Gerald R. Ford International Airport

Medium Voltage Loop
5500 44th Street SE
Grand Rapids, Michigan 49512

Project Manual
GFIAA Project No. C-419
Fishbeck Project No. 241208

BIDS AND PERMIT

fishbeck
Engineers | Architects | Scientists | Constructors

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PROJECT MANUAL
FOR
GERALD R. FORD INTERNATIONAL AIRPORT

MEDIUM VOLTAGE LOOP
5500 44TH STREET SE
GRAND RAPIDS, MICHIGAN 49512

January 20, 2025
GFIAA Project Number C-419
Project Number 241208

ENGINEER

FISHBECK
1515 Arboretum Drive, SE
Grand Rapids, MI 49546]
616.575.3824

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SECTION 00 01 10 - TABLE OF CONTENTS

SECTION 00 21 13 - INSTRUCTIONS TO BIDDERS

SUMMARY

1.1 DOCUMENT INCLUDES

A. Invitation
   1. Bid Submission
   2. Intent
   3. Work Identified in Contract Documents
   4. Contract Time

B. Bid Documents and Contract Documents
   1. Definitions
   2. Contract Documents Identification
   3. Availability
   4. Examination
   5. Inquiries/Addenda
   6. Product/Assembly/System Substitutions

C. Site Assessment
   1. Site Examination

D. Bid Submission
   1. Bid Depository
   2. Submission Procedure
   3. Bid Ineligibility

E. Bid Enclosures/Requirements
   1. Security Deposit
   2. Performance Assurance
   3. Bid Form Requirements
   4. Bid Form Signature
   5. Additional Bid Information
   6. Selection and Award of Alternates

F. Offer Acceptance/Rejection
   1. Duration of Offer
   2. Acceptance of Offer

INVITATION

2.1 BID SUBMISSION

A. Bids signed and under seal, executed, and dated will be received at the office of the GFIAA before 10:00 a.m. local standard time on February 7, 2025.
   1. Deliver to the GFIAA Engineering Office Front Desk
      5500 44th St. SE
      Grand Rapids, Michigan 49512
   2. Bids may be delivered Electronically to the link:
      GFIAA Medium Voltage Loop Bids Received

B. Offers submitted after the above time will be returned to the bidder unopened.

C. Offers will be opened at 10:00 a.m. on the 7th day of February, in the International Room A of the Gerald R. Ford International Airport.

D. Amendments to the submitted offer will be permitted if received in writing prior to bid closing and if endorsed by the same party or parties who signed and sealed the offer.

2.2 INTENT

A. The intent of this Bid request is to obtain an offer to perform work to complete project named Medium Voltage Loop for a Stipulated Sum contract, in accordance with Contract Documents.

2.3 WORK IDENTIFIED IN THE CONTRACT DOCUMENTS

A. Work of this proposed Contract comprises installation of a campus electrical loop as outlined in the Bid Documents, including general construction, electrical, and site Work.

B. Project Location:
5500 44th St SE.
Grand Rapids, Michigan49512.

2.4 CONTRACT TIME

A. Perform the Work within the time state in Section 00 41 00 - Bid Form.

B. The bidder, in submitting an offer, accepts the Contract Time period stated for performing the Work. The completion date in the Agreement shall be the Contract Time added to the commencement date. The bidder may suggest a revision to the Contract Time with a specific adjustment to the Bid Amount.

BID DOCUMENTS AND CONTRACT DOCUMENTS

3.1 DEFINITIONS

A. Bid Documents: Contract Documents supplemented with Instructions to Bidders, Information Available to Bidders, Bid Form Bid securities identified.

B. Bid, Offer, or Bidding: Act of submitting an offer under seal.

C. Bid Amount: Monetary sum identified by the Bidder in the Bid Form.

3.2 CONTRACT DOCUMENTS IDENTIFICATION

A. Contract Documents are identified as GFIAA's Project Number C-419, as prepared by Engineer, and with contents as identified in the Project Manual.

3.3 AVAILABILITY

A. Bid documents may be obtained at the following link: GFIAA MV Loop Bid Documents

B. Bid Documents are made available only for the purpose of obtaining offers for this project. Their use does not grant a license for other purposes.

3.4 EXAMINATION

A. Bid Documents are available online at the following link: GFIAA MV Loop Bid Documents

B. Upon receipt of Bid Documents verify that documents are complete. Notify Engineer should the documents be incomplete.

C. Immediately notify Engineer upon finding discrepancies or omissions in the Bid Documents.

3.5 INQUIRIES/ADDENDA

A. Direct questions to Kristi Kelly, email; kkelly@fishbeck.com.
   1. Email inquiries should include the Engineer project number or GFIAA project number in the subject line to ensure prompt response.

B. Addenda may be issued during the bidding period. All Addenda become part of Contract Documents. Include resultant costs in the Bid Amount.

C. Verbal answers are not binding on any party.

D. Clarifications requested by bidders must be in writing no later than 5:00pm, local time, February 4, 2025. The reply will be in the form of an Addendum, a copy of which will be forwarded to known recipients.

3.6 PRODUCT/ASSEMBLY/SYSTEM SUBSTITUTIONS

A. General Requirements for Substitution Requests:
   1. Project Manual establishes standards for products, assemblies, and systems.
   2. Submit requests only for elements for which substitution is specifically allowed in the Project Manual.
   3. Provide sufficient information to determine acceptability of proposed substitutions.
   4. Provide complete information on required revisions to other work to accommodate each proposed substitution.

B. Substitution Request Time Restrictions:
   1. Where the Bid Documents stipulate a particular product, substitutions will be considered up to 10 days before receipt of bids.

C. Substitution Request Form:
   1. Submit substitution requests by completing the form in Section 00 43 25; see this section for additional information and instructions. Use only this form; other forms of submission are unacceptable.

D. Review and Acceptance of Request:
   1. Engineer may approve the proposed substitution and will issue an Addendum to known bidders.
   2. For approved substitutions, include representation of changes in the bid, if any, required in the work and changes to Contract Time and Contract Sum to accommodate such substitutions. A later claim by the bidder for an addition to the Contract Time or Contract Sum because of changes in work necessitated by use of substitutions will not be considered.

E. See Section 01 25 00 - Substitution Procedures for additional requirements.

SITE ASSESSMENT

4.1 SITE EXAMINATION

A. The bidder is required to contact Engineer in order to arrange a date and time to visit the project site: Adam Meeker, 616.464.3881, akmeeker@fishbeck.com.

B. Visiting secure areas will require escort by badged officials.

BID SUBMISSION

5.1 SUBMISSION PROCEDURE

A. Bidders shall be solely responsible for the delivery of their bids in the manner and time prescribed.

B. Submit one copy of the executed offer on the Bid Forms provided, signed and sealed with the required security in a closed opaque envelope, clearly identified with bidder's name, project name, number and GFIAA's name on the outside.

C. Bids may be submitted electronically to the following: GFIAA Medium Voltage Loop Bids Received

D. Improperly completed information, irregularities in bid bond, may be cause not to open the Bid Form envelope and declare the bid invalid or informal.

E. An abstract summary of submitted bids will be made available to all bidders following bid opening.

5.2 BID INELIGIBILITY

A. Bids that are unsigned, improperly signed or sealed, conditional, illegible, obscure, contain arithmetical errors, erasures, alterations, or irregularities of any kind, may at the discretion of the GFIAA, be declared unacceptable.

B. Bid Forms, Appendices, and enclosures that are improperly prepared may, at the discretion of GFIAA, be declared unacceptable.

BID ENCLOSURES/REQUIREMENTS

6.1 SECURITY DEPOSIT

A. Bids shall be accompanied by a security deposit as follows:
   1. Bid Bond of a sum no less than 5 percent of the Bid Amount on AIA A310 Bid Bond Form.

B. Endorse the Bid Bond in the name of the GFIAA as obligee, signed and sealed by the principal (Contractor) and surety.

C. The security deposit will be returned after delivery to the GFIAA of the required Performance and Payment Bond(s) by the accepted bidder.

D. Include the cost of bid security in the Bid Amount.

E. If no contract is awarded, all security deposits will be returned.

6.2 PERFORMANCE ASSURANCE

A. Accepted Bidder: Provide a Performance bond as described in 00 73 00 - Supplementary Conditions.

B. Include the cost of performance assurance bonds in the Bid Amount.

6.3 BID FORM REQUIREMENTS

A. Complete all requested information in the Bid Form and Appendices.

6.4 BID FORM SIGNATURE

A. The Bid Form shall be signed by the bidder, as follows:
   1. Sole Proprietorship: Signature of sole proprietor in the presence of a witness who will also sign. Insert the words "Sole Proprietor" under the signature. Affix seal.
   2. Partnership: Signature of all partners in the presence of a witness who will also sign. Insert the word "Partner" under each signature. Affix seal to each signature.
   3. Corporation: Signature of a duly authorized signing officer(s) in their normal signatures. Insert the officer's capacity in which the signing officer acts, under each signature. Affix the corporate seal. If the bid is signed by officials other than the president and secretary of the company, or the president/secretary/treasurer of the company, a copy of the by-law resolution of their board of directors authorizing them to do so, must also be submitted with the Bid Form in the bid envelope.
   4. Joint Venture: Each party of the joint venture shall execute the Bid Form under their respective seals in a manner appropriate to such party as described above, similar to the requirements of a Partnership.

6.5 ADDITIONAL BID INFORMATION

A. Submit the following Supplements concurrent with bid submission:
   1. Document 00 43 25 - Substitution Request Form - During Procurement.
   2. Document 00 43 39 - Minority Business Enterprise Statement of Intent Form identifies minority firms Bidder intends to use.

OFFER ACCEPTANCE/REJECTION

7.1 DURATION OF OFFER

A. Bids shall remain open to acceptance and shall be irrevocable for a period of sixty (60) days after the bid closing date.

7.2 ACCEPTANCE OF OFFER

A. GFIAA reserves the right to accept or reject any or all offers.

B. After acceptance by GFIAA, will issue to the successful bidder, a written letter of Contract Award.

END OF SECTION

SECTION 00 41 00 - BID FORM

THE PROJECT AND THE PARTIES

1.1 TO:

A. GFIAA
5500 44th St SE
Project Location Address 2
Grand Rapids, Michigan49512

1.2 FOR:

A. Project: Medium Voltage Loop

B. Owner's Project Number: C-419
5500 44th St SE
Grand Rapids, Michigan49512

1.3 DATE: _____ (BIDDER TO ENTER DATE)

1.4 SUBMITTED BY: (BIDDER TO ENTER NAME AND ADDRESS)

A. Bidder's Full Name _____
1. Address _____
2. City, State, Zip_____

1.5 OFFER

A. Having examined the Place of The Work and all matters referred to in the Instructions to Bidders and the Bid Documents prepared by Fishbeck for the above mentioned project, we, the undersigned, hereby offer to enter into a Contract to perform the Work for the Sum of:

B. _____
_____ dollars
($_____), in lawful money of the United States of America.

C. We have included the required security Bid Bond as required by the Instruction to Bidders.

D. We have included the required performance assurance bonds in the Bid Amount as required by the Instructions to Bidders.
1. The cost of the required performance assurance bonds is _ _____ _dollars
($_____), in lawful money of the United States of America.

E. All applicable federal taxes are included and State of Michigan taxes are included in the Bid Sum.

F. All Cash and Contingency Allowances described in Section 01 21 00 - Allowances are included in the Bid Sum.

1.6 ACCEPTANCE

A. This offer shall be open to acceptance and is irrevocable for sixty days from the bid closing date.

B. If this bid is accepted by GFIAA within the time period stated above, we will:
   1. Execute the Agreement within seven days of receipt of Notice of Award.
   2. Furnish the required bonds within seven days of receipt of Notice of Award.

C. If this bid is accepted within the time stated, and we fail to commence the Work or we fail to provide the required Bond(s), the security deposit shall be forfeited as damages to GFIAA by reason of our failure, limited in amount to the lesser of the face value of the security deposit or the difference between this bid and the bid upon which a Contract is signed.

D. In the event our bid is not accepted within the time stated above, the required security deposit shall be returned to the undersigned, in accordance with the provisions of the Instructions to Bidders; unless a mutually satisfactory arrangement is made for its retention and validity for an extended period of time.

