appropriate)

- D. I, the undersigned, certify that Vendor is currently engaged in activity in Russia and/or Belarus, but is doing so consistent with federal law and/or regulation and/or license. A detailed description of how the Vendor's activity in Russia and/or Belarus is consistent with federal law, or is within the requirements of the federal exemption and/or license is set forth below. (Attach Additional Sheets If Necessary.)

Signature of Vendor's Authorized Representative

Print Name and Title of Vendor's Authorized Representative

Vendor's Name

Vendor's Address (Street Address)

Vendor's Address (City/State/Zip Code)

Date

Vendor's FEIN

Vendor's Phone Number

Vendor's Fax Number

Vendor's Email Address

Definitions

¹ Vendor means: (1) A natural person, corporation, company, limited partnership, limited liability partnership, limited liability company, business association, sole proprietorship, joint venture, partnership, society, trust, or any other nongovernmental entity, organization, or group; (2) Any governmental entity or instrumentality of a government, including a multilateral development institution, as defined in Section 1701(c)(3) of the International Financial Institutions Act, 22 U.S.C. 262r(c)(3); or (3) Any parent, successor, subunit, direct or indirect subsidiary, or any entity under common ownership or control with, any entity described in paragraph (1) or (2).

² Engaged in prohibited activities in Russia or Belarus means: (1) companies in which the Government of Russia or Belarus has any direct equity share; (2) having any business operations commencing after the effective date of this act that involve contracts with or the provision of goods or services to the Government of Russia or Belarus; (3) being headquartered in Russia or having its principal place of business in Russia or Belarus, or (4) supporting, assisting or facilitating the Government of Russia or Belarus in their campaigns to invade the sovereign country of Ukraine, either through in-kind support or for profit.

NEW JERSEY DEPARTMENT OF THE TREASURY
DIVISION OF PROPERTY MANAGEMENT AND CONSTRUCTION
CERTIFICATION OF NON-DEBARMENT FORM

DPMC Contract No: _____

Contract Name: _____

Contractor Name: _____

Contractor Address: _____

CERTIFICATION

Pursuant to N.J.S.A. 52:32-44.1, I, the undersigned, being duly authorized to complete this certification on behalf of the above-named Contractor, do hereby certify and attest, under the pains and penalties of perjury, that:

- The Contractor is not debarred at the federal level from contracting with the federal government;
- None of the parent entities, subsidiaries, related entities or affiliates of the Contractor are debarred at the federal level from contracting with the federal government;
- I am authorized to execute this certification on behalf of the Contractor;
- I acknowledge that the State of New Jersey is relying on the information contained herein;
- I acknowledge that I am under a continuing obligation from the date of this certification through the completion of any contract(s) with DPMC to notify DPMC in writing of any changes to the information contained herein; and
- I acknowledge that it is a criminal offense to make a false statement or misrepresentation in this certification. If I do so, I will be subject to criminal prosecution, and such misrepresentation may be considered fraudulent, and/or a material breach of the Contractor's contract(s) with the State of New Jersey.

If DPMC finds a person or entity to be in violation of the law, it shall take action as may be appropriate and permitted by law, rule or contract, including but not limited to, imposing sanctions, seeking compliance, recovering damages, declaring the party in default and/or seeking debarment or suspension of the party.

Signature: _____

Print Name: _____

Title: _____

Date: _____

DISCLOSURE OF INVESTMENT ACTIVITIES IN IRAN FORM

BID SOLICITATION # AND TITLE: _____

BIDDER NAME: _____

Pursuant to N.J.S.A. 52:32-57, et seq. (P.L. 2012, c.25 and P.L. 2021, c.4) any person or entity that submits a bid or proposalor otherwise proposes to enter into or renew a contract with the State of New Jersey must certify that neither the person nor entity, nor any of its parents, subsidiaries, or affiliates, is identified on the New Jersey Department of the Treasury’s Chapter 25 List as a person or entity engaged in investment activities in Iran. The Chapter 25 list is found at <https://www.state.nj.us/treasury/purchase/pdf/Chapter25List.pdf>. Bidders must review this list prior to completing the below certification. If the Director of the Division of Property Management and Construction finds a person or entity to be in violation of the 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/or seeking debarment or suspension of the party.

CHECK THE APPROPRIATE BOX

I certify, pursuant to N.J.S.A. 52:32-57, et seq. (P.L. 2012, c.25 and P.L. 2021, c.4), that neither the Bidder listed above nor any of its parents, subsidiaries, or affiliates is listed on the New Jersey Department of the Treasury’s Chapter 25 List of entities determined to be engaged in prohibited activities in Iran.

OR

I am unable to certify as above because the Bidder and/or one or more of its parents, subsidiaries, or affiliates is listed on the New Jersey Department of the Treasury’s Chapter 25 List. I will provide a detailed, accurate and precise description of the activities of the Bidder, or one of its parents, subsidiaries or affiliates, has engaged in regarding investment activities in Iran by completing the information requested below.

Entity Engaged in Investment Activities
Relationship to Bidder
Description of Activities

Duration of Engagement
Anticipated Cessation Date

Attach Additional Sheets If Necessary.

CERTIFICATION

I, the undersigned, certify that I am authorized to execute this certification on behalf of the Bidder, that the foregoing information and any attachments hereto, to the best of my knowledge are true and complete. I acknowledge that the State of New Jersey is relying on the information contained herein, and that the Bidder is under a continuing obligation from the date of this certification through the completion of any contract(s) with the State to notify the State in writing of any changes to the information contained herein; that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification. If I do so, I will be subject to criminal prosecution under the law, and it will constitute a material breach of my agreement(s) with the State, permitting the State to declare any contract(s) resulting from this certification void and unenforceable.

Signature

Date

Print Name and Title