1.7 CONTRACT TIME

A. If this Bid is accepted, we will:

B. Complete the Work by the 31st day of August, 2026.

1.8 CHANGES TO THE WORK

A. When Engineer establishes that the method of valuation for Changes in the Work will be net cost plus a percentage fee in accordance with General Conditions, our percentage fee will be:
   1. _____ percent overhead and profit on the net cost of our own Work;
   2. _____ percent on the cost of work done by any Subcontractor.

B. On work deleted from the Contract, our credit to GFIAA shall be Engineer-approved net cost plus _____ of the overhead and profit percentage noted above.

1.9 ADDENDA

A. The following Addenda have been received. The modifications to the Bid Documents noted below have been considered and all costs are included in the Bid Sum.
   1. Addendum # _____ Dated _____.
   2. Addendum # _____ Dated _____.

1.10 BID FORM SUPPLEMENTS

A. The following Supplements are attached to this Bid Form and are considered an integral part of this Bid Form:
   1. Document 00 43 25 - Substitution Request Form - During Procurement.
   2. Document 00 43 39 - Minority Business Enterprise Statement of Intent Form identifies minority firms Bidder intends to use.

B. The following requirements shall be acknowledged with a checkmark below:
   1. ____ Bidder has read and understands section 1.5 Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity, Document 00 73 00 Supplementary Conditions.

2. ____ Bidder has read and understands section 1.6 Breach of Contract, Document 00 73 00 Supplementary Conditions.
3. ____ Bidder has read and understands section 1.7 FAA Buy American Preference, Document 00 73 00 Supplementary Conditions.
4. ____ Bidder has read and understands section 1.8 General Civil Rights Provisions, Document 00 73 00 Supplementary Conditions.
5. ____ Bidder has read and understands section 1.9 Clean Air and Water Pollution Control, Document 00 73 00 Supplementary Conditions.
6. ____ Bidder has read and understands section 1.10 Contract Work Hours and Safety Standards Act Requirements, Document 00 73 00 Supplementary Conditions.
7. ____ Bidder has read and understands section 1.11 Copeland "Anti-Kickback" Act, Document 00 73 00 Supplementary Conditions.
8. ____ Bidder has read and understands section 1.12 Davis-Bacon Requirements, Document 00 73 00 Supplementary Conditions.
9. ____ Bidder has read and understands section 1.13 Debarment and Suspension, Document 00 73 00 Supplementary Conditions.
10. ____ Bidder has read and understands section 1.14 Disadvantaged Business Enterprise, Document 00 73 00 Supplementary Conditions.
11. ____ Bidder has read and understands section 1.15 Distracted Driving, Document 00 73 00 Supplementary Conditions.
12. ____ Bidder has read and understands section 1.16 Equal Opportunity Clause, Document 00 73 00 Supplementary Conditions.
13. ____ Bidder has read and understands section 1.17 Federal Fair Labor Standards Act (Federal Minimum Wage), Document 00 73 00 Supplementary Conditions.
14. ____ Bidder has read and understands section 1.18 Lobbying and Influencing Federal Employees, Document 00 73 00 Supplementary Conditions.
15. ____ Bidder has read and understands section 1.19 Prohibition of Segregated Facilities, Document 00 73 00 Supplementary Conditions.
16. ____ Bidder has read and understands section 1.20 Occupational Safety and Health Act of 1970, Document 00 73 00 Supplementary Conditions.
17. ____ Bidder has read and understands section 1.21 Procurement of Recovered Materials, Document 00 73 00 Supplementary Conditions.
18. ____ Bidder has read and understands section 1.22 Certification of Offeror/Bidder Regarding Tax Delinquency and Felony Convictions, Document 00 73 00 Supplementary Conditions.
19. ____ Bidder has read and understands section 1.23 Terminaltion of Contract, Document 00 73 00 Supplementary Conditions.
20. ____ Bidder has read and understands section 1.24 Trade Restriction Certification, Document 00 73 00 Supplementary Conditions.
21. ____ Bidder has read and understands section 1.25 Veteran's Preference, Document 00 73 00 Supplementary Conditions.

1.11 BID FORM SIGNATURE(S)

A. The Corporate Seal of

B. _____

C. (Bidder - print the full name of your firm)

D. was hereunto affixed in the presence of:

E. _____

F. (Authorized signing officer, Title)

G. (Seal)

H. _____

I. (Authorized signing officer, Title)

1.12 IF THE BID IS A JOINT VENTURE OR PARTNERSHIP, ADD ADDITIONAL FORMS OF EXECUTION FOR EACH MEMBER OF THE JOINT VENTURE IN THE APPROPRIATE FORM OR FORMS AS ABOVE.

END OF SECTION

A1.1.1 Certification of Compliance with FAA Buy American Preference – Construction Projects

As a matter of bid responsiveness, the bidder or offeror must complete, sign, date, and submit this certification statement with its proposal. The bidder or offeror must indicate how it intends to comply with 49 USC § 50101, BABA and other related Made in America Laws, U.S. statutes, guidance, and FAA policies, by selecting one of the following certification statements. These statements are mutually exclusive. Bidder must select one or the other (i.e., not both) by inserting a checkmark (✓) or the letter "X".

☐ Bidder or offeror hereby certifies that it will comply with 49 USC § 50101, BABA and other related U.S. statutes, guidance, and policies of the FAA by:

a) Only installing iron, steel and manufactured products produced in the United States;

b) Only installing construction materials defined as: an article, material, or supply – other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives that are or consist primarily of non-ferrous metals; plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables); glass (including optic glass); lumber or drywall that have been manufactured in the United States.

c) Installing manufactured products for which the Federal Aviation Administration (FAA) has issued a waiver as indicated by inclusion on the current FAA Nationwide Buy American Waivers Issued listing; or

d) Installing products listed as an Excepted Article, Material or Supply in Federal Acquisition Regulation Subpart 25.108.

By selecting this certification statement, the bidder or offeror agrees:

a) To provide to the Airport Sponsor or the FAA evidence that documents the source and origin of the iron, steel, and/or manufactured product.
b) To faithfully comply with providing U.S. domestic products.
c) To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.
d) Certify that all construction materials used in the project are manufactured in the U.S.

☐ The bidder or offeror hereby certifies it cannot comply with the 100 percent Buy American Preferences of 49 USC § 50101(a) but may qualify for a Type 3 or Type 4 waiver under 49 USC § 50101(b). By selecting this certification statement, the apparent bidder or offeror with the apparent low bid agrees:

a) To the submit to the Airport Sponsor or FAA within 15 calendar days of being selected as the responsive bidder, a formal waiver request and required documentation that supports the type of waiver being requested.
b) That failure to submit the required documentation within the specified timeframe is cause for a non-responsive determination that may result in rejection of the proposal.
c) To faithfully comply with providing U.S. domestic products at or above the approved U.S. domestic content percentage as approved by the FAA.

d) To furnish U.S. domestic product for any waiver request that the FAA rejects.
e) To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.

Required Documentation

Type 2 Waiver (Nonavailability) - The iron, steel, manufactured goods or construction materials or manufactured goods are not available in sufficient quantity or quality in the United States. The required documentation for the Nonavailability waiver is

a) Completed Content Percentage Worksheet and Final Assembly Questionnaire
b) Record of thorough market research, consideration where appropriate of qualifying alternate items, products, or materials including;
c) A description of the market research activities and methods used to identify domestically manufactured items capable of satisfying the requirement, including the timing of the research and conclusions reached on the availability of sources.

Type 3 Waiver – The cost of components and subcomponents produced in the United States is more than 60 percent of the cost of all components and subcomponents of the "facility/project." The required documentation for a Type 3 waiver is:

a) Completed Content Percentage Worksheet and Final Assembly Questionnaire including;
b) Listing of all manufactured products that are not comprised of 100 percent U.S. domestic content (excludes products listed on the FAA Nationwide Buy American Waivers Issued listing and products excluded by Federal Acquisition Regulation Subpart 25.108; products of unknown origin must be considered as non-domestic products in their entirety).
c) Cost of non-domestic components and subcomponents, excluding labor costs associated with final assembly and installation at project location.
d) Percentage of non-domestic component and subcomponent cost as compared to total "facility" component and subcomponent costs, excluding labor costs associated with final assembly and installation at project location.

Type 4 Waiver (Unreasonable Costs) - Applying this provision for iron, steel, manufactured goods or construction materials would increase the cost of the overall project by more than 25 percent. The required documentation for this waiver is:

a) A completed Content Percentage Worksheet and Final Assembly Questionnaire from
b) At minimum two comparable equal bids and/or offers;
c) Receipt or record that demonstrates that supplier scouting called for in Executive Order 14005, indicates that no domestic source exists for the project and/or component;
d) Completed waiver applications for each comparable bid and/or offer.

False Statements: Per 49 USC § 47126, this certification concerns a matter within the jurisdiction of the Federal Aviation Administration and the making of a false, fictitious, or fraudulent certification may render the maker subject to prosecution under Title 18, United States Code.

Date	Signature
Company Name	Title

A1.1.2 Certification of Compliance with FAA Buy American Preference – Equipment/Building Projects

As a matter of bid responsiveness, the bidder or offeror must complete, sign, date, and submit this certification statement with their proposal. The bidder or offeror must indicate how they intend to comply with 49 USC § 50101, and other Made in America Laws, U.S. statutes, guidance, and FAA policies by selecting one on the following certification statements. These statements are mutually exclusive. Bidder must select one or the other (not both) by inserting a checkmark (✓) or the letter "X".

☐ Bidder or offeror hereby certifies that it will comply with 49 USC § 50101, BABA and other related U.S. statutes, guidance, and policies of the FAA by:

a) Only installing steel and manufactured products produced in the United States;
b) Only installing construction materials defined as: an article, material, or supply – other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives that are or consist primarily of non-ferrous metals; plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables); glass (including optic glass); lumber or drywall that have been manufactured in the United States.
c) Installing manufactured products for which the Federal Aviation Administration (FAA) has issued a waiver as indicated by inclusion on the current FAA Nationwide Buy American Waivers Issued listing; or
d) Installing products listed as an Excepted Article, Material or Supply in Federal Acquisition Regulation Subpart 25.108.

By selecting this certification statement, the bidder or offeror agrees:

a) To provide to the Airport Sponsor or FAA evidence that documents the source and origin of the steel and manufactured product.
b) To faithfully comply with providing U.S. domestic product.
c) To furnish U.S. domestic product for any waiver request that the FAA rejects.
d) To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.

☐ The bidder or offeror hereby certifies it cannot comply with the 100 percent Buy American Preferences of 49 USC § 50101(a) but may qualify for a Type 3 waiver under 49 USC § 50101(b). By selecting this certification statement, the apparent bidder or offeror with the apparent low bid agrees:

a) To submit to the Airport Sponsor or FAA within 15 calendar days of being selected as the responsive bidder, a formal waiver request and required documentation that supports the type of waiver being requested.
b) That failure to submit the required documentation within the specified timeframe is cause for a non-responsive determination that may result in rejection of the proposal.
c) To faithfully comply with providing U.S. domestic products at or above the approved U.S. domestic content percentage as approved by the FAA.
d) To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.

Required Documentation

Type 2 Waiver (**Nonavailability)** - The iron, steel, manufactured goods or construction materials are not available in sufficient quantity or quality in the United States. The required documentation for the Nonavailability waiver is:

a) Completed Content Percentage Worksheet and Final Assembly Questionnaire

b) Record of thorough market research, consideration where appropriate of qualifying alternate items, products, or materials including;

c) A description of the market research activities and methods used to identify domestically manufactured items capable of satisfying the requirement, including the timing of the research and conclusions reached on the availability of sources.

Type 3 Waiver – The cost of the item components and subcomponents produced in the United States is more that 60 percent of the cost of all components and subcomponents of the "item". The required documentation for a Type 3 waiver is:

a) Completed Content Percentage Worksheet and Final Assembly Questionnaire including;
b) Listing of all product components and subcomponents that are not comprised of 100 percent U.S. domestic content (Excludes products listed on the FAA Nationwide Buy American Waivers Issued listing and products excluded by Federal Acquisition Regulation Subpart 25.108 (products of unknown origin must be considered as non-domestic products in their entirety).
c) Cost of non-domestic components and subcomponents, excluding labor costs associated with final assembly at place of manufacture.
d) Percentage of non-domestic component and subcomponent cost as compared to total "item" component and subcomponent costs, excluding labor costs associated with final assembly at place of manufacture.

Type 4 Waiver (Unreasonable Costs) - Applying this provision for iron, steel, manufactured goods or construction materials, would increase the cost of the overall project by more than 25 percent. The required documentation for this waiver is:

a) Completed Content Percentage Worksheet and Final Assembly Questionnaire from
b) At minimum two comparable equal bidders and/or offerors;
c) Receipt or record that demonstrates that supplier scouting called for in Executive Order 14005, indicates that no domestic source exists for the project and/or component;
d) Completed waiver applications for each comparable bid and/or offer.

False Statements: Per 49 USC § 47126, this certification concerns a matter within the jurisdiction of the Federal Aviation Administration and the making of a false, fictitious, or fraudulent certification may render the maker subject to prosecution under Title 18, United States Code.

Date	Signature
Company Name	Title

SECTION 00 43 25 - SUBSTITUTION REQUEST FORM - DURING PROCUREMENT

CONTRACTOR SHALL SUBMIT CSI FORM 1.5C FOR REQUESTING SUBSTITUTIONS DURING BIDDING.

END OF SECTION

SUBSTITUTION REQUEST

(During the Bidding/Negotiating Stage)

Project: _____ Substitution Request Number: _____

_____ From: _____

To: _____ Date: _____

_____ A/E Project Number: _____

Re: _____ Contract For: _____

Specification Title: _____ Description: _____

Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____ Phone: _____

Trade Name: _____ Model No.: _____

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

_____

Telephone: _____

A/E's REVIEW AND ACTION

☐ Substitution approved - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by: Date:

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

Form Version: January 2013
CSI Form 1.5C

SECTION 00 43 39 - MINORITY BUSINESS ENTERPRISE STATEMENT OF INTENT FORM

STATEMENT OF INTENT

PROJECT IDENTIFICATION

Project Name: Medium Voltage Loop.

GFIAA's Project Number: C-419.

5500 44th St SE.

Grand Rapids, Michigan, 49512.

The Owner, referred to as GFIAA: Gerald R. Ford International Airport Authority.

PROJECT GOALS

Participation Goal: 5 percent, minimum.

BIDDER INFORMATION

SUBMITTED BY:

Bidder's Full Name: _____

Address 1: _____

Address 2: _____

City, State, Zip: _____

WAIVER OR MODIFICATION OF PERCENTAGE GOALS

2.1 PARTICULARS

Request for a Waiver has legal, documented basis:

Good-faith efforts to attain participation percentage goals include the following items. Circle applicable choice for each type of effort.

[YES] / [NO] / [N/A] Efforts made to select portions of the work proposed performed by minority businesses in order to increase the likelihood of achieving stated goal.
Documentation is attached.

[YES] / [NO] / [N/A] Efforts to negotiate with potential participants for specific sub-bids.
Documentation is attached.

[YES] / [NO] / [N/A] Efforts made to assist potential participants that need assistance in obtaining bonding or required insurance.
Documentation is attached.

MINORITY BUSINESS ENTERPRISE AFFIDAVIT

REPRESENTATIONS

The undersigned MBE firm intends to perform work in connection with the above referenced project as a corporation.

The undersigned individual affirms role as duly authorized official representing the proposed firm and affirms applicable minority business enterprise certification is not expired or revoked.

A copy of current certification is attached.

If awarded the contract, the firm intends to enter into a subcontract to perform the work described below at the indicated prices.

DESCRIPTION OF WORK	ESTIMATED QUANTITY	UNIT PRICE	ESTIMATED COST	EXCLUSIONS

Total dollar amount credited to MBE firm: _____

Proposed total dollar contract price: _____

The total price to MBE contractor for work performed under this contract is _____ percent of the proposed total contract price.

_____

CERTIFICATIONS

The undersigned certifies to enter into a formal agreement upon execution of the contract for the above referenced project pursuant to conditions noted in attached documents, swearing and affirming under the pains and penalties of perjury that the preceding information and appropriate attachments are true and accurate.

Name of MBE Firm: _____

Authorized Signature: _____

Name and Title: _____

Date: _____

Name of Bidder Firm: _____

Authorized Signature: _____

Name and Title: _____

Date: _____

END OF SECTION

SECTION 00 52 00 - AGREEMENT FORM

PART 1 GENERAL

1.1 FORM OF AGREEMENT

1.2 THE AGREEMENT TO BE EXECUTED IS ATTACHED FOLLOWING THIS PAGE.

1.3 RELATED REQUIREMENTS

A. Section 00 72 00 - General Conditions.

B. Section 00 73 00 - Supplementary Conditions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

DRAFT AIA® Document A101® – 2017

Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

AGREEMENT made as of the « » day of « » in the year « »
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

« »« »
« »
« »
« »

and the Contractor:
(Name, legal status, address and other information)

« »« »
« »
« »
« »

for the following Project:
(Name, location and detailed description)

«GFIAA Medium Voltage Loop»
« »
« »

The Architect:
(Name, legal status, address and other information)

« »« »
« »
« »
« »

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

The parties should complete A101®–2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201®–2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

TABLE OF ARTICLES

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[« »] The date of this Agreement.

[« »] A date set forth in a notice to proceed issued by the Owner.

[« »] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

« »

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:
(Check one of the following boxes and complete the necessary information.)

[« »] Not later than « » (« ») calendar days from the date of commencement of the Work.

[« »] By the following date: « »

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be « » ($ « »), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	Price

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance

§ 4.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item	Price

§ 4.4 Unit prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)

§ 4.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any.)

« »

§ 4.6 Other:
(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

« »

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

« »

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the « » day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the « » day of the « » month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than « » (« ») days after the Architect receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

- **.1** That portion of the Contract Sum properly allocable to completed Work;
- **.2** That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- **.3** That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

- **.1** The aggregate of any amounts previously paid by the Owner;
- **.2** The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;
- **.3** Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- **.4** For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and
- **.5** Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:
(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

« »

§ 5.1.7.1.1 The following items are not subject to retainage:
(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

« »

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:
(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

« »

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:
(Insert any other conditions for release of retainage upon Substantial Completion.)

« »

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

« »

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

« » % « »

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

« »
« »
« »

« »

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

[« »] Arbitration pursuant to Section 15.4 of AIA Document A201–2017

[« »] Litigation in a court of competent jurisdiction

[« »] Other *(Specify)*

« »

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

§ 7.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:
(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

« »

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:
(Name, address, email address, and other information)

« »
« »
« »
« »
« »
« »

§ 8.3 The Contractor's representative:
(Name, address, email address, and other information)

« »
« »
« »
« »
« »
« »

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™–2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with a building information modeling exhibit, if completed, or as otherwise set forth below:
(If other than in accordance with a building information modeling exhibit, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

« »

§ 8.7 Other provisions:

« »

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

.1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor

.2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds

.3 AIA Document A201™–2017, General Conditions of the Contract for Construction

.4 Building information modeling exhibit, dated as indicated below:
(Insert the date of the building information modeling exhibit incorporated into this Agreement.)

« »

.5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.8 Other Exhibits:
(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

[« »] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

« »

[« »] The Sustainability Plan:

Title	Date	Pages

[« »] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.9 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™–2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

« »

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
« »« »	« »« »
(Printed name and title)	*(Printed name and title)*

DRAFT AIA® Document A101® – 2017 Exhibit A

Insurance and Bonds

This Insurance and Bonds Exhibit is part of the Agreement, between the Owner and the Contractor, dated the « » day of « » in the year « »
(In words, indicate day, month and year.)

for the following **PROJECT**:
(Name and location or address)

«GFIAA Medium Voltage Loop»
« »

THE OWNER:
(Name, legal status and address)

« »« »
« »

THE CONTRACTOR:
(Name, legal status and address)

« »« »
« »

TABLE OF ARTICLES

ARTICLE A.1 GENERAL

The Owner and Contractor shall purchase and maintain insurance, and provide bonds, as set forth in this Exhibit. As used in this Exhibit, the term General Conditions refers to AIA Document A201™–2017, General Conditions of the Contract for Construction.

ARTICLE A.2 OWNER'S INSURANCE

§ A.2.1 General

Prior to commencement of the Work, the Owner shall secure the insurance, and provide evidence of the coverage, required under this Article A.2 and, upon the Contractor's request, provide a copy of the property insurance policy or policies required by Section A.2.3. The copy of the policy or policies provided shall contain all applicable conditions, definitions, exclusions, and endorsements.

§ A.2.2 Liability Insurance

The Owner shall be responsible for purchasing and maintaining the Owner's usual general liability insurance.

§ A.2.3 Required Property Insurance

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

This document is intended to be used in conjunction with AIA Document A201®–2017, General Conditions of the Contract for Construction. Article 11 of A201®–2017 contains additional insurance provisions.

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§ A.2.3.1 Unless this obligation is placed on the Contractor pursuant to Section A.3.3.2.1, the Owner shall purchase and maintain, from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located, property insurance written on a builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis. The Owner's property insurance coverage shall be no less than the amount of the initial Contract Sum, plus the value of subsequent Modifications and labor performed and materials or equipment supplied by others. The property insurance shall be maintained until Substantial Completion and thereafter as provided in Section A.2.3.1.3, unless otherwise provided in the Contract Documents or otherwise agreed in writing by the parties to this Agreement. This insurance shall include the interests of the Owner, Contractor, Subcontractors, and Sub-subcontractors in the Project as insureds. This insurance shall include the interests of mortgagees as loss payees.

§ A.2.3.1.1 Causes of Loss. The insurance required by this Section A.2.3.1 shall provide coverage for direct physical loss or damage, and shall not exclude the risks of fire, explosion, theft, vandalism, malicious mischief, collapse, earthquake, flood, or windstorm. The insurance shall also provide coverage for ensuing loss or resulting damage from error, omission, or deficiency in construction methods, design, specifications, workmanship, or materials. Sub-limits, if any, are as follows:
(Indicate below the cause of loss and any applicable sub-limit.)

Causes of Loss	Sub-Limit

§ A.2.3.1.2 Specific Required Coverages. The insurance required by this Section A.2.3.1 shall provide coverage for loss or damage to falsework and other temporary structures, and to building systems from testing and startup. The insurance shall also cover debris removal, including demolition occasioned by enforcement of any applicable legal requirements, and reasonable compensation for the Architect's and Contractor's services and expenses required as a result of such insured loss, including claim preparation expenses. Sub-limits, if any, are as follows:
(Indicate below type of coverage and any applicable sub-limit for specific required coverages.)

Coverage	Sub-Limit

§ A.2.3.1.3 Unless the parties agree otherwise, upon Substantial Completion, the Owner shall continue the insurance required by Section A.2.3.1 or, if necessary, replace the insurance policy required under Section A.2.3.1 with property insurance written for the total value of the Project that shall remain in effect until expiration of the period for correction of the Work set forth in Section 12.2.2 of the General Conditions.

§ A.2.3.1.4 Deductibles and Self-Insured Retentions. If the insurance required by this Section A.2.3 is subject to deductibles or self-insured retentions, the Owner shall be responsible for all loss not covered because of such deductibles or retentions.

§ A.2.3.2 Occupancy or Use Prior to Substantial Completion. The Owner's occupancy or use of any completed or partially completed portion of the Work prior to Substantial Completion shall not commence until the insurance company or companies providing the insurance under Section A.2.3.1 have consented in writing to the continuance of coverage. The Owner and the Contractor shall take no action with respect to partial occupancy or use that would cause cancellation, lapse, or reduction of insurance, unless they agree otherwise in writing.

§ A.2.3.3 Insurance for Existing Structures
If the Work involves remodeling an existing structure or constructing an addition to an existing structure, the Owner shall purchase and maintain, until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, "all-risks" property insurance, on a replacement cost basis, protecting the existing structure against direct physical loss or damage from the causes of loss identified in Section A.2.3.1, notwithstanding the undertaking of the Work. The Owner shall be responsible for all co-insurance penalties.

§ A.2.4 Optional Extended Property Insurance.
The Owner shall purchase and maintain the insurance selected and described below.

(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. For each type of insurance selected, indicate applicable limits of coverage or other conditions in the fill point below the selected item.)

[« »] **§ A.2.4.1 Loss of Use, Business Interruption, and Delay in Completion Insurance**, to reimburse the Owner for loss of use of the Owner's property, or the inability to conduct normal operations due to a covered cause of loss.

« »

[« »] **§ A.2.4.2 Ordinance or Law Insurance**, for the reasonable and necessary costs to satisfy the minimum requirements of the enforcement of any law or ordinance regulating the demolition, construction, repair, replacement or use of the Project.

« »

[« »] **§ A.2.4.3 Expediting Cost Insurance**, for the reasonable and necessary costs for the temporary repair of damage to insured property, and to expedite the permanent repair or replacement of the damaged property.

« »

[« »] **§ A.2.4.4 Extra Expense Insurance**, to provide reimbursement of the reasonable and necessary excess costs incurred during the period of restoration or repair of the damaged property that are over and above the total costs that would normally have been incurred during the same period of time had no loss or damage occurred.

« »

[« »] **§ A.2.4.5 Civil Authority Insurance**, for losses or costs arising from an order of a civil authority prohibiting access to the Project, provided such order is the direct result of physical damage covered under the required property insurance.

« »

[« »] **§ A.2.4.6 Ingress/Egress Insurance**, for loss due to the necessary interruption of the insured's business due to physical prevention of ingress to, or egress from, the Project as a direct result of physical damage.

« »

[« »] **§ A.2.4.7 Soft Costs Insurance**, to reimburse the Owner for costs due to the delay of completion of the Work, arising out of physical loss or damage covered by the required property insurance: including construction loan fees; leasing and marketing expenses; additional fees, including those of architects, engineers, consultants, attorneys and accountants, needed for the completion of the construction, repairs, or reconstruction; and carrying costs such as property taxes, building permits, additional interest on loans, realty taxes, and insurance premiums over and above normal expenses.

« »

§ A.2.5 Other Optional Insurance.

The Owner shall purchase and maintain the insurance selected below.

(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance.)

[« »] **§ A.2.5.1 Cyber Security Insurance** for loss to the Owner due to data security and privacy breach, including costs of investigating a potential or actual breach of confidential or private information. *(Indicate applicable limits of coverage or other conditions in the fill point below.)*

« »

[« »] **§ A.2.5.2 Other Insurance**
(List below any other insurance coverage to be provided by the Owner and any applicable limits.)

Coverage	Limits

ARTICLE A.3 CONTRACTOR'S INSURANCE AND BONDS

§ A.3.1 General

§ A.3.1.1 Certificates of Insurance. The Contractor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Article A.3 at the following times: (1) prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. An additional certificate evidencing continuation of commercial liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment and thereafter upon renewal or replacement of such coverage until the expiration of the periods required by Section A.3.2.1 and Section A.3.3.1. The certificates will show the Owner as an additional insured on the Contractor's Commercial General Liability and excess or umbrella liability policy or policies.

§ A.3.1.2 Deductibles and Self-Insured Retentions. The Contractor shall disclose to the Owner any deductible or self-insured retentions applicable to any insurance required to be provided by the Contractor.

§ A.3.1.3 Additional Insured Obligations. To the fullest extent permitted by law, the Contractor shall cause the commercial general liability coverage to include (1) the Owner, the Architect, and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 07 04, CG 20 37 07 04, and, with respect to the Architect and the Architect's consultants, CG 20 32 07 04.

§ A.3.2 Contractor's Required Insurance Coverage

§ A.3.2.1 The Contractor shall purchase and maintain the following types and limits of insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:
(If the Contractor is required to maintain insurance for a duration other than the expiration of the period for correction of Work, state the duration.)

« »

§ A.3.2.2 Commercial General Liability

§ A.3.2.2.1 Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than « » ($ « ») each occurrence, « » ($ « ») general aggregate, and « » ($ « ») aggregate for products-completed operations hazard, providing coverage for claims including

.1 damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person;

.2 personal injury and advertising injury;

.3 damages because of physical damage to or destruction of tangible property, including the loss of use of such property;

.4 bodily injury or property damage arising out of completed operations; and

.5 the Contractor's indemnity obligations under Section 3.18 of the General Conditions.

§ A.3.2.2.2 The Contractor's Commercial General Liability policy under this Section A.3.2.2 shall not contain an exclusion or restriction of coverage for the following:

.1 Claims by one insured against another insured, if the exclusion or restriction is based solely on the fact that the claimant is an insured, and there would otherwise be coverage for the claim.

.2 Claims for property damage to the Contractor's Work arising out of the products-completed operations hazard where the damaged Work or the Work out of which the damage arises was performed by a Subcontractor.

.3 Claims for bodily injury other than to employees of the insured.

.4 Claims for indemnity under Section 3.18 of the General Conditions arising out of injury to employees of the insured.

.5 Claims or loss excluded under a prior work endorsement or other similar exclusionary language.

.6 Claims or loss due to physical damage under a prior injury endorsement or similar exclusionary language.

.7 Claims related to residential, multi-family, or other habitational projects, if the Work is to be performed on such a project.

.8 Claims related to roofing, if the Work involves roofing.

.9 Claims related to exterior insulation finish systems (EIFS), synthetic stucco or similar exterior coatings or surfaces, if the Work involves such coatings or surfaces.

.10 Claims related to earth subsidence or movement, where the Work involves such hazards.

.11 Claims related to explosion, collapse and underground hazards, where the Work involves such hazards.

§ A.3.2.3 Automobile Liability covering vehicles owned, and non-owned vehicles used, by the Contractor, with policy limits of not less than « » ($ « ») per accident, for bodily injury, death of any person, and property damage arising out of the ownership, maintenance and use of those motor vehicles along with any other statutorily required automobile coverage.

§ A.3.2.4 The Contractor may achieve the required limits and coverage for Commercial General Liability and Automobile Liability through a combination of primary and excess or umbrella liability insurance, provided such primary and excess or umbrella insurance policies result in the same or greater coverage as the coverages required under Section A.3.2.2 and A.3.2.3, and in no event shall any excess or umbrella liability insurance provide narrower coverage than the primary policy. The excess policy shall not require the exhaustion of the underlying limits only through the actual payment by the underlying insurers.

§ A.3.2.5 Workers' Compensation at statutory limits.

§ A.3.2.6 Employers' Liability with policy limits not less than « » ($ « ») each accident, « » ($ « ») each employee, and « » ($ « ») policy limit.

§ A.3.2.7 Jones Act, and the Longshore & Harbor Workers' Compensation Act, as required, if the Work involves hazards arising from work on or near navigable waterways, including vessels and docks

§ A.3.2.8 If the Contractor is required to furnish professional services as part of the Work, the Contractor shall procure Professional Liability insurance covering performance of the professional services, with policy limits of not less than « » ($ « ») per claim and « » ($ « ») in the aggregate.

§ A.3.2.9 If the Work involves the transport, dissemination, use, or release of pollutants, the Contractor shall procure Pollution Liability insurance, with policy limits of not less than « » ($ « ») per claim and « » ($ « ») in the aggregate.

§ A.3.2.10 Coverage under Sections A.3.2.8 and A.3.2.9 may be procured through a Combined Professional Liability and Pollution Liability insurance policy, with combined policy limits of not less than « » ($ « ») per claim and « » ($ « ») in the aggregate.

§ A.3.2.11 Insurance for maritime liability risks associated with the operation of a vessel, if the Work requires such activities, with policy limits of not less than « » ($ « ») per claim and « » ($ « ») in the aggregate.

§ A.3.2.12 Insurance for the use or operation of manned or unmanned aircraft, if the Work requires such activities, with policy limits of not less than « » ($ « ») per claim and « » ($ « ») in the aggregate.

§ A.3.3 Contractor's Other Insurance Coverage

§ A.3.3.1 Insurance selected and described in this Section A.3.3 shall be purchased from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:
(If the Contractor is required to maintain any of the types of insurance selected below for a duration other than the expiration of the period for correction of Work, state the duration.)

« »

§ A.3.3.2 The Contractor shall purchase and maintain the following types and limits of insurance in accordance with Section A.3.3.1.
(Select the types of insurance the Contractor is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. Where policy limits are provided, include the policy limit in the appropriate fill point.)

[« »] **§ A.3.3.2.1** Property insurance of the same type and scope satisfying the requirements identified in Section A.2.3, which, if selected in this section A.3.3.2.1, relieves the Owner of the responsibility to purchase and maintain such insurance except insurance required by Section A.2.3.1.3 and Section A.2.3.3. The Contractor shall comply with all obligations of the Owner under Section A.2.3 except to the extent provided below. The Contractor shall disclose to the Owner the amount of any deductible, and the Owner shall be responsible for losses within the deductible. Upon request, the Contractor shall provide the Owner with a copy of the property insurance policy or policies required. The Owner shall adjust and settle the loss with the insurer and be the trustee of the proceeds of the property insurance in accordance with Article 11 of the General Conditions unless otherwise set forth below:
(Where the Contractor's obligation to provide property insurance differs from the Owner's obligations as described under Section A.2.3, indicate such differences in the space below. Additionally, if a party other than the Owner will be responsible for adjusting and settling a loss with the insurer and acting as the trustee of the proceeds of property insurance in accordance with Article 11 of the General Conditions, indicate the responsible party below.)

« »

[« »] **§ A.3.3.2.2 Railroad Protective Liability Insurance**, with policy limits of not less than « » ($ « ») per claim and « » ($ « ») in the aggregate, for Work within fifty (50) feet of railroad property.

[« »] **§ A.3.3.2.3 Asbestos Abatement Liability Insurance**, with policy limits of not less than « » ($ « ») per claim and « » ($ « ») in the aggregate, for liability arising from the encapsulation, removal, handling, storage, transportation, and disposal of asbestos-containing materials.

[« »] **§ A.3.3.2.4** Insurance for physical damage to property while it is in storage and in transit to the construction site on an "all-risks" completed value form.

[« »] **§ A.3.3.2.5** Property insurance on an "all-risks" completed value form, covering property owned by the Contractor and used on the Project, including scaffolding and other equipment.

[« »] **§ A.3.3.2.6 Other Insurance**
(List below any other insurance coverage to be provided by the Contractor and any applicable limits.)

Coverage	Limits

§ A.3.4 Performance Bond and Payment Bond

The Contractor shall provide surety bonds, from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located, as follows:
(Specify type and penal sum of bonds.)

Type	Penal Sum ($0.00)
Payment Bond	
Performance Bond	

Payment and Performance Bonds shall be AIA Document A312™, Payment Bond and Performance Bond, or contain provisions identical to AIA Document A312™, current as of the date of this Agreement.

ARTICLE A.4 SPECIAL TERMS AND CONDITIONS

Special terms and conditions that modify this Insurance and Bonds Exhibit, if any, are as follows:

« »

SECTION 00 72 00 - GENERAL CONDITIONS

FORM OF GENERAL CONDITIONS

1.1 THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, AIA DOCUMENT A201, 2017 EDITION IS PART OF THIS CONTRACT AND IS INCORPORATED HEREIN AS FULLY AS IF HERE SET FORTH.

RELATED REQUIREMENTS

2.1 SECTION 00 73 00 - SUPPLEMENTARY CONDITIONS.

SUPPLEMENTARY CONDITIONS

3.1 REFER TO DOCUMENT 00 73 00 - SUPPLEMENTARY CONDITIONS FOR AMENDMENTS TO THESE GENERAL CONDITIONS.

END OF SECTION

SECTION 00 73 00 - SUPPLEMENTARY CONDITIONS

PART 1 GENERAL

1.1 SUMMARY

A. These Supplementary Conditions amend and supplement the General Conditions defined in Document 00 72 00 - General Conditions and other provisions of Contract Documents as indicated below. Provisions that are not so amended or supplemented remain in full force and effect.

B. The terms used in these Supplementary Conditions that are defined in the General Conditions have the meanings assigned to them in the General Conditions.

1.2 MODIFICATIONS TO GENERAL CONDITIONS AS INDICATED

1.3 PAYMENT AND PERFORMANCE BOND REQUIRED

A. The Bidder shall furnish bonds covering 100% of the faithful performance of the Contract and payment of all obligations arising thereunder. Bonds shall be issued by a surety meeting the requirements of the agreement.

B. Bond shall be submitted on AIA form A312.

C. Bond shall be delivered at the time of agreement excecution.

D. Bond shall be dated on or after the date of the Notice of Award.

1.4 ACCESS TO RECORDS AND REPORTS

A. The Contractor must maintain an acceptable cost accounting system. The Contractor agrees to provide the Owner, the Federal Aviation Administration and the Comptroller General of the United States or any of their duly authorized representatives access to any books, documents, papers and records of the Contractor which are directly pertinent to the specific contract for the purpose of making audit, examination, excerpts and transcriptions. The Contractor agrees to maintain all books, records and reports required under this contract for a period of not less than three years after final payment is made and all pending matters are closed

1.5 NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY

A. The Offeror’s or Bidder’s attention is called to the “Equal Opportunity Clause” and the “Standard Federal Equal Employment Opportunity Construction Contract Specifications” set forth herein.

B. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor’s aggregate workforce in each trade on all construction work in the covered area, are as follows:
   1. Timetable
      a. Goals for minority participation for each trade: N/A (Goal is 5% for entire contract)
      b. Goals for female participation for each trade: 6.9%

2. These goals are applicable to all of the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the Contractor also is subject to the goals for both its federally involved and nonfederally involved construction.
3. The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a) and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

C. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs (OFCCP) within 10 working days of award of any construction subcontract in excess of $10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor; employer identification number of the subcontractor; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the subcontract is to be performed.

D. As used in this notice and in the contract resulting from this solicitation, the "covered area" is Michigan, Kent County, Grand Rapids.

1.6 BREACH OF CONTRACT TERMS

A. Any violation or breach of terms of this contract on the part of the Contractor or its subcontractors may result in the suspension or termination of this contract or such other action that may be necessary to enforce the rights of the parties of this agreement.

B. Owner will provide Contractor written notice that describes the nature of the breach and corrective actions the Contractor must undertake in order to avoid termination of the contract. Owner reserves the right to withhold payments to Contractor until such time the Contractor corrects the breach or the Owner elects to terminate the contract. The Owner's notice will identify a specific date by which the Contractor must correct the breach. Owner may proceed with termination of the contract if the Contractor fails to correct the breach by the deadline indicated in the Owner's notice.

C. The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder are in addition to, and not a limitation of, any duties, obligations, rights and remedies otherwise imposed or available by law.

1.7 FAA BUY AMERICAN PREFERENCE

A. The Contractor certifies that its bid/offer is in compliance with 49 USC § 50101, BABA and other related Made in America Laws,U.S. statutes, guidance, and FAA policies, which provide that Federal funds may not be obligated unless all iron, steel and manufactured goods used in AIP funded projects are produced in the United States, unless the Federal Aviation Administration has issued a waiver for the product; the product is listed as an Excepted Article, Material Or Supply in Federal Acquisition Regulation subpart

25.108; or is included in the FAA Nationwide Buy American Waivers Issued list

B. Per Executive Order 14005 “Made in America Laws” means all statutes, regulations, rules, and Executive Orders relating to federal financial assistance awards or federal procurement, including those that refer to “Buy America” or “Buy American,” that require, or provide a preference for, the purchase or acquisition of goods, products, or materials produced in the United States, including iron, steel, and manufactured products offered in the United States.

C. The bidder or offeror must complete and submit the certification of compliance with FAA’s Buy American Preference, BABA and Made in America laws included herein with their bid or offer. The Airport Sponsor/Owner will reject as nonresponsive any bid or offer that does not include a completed certification of compliance with FAA’s Buy American Preference and BABA.

D. The bidder or offeror certifies that all constructions materials, defined to mean an article, material, or supply other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives that are or consist primarily of: non-ferrous metals; plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables); glass (including optic glass); lumber; or drywall used in the project are manufactured in the U.S.

E. As a matter of bid responsiveness, the bidder or offeror must complete, sign, date, and submit the included certification statement with its proposal.

1.8 GENERAL CIVIL RIGHTS PROVISIONS

A. In all its activities within the scope of its airport program, the Contractor agrees to comply with pertinent statutes, Executive Orders, and such rules as identified in Title VI List of Pertinent Nondiscrimination Acts and Authorities to ensure that no person shall, on the grounds of race, color, national origin (including limited English proficiency), creed, sex (including sexual orientation and gender identity), age, or disability be excluded from participating in any activity conducted with or benefiting from Federal assistance.

B. This provision is in addition to that required by Title VI of the Civil Rights Act of 1964.

C. The above provision binds the Contractor and subcontractors from the bid solicitation period through the completion of the contract.

D. Title VI List of Pertinent Nondiscrimination Acts and Authorities:
   1. During the performance of this contract, the Contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the “Contractor”) agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:
      a. Title VI of the Civil Rights Act of 1964 (42 USC § 2000d *et seq*., 78 stat. 252) (prohibits discrimination on the basis of race, color, national origin);
      b. 49 CFR part 21 (Non-discrimination in Federally-Assisted programs of the Department of Transportation—Effectuation of Title VI of the Civil Rights Act of 1964);
      c. The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 USC § 4601) (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
      d. Section 504 of the Rehabilitation Act of 1973 (29 USC § 794 *et seq*.), as amended (prohibits discrimination on the basis of disability); and 49 CFR part 27 (Nondiscrimination on the Basis of Disability in Programs or Activities Receiving Federal Financial Assistance);
      e. The Age Discrimination Act of 1975, as amended (42 USC § 6101 *et seq*.) (prohibits discrimination on the basis of age);

f. Airport and Airway Improvement Act of 1982 (49 USC § 47123), as amended (prohibits discrimination based on race, creed, color, national origin, or sex);
g. The Civil Rights Restoration Act of 1987 (PL 100-259) (broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, the Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
h. Titles II and III of the Americans with Disabilities Act of 1990 (42 USC § 12101, et seq) (prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities) as implemented by U.S. Department of Transportation regulations at 49 CFR parts 37 and 38;
i. The Federal Aviation Administration's Nondiscrimination statute (49 USC § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
j. Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (ensures nondiscrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations);
k. Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs [70 Fed. Reg. 74087 (2005)];
l. Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 USC § 1681, et seq)

2. During the performance of this contract, the Contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "Contractor"), agrees as follows:
   a. **Compliance with Regulations:** The Contractor (hereinafter includes consultants) will comply with the Title VI List of Pertinent Nondiscrimination Acts and Authorities, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.
   b. **Nondiscrimination:** The Contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, national origin (including limited English proficiency), creed, sex (including sexual orientation and gender identity), age, or disability in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The Contractor will not participate directly or indirectly in the discrimination prohibited by the Nondiscrimination Acts and Authorities, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR part 21.
   c. **Solicitations for Subcontracts, including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding or negotiation made by the Contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the Contractor of the contractor's obligations under this contract and the Nondiscrimination Acts and Authorities on the grounds of race, color, or national origin.
   d. **Information and Reports:** The Contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Sponsor or the Federal Aviation Administration to be pertinent to ascertain compliance with such Nondiscrimination Acts and Authorities and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the Contractor will so certify to the Sponsor or the Federal Aviation Administration, as appropriate, and will set forth what efforts it has made to obtain the information.
   e. **Sanctions for Noncompliance:** In the event of a Contractor's noncompliance with the non-discrimination provisions of this contract, the Sponsor will impose such contract sanctions as it or the Federal Aviation Administration may determine to be appropriate, including, but not limited to:

f. Withholding payments to the Contractor under the contract until the Contractor complies; and/or
g. Cancelling, terminating, or suspending a contract, in whole or in part.
h. Incorporation of Provisions:
i. The Contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations, and directives issued pursuant thereto. The Contractor will take action with respect to any subcontract or procurement as the Sponsor or the Federal Aviation Administration may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the Contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the Contractor may request the Sponsor to enter into any litigation to protect the interests of the Sponsor. In addition, the Contractor may request the United States to enter into the litigation to protect the interests of the United States

1.9 CLEAN AIR AND WATER POLLUTION CONTROL

A. Contractor agrees to comply with all applicable standards, orders, and regulations issued pursuant to the Clean Air Act (42 USC §§ 7401-7671q) and the Federal Water Pollution Control Act as amended (33 USC §§ 1251-1387). The Contractor agrees to report any violation to the Owner immediately upon discovery. The Owner assumes responsibility for notifying the Environmental Protection Agency (EPA) and the Federal Aviation Administration.

B. Contractor must include this requirement in all subcontracts that exceed $150,000.

1.10 CONTRACT WORK HOURS AND SAFETY STANDARDS ACT REQUIREMENTS

A. Overtime Requirements
1. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic, including watchmen and guards, in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek

B. Violation; Liability for Unpaid Wages; Liquidated Damages
1. In the event of any violation of the clause set forth in paragraph (1) of this clause, the Contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this clause, in the sum of $29 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this clause.

C. Withholding for Unpaid Wages and Liquidated Damages
1. The Federal Aviation Administration (FAA) or the Owner shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this clause.

D. Subcontractors
   1. The Contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraphs (1) through (4) and also a clause requiring the subcontractor to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this clause.

1.11 COPELAND "ANTI-KICKBACK" ACT

A. Contractor must comply with the requirements of the Copeland “Anti-Kickback” Act (18 USC 874 and 40 USC 3145), as supplemented by Department of Labor regulation 29 CFR part 3. Contractor and subcontractors are prohibited from inducing, by any means, any person employed on the project to give up any part of the compensation to which the employee is entitled. The Contractor and each Subcontractor must submit to the Owner, a weekly statement on the wages paid to each employee performing on covered work during the prior week. Owner must report any violations of the Act to the Federal Aviation Administration.

1.12 DAVIS-BACON REQUIREMENTS

A. Minimum Wages
   1. All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by the Secretary of Labor under the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalent thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics.
   2. Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer’s payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under (1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can easily be seen by the workers.
   3. The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:
   4. The work to be performed by the classification requested is not performed by a classification in the wage determination.
      a. The classification is utilized in the area by the construction industry; and
      b. The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.
   5. If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be

sent by the contracting officer to the Administrator of the Wage and Hour Division, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

6. In the event the Contractor, the laborers, or mechanics to be employed in the classification, or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.
7. The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (3)(B) or (C) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

B. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

C. If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, that the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program

D. Withholding. The Federal Aviation Administration or the Sponsor shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the Contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the Federal Aviation Administration may, after written notice to the Contractor, Sponsor, Applicant, or Owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

E. Payrolls and Basic Records.
1. Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker; his or her correct classification; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in 1(b)(2)(B) of the Davis-Bacon Act); daily and weekly number of hours worked; deductions made; and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records that show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and

records which show the costs anticipated or the actual costs incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

2. Submit
   a. The Contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the Federal Aviation Administration if the agency is a party to the contract, but if the agency is not such a party, the Contractor will submit the payrolls to the applicant, Sponsor, or Owner, as the case may be, for transmission to the Federal Aviation Administration. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR § 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g.,the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division Web site at https://www.dol.gov/agencies/whd/government-contracts/construction/payroll-certification or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker and shall provide them upon request to the Federal Aviation Administration if the agency is a party to the contract, but if the agency is not such a party, the Contractor will submit them to the applicant, Sponsor, or Owner, as the case may be, for transmission to the Federal Aviation Administration, the Contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the sponsoring government agency (or the applicant, Sponsor, or Owner)
   b. Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:
      1) That the payroll for the payroll period contains the information required to be provided under 29 CFR § 5.5(a)(3)(ii), the appropriate information is being maintained under 29 CFR § 5.5 (a)(3)(i), and that such information is correct and complete;

      2) That each laborer and mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR Part 3;

      3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

   c. The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (3)(ii)(B) of this section.
   d. The falsification of any of the above certifications may subject the Contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.
3. The Contractor or subcontractor shall make the records required under paragraph (3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the Sponsor, the Federal Aviation Administration, or the Department of Labor and shall permit such representatives to interview employees during working hours on the job. If the Contractor or

subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the Contractor, Sponsor, applicant, or Owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR § 5.12.

F. Apprentices and Trainees.

1. Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits,apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

2. Trainees. Except as provided in 29 CFR § 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination that provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate that is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

3. Equal Employment Opportunity. The utilization of apprentices, trainees, and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

G. Compliance with Copeland Act Requirements.
1. The Contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this contract.

H. Subcontracts
1. The Contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR §§ 5.5(a)(1) through (10) and such other clauses as the Federal Aviation Administration may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR § 5.5.

I. Contract Termination: Debarment.
1. A breach of the contract clauses in paragraph 1 through 10 of this section may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR § 5.12.

J. Compliance with Davis-Bacon and Related Act Requirements.
1. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract.

K. Disputes Concerning Labor Standards.
1. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

L. Certification of Eligibility.
1. By entering into this contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR § 5.12(a)(1).
2. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR § 5.12(a)(1).
3. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 USC § 1001.

1.13 DEBARMENT AND SUSPENSION

A. Bidder or Offeror Certification
1. By submitting a bid/proposal under this solicitation, the bidder or offeror certifies that neither it nor its principals are presently debarred or suspended by any Federal department or agency from participation in this transaction.

B. Lower Tier Contract Certification
1. The successful bidder, by administering each lower tier subcontract that exceeds $25,000 as a "covered transaction", must confirm each lower tier participant of a "covered transaction" under the project is not presently debarred or otherwise disqualified from participation in this federally-assisted project. The successful bidder will accomplish this by:
a. Checking the System for Award Management at website: http://www.sam.gov.
b. Collecting a certification statement similar to the Certification of Offeror /Bidder Regarding Debarment, above.
c. Inserting a clause or condition in the covered transaction with the lower tier contract.

2. If the Federal Aviation Administration later determines that a lower tier participant failed to disclose to a higher tier participant that it was excluded or disqualified at the time it entered the covered transaction, the FAA may pursue any available remedies, including suspension and debarment of the non-compliant participant.

1.14 DISADVANTAGED BUSINESS ENTERPRISE

A. Bid Information Submitted as a matter of responsiveness
   1. The Owner's award of this contract is conditioned upon Bidder or Offeror satisfying the good faith effort requirements of 49 CFR § 26.53.
   2. As a condition of responsiveness, the Bidder or Offeror must submit the following information with its proposal on the forms provided herein.
      a. The names and addresses of Disadvantaged Business Enterprise (DBE) firms that will participate in the contract;
      b. A description of the work that each DBE firm will perform;
      c. The dollar amount of the participation of each DBE firm listed under (1);
      d. Written statement from Bidder or Offeror that attests their commitment to use the DBE firm(s) listed under (1) to meet the Owner's project goal
      e. Written confirmation from each listed DBE firm that it is participating in the contract in the kind and amount of work provided in the prime contractor's commitment; and
      f. If Bidder or Offeror cannot meet the advertised project DBE goal, evidence of good faith efforts undertaken by the Bidder or Offeror as described in appendix A to 49 CFR part 26. The documentation of good faith efforts must include copies of each DBE and non-DBE subcontractor quote submitted to the bidder when a non-DBE subcontractor was selected over a DBE for work on the contract.

B. Bid Information Submitted as a Matter of Responsibility:
   1. The Owner's award of this contract is conditioned upon Bidder or Offeror satisfying the good faith effort requirements of 49 CFR § 26.53.
   2. As a condition of responsibility, every Bidder or Offeror must submit the following information on the forms provided herein within five days after bid opening.
      a. The names and addresses of Disadvantaged Business Enterprise (DBE) firms that will participate in the contract;
      b. A description of the work that each DBE firm will perform;
      c. The dollar amount of the participation of each DBE firm listed under (1);
      d. Written statement from Bidder or Offeror that attests their commitment to use the DBE firm(s) listed under (1) to meet the Owner's project goal;
      e. Written confirmation from each listed DBE firm that it is participating in the contract in the kind and amount of work provided in the prime contractor's commitment; and
      f. If Bidder or Offeror cannot meet the advertised project DBE goal, evidence of good faith efforts undertaken by the Bidder or Offeror as described in appendix A to 49 CFR part 26. The documentation of good faith efforts must include copies of each DBE and non-DBE subcontractor quote submitted to the bidder when a non-DBE subcontractor was selected over a DBE for work on the contract.

C. The requirements of 49 CFR part 26 apply to this contract. It is the policy of the GFIAA to practice nondiscrimination based on race, color, sex, or national origin in the award or performance of this contract. The Owner encourages participation by all firms qualifying under this solicitation regardless of business size or ownership.

D. Contract Assurance (49 CFR § 26.13)
   1. The Contractor, subrecipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The Contractor shall carry out applicable requirements of 49 CFR part 26 in the award and administration of DOT-assisted contracts. Failure by the Contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate,

which may include, but is not limited to:
a. Withholding monthly progress payments;
b. Assessing sanctions;
c. Liquidated damages; and/or
d. Disqualifying the Contractor from future bidding as non-responsible.

E. Prompt Payment (§26.29)
1. The prime contractor agrees to pay each subcontractor under this prime contract for satisfactory performance of its contract no later than 10 days from the receipt of each payment the prime contractor receives from the Owner. The prime contractor agrees further to return retainage payments to each subcontractor within 30 days after the subcontractor's work is satisfactorily completed. Any delay or postponement of payment from the above referenced time frame may occur only for good cause following written approval of the Owner. This clause applies to both DBE and non-DBE subcontractors.

1.15 DISTRACTED DRIVING

A. Texting When Driving
1. In accordance with Executive Order 13513, "Federal Leadership on Reducing Text Messaging While Driving", (10/1/2009) and DOT Order 3902.10, "Text Messaging While Driving", (12/30/2009), the Federal Aviation Administration encourages recipients of Federal grant funds to adopt and enforce safety policies that decrease crashes by distracted drivers, including policies to ban text messaging while driving when performing work related to a grant or subgrant.
2. In support of this initiative, the Owner encourages the Contractor to promote policies and initiatives for its employees and other work personnel that decrease crashes by distracted drivers, including policies that ban text messaging while driving motor vehicles while performing work activities associated with the project. The Contractor must include the substance of this clause in all sub-tier contracts exceeding $10,000 that involve driving a motor vehicle in performance of work activities associated with the project.

1.16 EQUAL OPPORTUNITY CLAUSE

A. During the performance of this contract, the Contractor agrees as follows:
1. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, sexual orientation, gender identify, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, 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 setting forth the provisions of this nondiscrimination clause.
2. The Contractor 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 race, color, religion, sex, sexual orientation, gender identity, or national origin.
3. The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.

4. The Contractor will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice to be provided by the agency contracting officer, advising the labor union or workers' representative of the Contractor's commitments under this section 202 of Executive Order 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
5. The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
6. The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
7. In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any such rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
8. The Contractor will include the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as may be directed by the Secretary of Labor as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, that in the event the contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

B. Standard Federal Equal Employment Opportunity Construction Contract Specifications
   1. As used in these specifications:
      a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;
      b. b. "Director" means Director, Office of Federal Contract Compliance Programs (OFCCP), U.S. Department of Labor, or any person to whom the Director delegates authority;
      c. "Employer identification number" means the Federal social security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941;
      d. "Minority" includes:
         1) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);

         2) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race);

         3) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and

         4) American Indian or Alaskan native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

   2. Whenever the Contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of $10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the Contractor is participating (pursuant to 41 CFR part 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each contractor or subcontractor participating in an approved plan is individually required to comply with its obligations under the EEO clause and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other contractors or subcontractors toward a goal in an approved Plan does not excuse any covered contractor's or subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.
4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7a through 7p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered construction contractors performing construction work in a geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.
5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.
6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.
7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:
    a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other onsite supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.
    b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.
    c. c. Maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source, or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.
    d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.
f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.
g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions including specific review of these items with onsite supervisory personnel such superintendents, general foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.
h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other contractors and subcontractors with whom the Contractor does or anticipates doing business.
i. Direct its recruitment efforts, both oral and written, to minority, female, and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.
j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer, and vacation employment to minority and female youth both on the site and in other areas of a contractor's work force.
k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR part 60-3.
l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel, for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.
m. Ensure that seniority practices, job classifications, work assignments, and other personnel practices do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.
n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.
o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.
p. Conduct a review, at least annually, of all supervisor's adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations, which assist in fulfilling one or more of their affirmative action obligations (7a through 7p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the Contractor is a member and participant may be asserted as fulfilling any one or more of its obligations under 7a through 7p of these specifications provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its

individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).
10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, sexual orientation, gender identity, or national origin.
11. The Contractor shall not enter into any subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.
12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination, and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.
13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR part 60-4.8.
14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government, and to keep records. Records shall at least include for each employee, the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.
15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g. those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

1.17 FEDERAL FAIR LABOR STANDARDS ACT (FEDERAL MINIMUM WAGE)

A. All contracts and subcontracts that result from this solicitation incorporate by reference the provisions of 29 CFR part 201, et seq, the Federal Fair Labor Standards Act (FLSA), with the same force and effect as if given in full text. The FLSA sets minimum wage, overtime pay, recordkeeping, and child labor standards for full and part-time workers.

B. The Contractor has full responsibility to monitor compliance to the referenced statute or regulation. The Contractor must address any claims or disputes that arise from this requirement directly with the U.S. Department of Labor – Wage and Hour Division.

1.18 LOBBYING AND INFLUENCING FEDERAL EMPLOYEES

A. Certification Regarding Lobbying: The Bidder or Offeror certifies by signing and submitting this bid or porposal, to the best of his or her knowledge and belief, that:
   1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the Bidder or Offeror, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
   2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, “Disclosure Form to Report Lobbying,” in accordance with its instructions.
   3. The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

B. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

1.19 PROHIBITION OF SEGREGATED FACILITIES

A. The Contractor agrees that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The Contractor agrees that a breach of this clause is a violation of the Equal Employment Opportunity clause in this contract.

B. “Segregated facilities,” as used in this clause, means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees that are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, sex, sexual orientation, gender identity, or national origin because of written or oral policies or employee custom. The term does not include separate or single-user rest rooms or necessary dressing or sleeping areas provided to assure privacy between the sexes.

C. The Contractor shall include this clause in every subcontract and purchase order that is subject to the Equal Employment Opportunity clause of this contract.

1.20 OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970

A. All contracts and subcontracts that result from this solicitation incorporate by reference the requirements of 29 CFR Part 1910 with the same force and effect as if given in full text. The employer must provide a work environment that is free from recognized hazards that may cause death or serious physical harm to

the employee. The employer retains full responsibility to monitor its compliance and their subcontractor's compliance with the applicable requirements of the Occupational Safety and Health Act of 1970 (29 CFR Part 1910). The employer must address any claims or disputes that pertain to a referenced requirement directly with the U.S. Department of Labor – Occupational Safety and Health Administration.

1.21 PROCUREMENT OF RECOVERED MATERIALS

A. Contractor and subcontractor agree to comply with Section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, and the regulatory provisions of 40 CFR Part 247. In the performance of this contract and to the extent practicable, the Contractor and subcontractors are to use products containing the highest percentage of recovered materials for items designated by the Environmental Protection Agency (EPA) under 40 CFR Part 247 whenever:
   1. The contract requires procurement of $10,000 or more of a designated item during the fiscal year; or
   2. The contractor has procured $10,000 or more of a designated item using Federal funding during the previous fiscal year.

B. The list of EPA-designated items is available at www.epa.gov/smm/comprehensive-procurement-guidelines-construction-products.

C. Section 6002(c) establishes exceptions to the preference for recovery of EPA-designated products if the contractor can demonstrate the item is:
   1. Not reasonably available within a timeframe providing for compliance with the contract performance schedule;
   2. Fails to meet reasonable contract performance requirements; or
   3. Is only available at an unreasonable price.

1.22 CERTIFICATION OF OFFEROR/BIDDER REGARDING TAX DELINQUENCY AND FELONY CONVICTIONS

A. The applicant must complete the following two certification statements. The applicant must indicate its current status as it relates to tax delinquency and felony conviction by inserting a checkmark in the space following the applicable response. The applicant agrees that, if awarded a contract resulting from this solicitation, it will incorporate this provision for certification in all lower tier subcontracts.

B. Certifications:
   1. The applicant represents that it is ( ) is not ( ) a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.
   2. The applicant represents that it is ( ) is not ( ) a corporation that was convicted of a criminal violation under any Federal law within the preceding 24 months.

C. Note: If an applicant responds in the affirmative to either of the above representations, the applicant is ineligible to receive an award unless the Sponsor has received notification from the agency suspension and debarment official (SDO) that the SDO has considered suspension or debarment and determined that further action is not required to protect the Government's interests. The applicant therefore must provide information to the owner about its tax liability or conviction to the Owner, who will then notify the FAA Airports District Office, which will then notify the agency's SDO to facilitate completion of the required considerations before award decisions are made.

D. Term Definitions
   1. Felony conviction: Felony conviction means a conviction within the preceding twenty four (24) months of a felony criminal violation under any Federal law and includes conviction of an offense

defined in a section of the U.S. Code that specifically classifies the offense as a felony and conviction of an offense that is classified as a felony under 18 USC § 3559

2. Tax Delinquency: A tax delinquency is any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

1.23 TERMINATION OF CONTRACT

A. Termination for Convenience:
   1. The Owner may terminate this contract in whole or in part at any time by providing written notice to the Contractor. Such action may be without cause and without prejudice to any other right or remedy of Owner. Upon receipt of a written notice of termination, except as explicitly directed by the Owner, the Contractor shall immediately proceed with the following obligations regardless of any delay in determining or adjusting amounts due under this clause:
      a. Contractor must immediately discontinue work as specified in the written notice.
      b. Terminate all subcontracts to the extent they relate to the work terminated under the notice.
      c. Discontinue orders for materials and services except as directed by the written notice.
      d. Deliver to the Owner all fabricated and partially fabricated parts, completed and partially completed work, supplies, equipment and materials acquired prior to termination of the work, and as directed in the written notice.
      e. Complete performance of the work not terminated by the notice.
      f. Take action as directed by the Owner to protect and preserve property and work related to this contract that Owner will take possession.
   2. Owner agrees to pay Contractor for:
      a. Completed and acceptable work executed in accordance with the contract documents prior to the effective date of termination;
      b. Documented expenses sustained prior to the effective date of termination in performing work and furnishing labor, materials, or equipment as required by the contract documents in connection with uncompleted work;
      c. Reasonable and substantiated claims, costs, and damages incurred in settlement of terminated contracts with Subcontractors and Suppliers; and
      d. Reasonable and substantiated expenses to the Contractor directly attributable to Owner's termination action.
   3. Owner will not pay Contractor for loss of anticipated profits or revenue or other economic loss arising out of or resulting from the Owner's termination action.
   4. The rights and remedies this clause provides are in addition to any other rights and remedies provided by law or under this contract.

B. Termination for Cause
   1. Section 80-09 of FAA Advisory Circular 150/5370-10 establishes standard language for conditions, rights, and remedies associated with Owner termination of this contract for cause due to default of the Contractor.

1.24 TRADE RESTRICTION CERTIFICATION

A. By submission of an offer, the Offeror certifies that with respect to this solicitation and any resultant contract, the Offeror:
   1. is not owned or controlled by one or more citizens of a foreign country included in the list of countries that discriminate against U.S. firms as published by the Office of the United States Trade Representative (USTR);
   2. has not knowingly entered into any contract or subcontract for this project with a person that is a citizen or national of a foreign country included on the list of countries that discriminate against U.S. firms as published by the USTR; and
   3. has not entered into any subcontract for any product to be used on the Federal project that is produced in a foreign country included on the list of countries that discriminate against U.S. firms

published by the USTR.

B. This certification concerns a matter within the jurisdiction of an agency of the United States of America and the making of a false, fictitious, or fraudulent certification may render the maker subject to prosecution under Title 18 USC § 1001.

C. The Offeror/Contractor must provide immediate written notice to the Owner if the Offeror/Contractor learns that its certification or that of a subcontractor was erroneous when submitted or has become erroneous by reason of changed circumstances. The Contractor must require subcontractors provide immediate written notice to the Contractor if at any time it learns that its certification was erroneous by reason of changed circumstances.

D. Unless the restrictions of this clause are waived by the Secretary of Transportation in accordance with 49 CFR § 30.17, no contract shall be awarded to an Offeror or subcontractor:
   1. who is owned or controlled by one or more citizens or nationals of a foreign country included on the list of countries that discriminate against U.S. firms published by the USTR; or
   2. whose subcontractors are owned or controlled by one or more citizens or nationals of a foreign country on such USTR list; or
   3. who incorporates in the public works project any product of a foreign country on such USTR list.

E. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by this provision. The knowledge and information of a contractor is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

F. The Offeror agrees that, if awarded a contract resulting from this solicitation, it will incorporate this provision for certification without modification in all lower tier subcontracts. The Contractor may rely on the certification of a prospective subcontractor that it is not a firm from a foreign country included on the list of countries that discriminate against U.S. firms as published by USTR, unless the Offeror has knowledge that the certification is erroneous.

G. This certification is a material representation of fact upon which reliance was placed when making an award. If it is later determined that the Contractor or subcontractor knowingly rendered an erroneous certification, the Federal Aviation Administration (FAA) may direct through the Owner cancellation of the contract or subcontract for default at no cost to the Owner or the FAA.

1.25 VETERAN'S PREFERENCE

A. In the employment of labor (excluding executive, administrative, and supervisory positions), the Contractor and all sub-tier contractors must give preference to covered veterans as defined within Title 49 United States Code Section 47112. Covered veterans include Vietnam-era veterans, Persian Gulf veterans, Afghanistan-Iraq war veterans, disabled veterans, and small business concerns (as defined by 15 USC § 632) owned and controlled by disabled veterans. This preference only applies when there are covered veterans readily available and qualified to perform the work to which the employment relates.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

"General Decision Number: MI20250088 01/03/2025

Superseded General Decision Number: MI20240088

State: Michigan

Construction Type: Building

County: Kent County in Michigan.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least $17.75 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2025.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least $13.30 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2025.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at http://www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/03/2025

ASBE0047-002 07/01/2024

	Rates	Fringes
ASBESTOS WORKER/HEAT & FROST INSULATOR	$ 38.00	21.60

BOIL0169-001 01/01/2024

	Rates	Fringes
BOILERMAKER	$ 39.65	35.68

BRMI0009-002 08/01/2023

	Rates	Fringes
TILE FINISHER	$ 26.35	20.74
TILE SETTER	$ 30.25	22.98

FOOTNOTE:

Paid Holiday: Fourth of July, if the worker has been employed by the contractor in any period of seven working days before said holiday within the current calendar year.

CARP1102-001 06/01/2024

	Rates	Fringes
MILLWRIGHT	$ 33.50	26.47

ENGI0324-035 06/01/2024

	Rates	Fringes
OPERATOR: Power Equipment		
GROUP 1	$ 41.28	25.25
GROUP 2	$ 39.57	25.25
GROUP 3	$ 39.57	25.25
GROUP 4	$ 31.23	25.25

PAID HOLIDAYS: New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day and Christmas Day.

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Concrete Pump; Grader/Blade; Highlift; Hoist; Roller; Scraper; Trencher

GROUP 2: Broom/Sweeper

GROUP 3: Boom Truck (non-swinging)

GROUP 4: Oiler

IRON0025-013 02/01/2024

	Rates	Fringes
IRONWORKER, REINFORCING	$ 31.00	28.91

LABO0355-027 06/01/2024

	Rates	Fringes
LABORER		
Grade Checker; Sandblaster..	$ 26.34	12.95

PAIN0845-006 06/01/2024

	Rates	Fringes
PAINTER: Brush and Spray.....	$ 29.68	20.40

PLUM0174-002 07/01/2024

	Rates	Fringes
PIPEFITTER (Including HVAC Pipe Installation; Excluding HVAC System Installation).....	$ 43.29	25.32
PLUMBER, Excludes HVAC Pipe and Unit Installation.....	$ 43.29	25.32

SHEE0007-014 05/01/2023

	Rates	Fringes
SHEET METAL WORKER, Excludes HVAC Duct and Unit Installation.....	$ 35.41	15.86

SUMI2011-013 02/01/2011

	Rates	Fringes
BRICKLAYER.....	$ 21.45	5.00
CARPENTER (Acoustical Ceiling Installation Only).....	$ 18.61	2.69
CARPENTER (Drywall Finishing/Taping Only).....	$ 17.35 **	2.69
CARPENTER (Drywall Hanging Only).....	$ 16.28 **	2.69
CARPENTER (Form Work Only).....	$ 18.62	6.42
CARPENTER, Excludes Acoustical Ceiling Installation, Drywall Finishing/Taping, Drywall Hanging, and Formwork.....	$ 18.14	4.59
CEMENT MASON/CONCRETE FINISHER...	$ 17.16 **	4.25
ELECTRICIAN, Excludes Low Voltage Wiring.....	$ 20.68	6.39
GLAZIER.....	$ 15.29 **	2.68
HVAC MECHANIC (Installation of HVAC Unit Only, Excludes Installation of HVAC Pipe and Duct).....	$ 16.75 **	2.75

IRONWORKER, ORNAMENTAL.....$ 18.48 7.93

IRONWORKER, STRUCTURAL.....$ 18.07 4.84

LABORER: Common or General.....$ 13.04 ** 4.80

LABORER: Landscape & Irrigation.....$ 10.47 ** 0.00

LABORER: Mason Tender - Brick...$ 18.87 2.16

LABORER: Mason Tender - Cement/Concrete.....$ 14.01 ** 2.45

LABORER: Pipelayer.....$ 18.32 3.28

OPERATOR: Backhoe/Excavator/Trackhoe.....$ 20.23 9.10

OPERATOR: Bobcat/Skid Steer/Skid Loader.....$ 16.50 ** 6.17

OPERATOR: Bulldozer.....$ 18.50 5.81

OPERATOR: Crane.....$ 19.21 6.76

OPERATOR: Forklift.....$ 21.48 9.13

OPERATOR: Tractor.....$ 15.72 ** 1.92

OPERATOR: Loader.....$ 17.16 ** 4.05

PAINTER: Roller.....$ 16.21 ** 2.81

ROOFER.....$ 14.05 ** 6.06

SHEET METAL WORKER (HVAC Duct Installation Only).....$ 18.32 4.66

SPRINKLER FITTER (Fire Sprinklers).....$ 17.07 ** 4.24

TRUCK DRIVER: Dump Truck.....$ 17.00 ** 5.71

TRUCK DRIVER: Tractor Haul Truck.....$ 13.57 ** 1.18

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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** Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 ($17.75) or 13658 ($13.30). Please see the Note at the top of the wage determination for more information. Please also note that the minimum wage requirements of Executive Order 14026 are not currently being enforced as to any contract or subcontract to which the states of Texas, Louisiana, or Mississippi, including their agencies, are a party.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any

solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than ""SU"", ""UAVG"", ?SA?, or ?SC? denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The ""SU"" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

?SU? wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The ""SA"" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the ?SA? identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

1) Has there been an initial decision in the matter? This can be:

a) a survey underlying a wage determination
b) an existing published wage determination
c) an initial WHD letter setting forth a position on a wage determination matter
d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210.

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END OF GENERAL DECISION"

SECTION 01 10 00 - SUMMARY

PART 1 GENERAL

1.1 PROJECT

A. Project Name: Medium Voltage Loop

B. GFIAA's Name: Gerald R. Ford International Airport Authority.

C. Engineer's Name: Fishbeck.

D. The Project consists of the construction of a Medium Voltage Electrical Loop on the airport campus.

1.2 CONTRACT DESCRIPTION

A. Contract Type: A single prime contract based on a Stipulated Price as described in Document 00 52 00 - Agreement Form.

1.3 DESCRIPTION OF ALTERATIONS WORK

A. Scope of alterations work is indicated on drawings.

B. Electrical Power and Lighting: Alter existing system and add new construction, keeping existing in operation.

1.4 WORK BY OWNER

A. GFIAA has contracted for work that will be incorporated into this project. Those items are identifed in the documents. This contract may be required to coordinate with other contractors and GFIAA staff to arrange access to rooms, vaults, conduit and equipment.

1.5 OWNER OCCUPANCY

A. GFIAA intends to continue to occupy adjacent portions of the existing campus during the entire construction period.

B. GFIAA intends to occupy the Project upon Substantial Completion.

C. Cooperate with GFIAA to minimize conflict and to facilitate GFIAA's operations.

D. Schedule the Work to accommodate GFIAA occupancy.

1.6 CONTRACTOR USE OF SITE AND PREMISES

A. Arrange use of site and premises to allow:
1. GFIAA occupancy.
2. Work by Others.
3. Work by GFIAA.
4. Use of site and premises by the public.

B. Provide access to and from site as required by law and by GFIAA:
   1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
   2. Do not obstruct roadways, sidewalks, or other public ways without permit.

C. Existing building spaces may not be used for storage.

D. Utility Outages and Shutdown:
   1. Limit disruption of utility services to hours the building is unoccupied.
   2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to GFIAA and authorities having jurisdiction.
   3. Prevent accidental disruption of utility services to other facilities.

1.7 WORK SEQUENCE

A. Coordinate construction schedule and operations with GFIAA.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 20 00 - PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

B. Documentation of changes in Contract Sum and Contract Time.

C. Change procedures.

D. Procedures for preparation and submittal of application for final payment.

1.2 SCHEDULE OF VALUES

A. Use Schedule of Values Form: AIA G703, edition stipulated in the Agreement.

B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Engineer for approval.

C. Forms filled out by hand will not be accepted.

1.3 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.

B. Use Form AIA G702 and Form AIA G703, edition stipulated in the Agreement.

C. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Engineer for approval.

D. Forms filled out by hand will not be accepted.

E. Execute certification by signature of authorized officer.

1.4 MODIFICATION PROCEDURES

A. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Engineer will issue instructions directly to Contractor.

B. For other required changes, Engineer will issue a document signed by GFIAA instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
   1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
   2. Promptly execute the change.

C. For changes for which advance pricing is desired, Engineer will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of

time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 10 days.

D. Contractor may propose a change by submitting a request for change to Engineer, describing the proposed change and its full effect on the work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation.

E. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
   1. For change requested by Engineer for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
   2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Engineer.

F. Substantiation of Costs: Provide full information required for evaluation.
   1. On request, provide the following data:
      a. Quantities of products, labor, and equipment.
      b. Taxes, insurance, and bonds.
      c. Overhead and profit.
      d. Justification for any change in Contract Time.
      e. Credit for deletions from Contract, similarly documented.
   2. Support each claim for additional costs with additional information:
      a. Origin and date of claim.
      b. Dates and times work was performed, and by whom.
      c. Time records and wage rates paid.
      d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
   3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

G. Execution of Change Orders: Engineer will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

H. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

I. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

J. Promptly enter changes in Project Record Documents.

1.5 APPLICATION FOR FINAL PAYMENT

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 21 00 - ALLOWANCES

PART 1 GENERAL

1.1 CONTINGENCY ALLOWANCE

A. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Contingency Allowance.

B. Funds will be drawn from the Contingency Allowance only by Change Order.

C. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

1.2 ALLOWANCES SCHEDULE

A. Section 33 05 30: Include the stipulated sum of $5,000 for unforseen conditions for direct bore operations at the east end of the project. This allowance is only intended to cover additional costs that may be encountered during the direct bore of utilities identified as Keynote 1 on E100 of the Bid Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 25 00 - SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Procedural requirements for proposed substitutions.

1.2 DEFINITIONS

A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
   1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
      a. Unavailability.
      b. Regulatory changes.
   2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.
      a. Substitution requests offering advantages solely to the Contractor will not be considered.

1.3 REFERENCE STANDARDS

A. CSI/CSC Form 1.5C - Substitution Request (During the Bidding/Negotiating Stage); Current Edition.

B. CSI/CSC Form 13.1A - Substitution Request (After the Bidding/Negotiating Phase); Current Edition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
   2. Agrees to provide the same warranty for the substitution as for the specified product.
   3. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to GFIAA.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.

C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.

D. Limit each request to a single proposed substitution item.

3.2 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

A. Submittal Form (after award of contract):
   1. Submit substitution requests by completing CSI/CSC Form 13.1A - Substitution Request (After Bidding/Negotiating). See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.

B. Engineer will consider requests for substitutions only within 30 days after date of Agreement.

C. Substitutions will not be considered under one or more of the following circumstances:
   1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
   2. Without a separate written request.
   3. When acceptance will require revisions to Contract Documents.

3.3 RESOLUTION

A. Engineer may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.

B. Engineer will notify Contractor in writing of decision to accept or reject request.

3.4 ACCEPTANCE

A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

3.5 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

B. Include completed Substitution Request Forms as part of the Project record. Include both approved and rejected Requests.

END OF SECTION

SECTION 01 30 00 - ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

A. Section 01 60 00 - Product Requirements: General product requirements.

1.2 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

B. Make the following types of submittals to Engineer:
   1. Requests for Interpretation (RFI).
   2. Requests for substitution.
   3. Shop drawings, product data, and samples.
   4. Test and inspection reports.
   5. Design data.
   6. Manufacturer's instructions and field reports.
   7. Applications for payment and change order requests.
   8. Progress schedules.
   9. Coordination drawings.
   10. Correction Punch List and Final Correction Punch List for Substantial Completion.
   11. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PRECONSTRUCTION MEETING

A. GFIAA will schedule a meeting after Notice of Award.

B. Attendance Required:
   1. GFIAA.
   2. Engineer.
   3. Contractor.

C. Agenda:
   1. Execution of GFIAA-Contractor Agreement.
   2. Submission of executed bonds and insurance certificates.
   3. Distribution of Contract Documents.
   4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
   5. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
   6. Scheduling.

D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer, GFIAA, participants, and those affected by decisions made.

3.2 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the work at maximum bi-monthly intervals.

B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required:
1. Contractor.
2. GFIAA.
3. Engineer.
4. Contractor's superintendent.
5. Major subcontractors.

D. Agenda:
1. Review minutes of previous meetings.
2. Review of work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede, or will impede, planned progress.
5. Review of submittals schedule and status of submittals.
6. Maintenance of progress schedule.
7. Corrective measures to regain projected schedules.
8. Planned progress during succeeding work period.
9. Maintenance of quality and work standards.
10. Effect of proposed changes on progress schedule and coordination.
11. Other business relating to work.

E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer, GFIAA, participants, and those affected by decisions made.

3.3 CONSTRUCTION PROGRESS SCHEDULE - SEE SECTION 01 32 16

A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of work, with a general outline for remainder of work.

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Submit updated schedule with each Application for Payment.

3.4 REQUESTS FOR INTERPRETATION (RFI)

A. Definition: A request seeking one of the following:
1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
2. A resolution to an issue which has arisen due to field conditions and affects design intent.

B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.

C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional

costs or delays in execution of the work.

1. Prepare a separate RFI for each specific item.
    a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
    b. Do not forward requests which solely require internal coordination between subcontractors.
2. Prepare in a format and with content acceptable to GFIAA.

D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.

1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
2. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
    a. Approval of submittals (use procedures specified elsewhere in this section).
    b. Approval of substitutions (see Section - 01 60 00 - Product Requirements)
    c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
    d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.

E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.

1. Official Project name and number, and any additional required identifiers established in Contract Documents.
2. GFIAA's, Engineer's, and Contractor's names.
3. Discrete and consecutive RFI number, and descriptive subject/title.
4. Issue date, and requested reply date.
5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.

F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.

G. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.

1. Indicate current status of every RFI. Update log promptly and on a regular basis.
2. Highlight items requiring priority or expedited response.
3. Identify and include improper or frivolous RFIs.

H. Review Time: Engineer will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.

1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

I. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to GFIAA.

1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
4. Notify Engineer within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.5 SUBMITTAL SCHEDULE

A. Submit to Engineer for review a schedule for submittals in tabular format.
   1. Coordinate with Contractor's construction schedule and schedule of values.
   2. Format schedule to allow tracking of status of submittals throughout duration of construction.
   3. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.
      a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.

3.6 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
   1. Product data.
   2. Shop drawings.
   3. Samples for selection.
   4. Samples for verification.

B. Submit to Engineer for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.

C. Samples will be reviewed for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - Closeout Submittals.

3.7 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
   1. Design data.
   2. Certificates.
   3. Test reports.
   4. Inspection reports.
   5. Manufacturer's instructions.
   6. Manufacturer's field reports.
   7. Other types indicated.

B. Submit for Engineer's knowledge as contract administrator or for GFIAA.

3.8 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Correction Punch List for Substantial Completion.

B. Submit Final Correction Punch List for Substantial Completion.

C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 78 00 - Closeout Submittals:
   1. Project record documents.
   2. Operation and maintenance data.
   3. Warranties.
   4. Bonds.
   5. Other types as indicated.

D. Submit for GFIAA's benefit during and after project completion.

3.9 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Engineer.
   1. After review, produce duplicates.
   2. Retained samples will not be returned to Contractor unless specifically so stated.

3.10 SUBMITTAL PROCEDURES

A. Refer to section 01-33-00 - Submittal Procedures

END OF SECTION

SECTION 01 32 16 - CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Preliminary schedule.

B. Construction progress schedule, bar chart type.

1.2 SUBMITTALS

A. Within 10 days after date of Agreement, submit preliminary schedule.

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Submit in PDF format.

1.3 QUALITY ASSURANCE

A. Scheduler: Contractor's personnel or specialist Consultant specializing in CPM scheduling with one years minimum experience in scheduling construction work of a complexity comparable to this Project, and having use of computer facilities capable of delivering a detailed graphic printout within 48 hours of request.

1.4 SCHEDULE FORMAT

A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.

B. Scale and Spacing: To allow for notations and revisions.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PRELIMINARY SCHEDULE

A. Prepare preliminary schedule in the form of a horizontal bar chart.

3.2 CONTENT

A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

B. Identify work of separate stages and other logically grouped activities.

C. Provide sub-schedules to define critical portions of the entire schedule.

D. Provide separate schedule of submittal dates for shop drawings, product data, and samples, owner-furnished products, products identified under Allowances, and dates reviewed submittals will be required from Engineer. Indicate decision dates for selection of finishes.

E. Indicate delivery dates for owner-furnished products.

F. Provide legend for symbols and abbreviations used.

3.3 BAR CHARTS

A. Include a separate bar for each major portion of Work or operation.

B. Identify the first work day of each week.

END OF SECTION

SECTION 01 33 00 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes procedures for the submittal of Shop Drawings, Product Data, Samples, Operation and Maintenance Manuals, and other information.

B. Related Sections include pertinent Sections of these Specifications for the individual Submittals required.

1.3 DEFINITIONS

A. Submittal: Information sent by Contractor to convey information about systems, equipment, materials, products, and administrative matters for the Work.

B. Resubmittal: Submittal sent for review a second or further time.

C. Product Data: Illustrations, standard schedules, diagrams, performance charts, instructions, brochures, or manufacturer's literature that describe the physical size, appearance, and other characteristics of materials or equipment for a portion of the Work.

D. Shop Drawings: Drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

E. Samples: Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

F. Action Submittals: Submittals that require Engineer's response.

G. Informational Submittals: Submittals that do not require Engineer's response.

H. Delegated-Design: In certain individual Specification Sections, design services or certifications by a design professional that are specifically delegated to the Contractor. Performance and design criteria are defined in the individual Specification Sections or on the Drawings. Contractor is solely responsible for design of those items or systems, coordination of the design with the balance of the Project, and achieving specified performance.

I. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format. All PDF files shall be searchable.

1.4 SUBMITTAL PROCEDURES

A. Submittal Schedule:
   1. Prepare and submit a Submittal schedule that identifies the following for each Submittal:
      a. Submittal number
      b. Submittal description
      c. Projected date Submittal will be submitted.
   2. An electronic copy (MS Excel file) of a blank Submittal schedule, in the preferred format, will be furnished by Engineer at the preconstruction meeting.

3. Submittal Numbers:
    a. Use the applicable Specification Section number followed by a decimal point and then a sequential number (e.g., 06 10 00.1).
    b. Resubmittals shall include a letter suffix after another decimal point (e.g., 06 10 00.1.A).
    c. Submittals that are not numbered correctly may be rejected.

B. Delivery Method:
1. Web-Based Collaboration and Document Sharing System:
    a. A web-based collaboration and document sharing system may be utilized at Contractor's, Owner's, or Engineer's option.
    b. Use of such a system will be discussed during the preconstruction meeting.
    c. All parties must agree on use of a web-based collaboration and document sharing system.
    d. Training and licensing will be provided for all parties by the party suggesting use of a web-based collaboration and document sharing system.
2. Where a web-based collaboration and document sharing system is not utilized, Submittals may be delivered as paper copies or electronic files at Contractor's option; except for Operation and Maintenance Manuals, which shall be delivered as specified herein.
3. Advise Engineer and Owner of delivery method to be used at the preconstruction meeting.
4. Where Submittals include information that is intended to be printed on sheets larger than 11 inches x 17 inches, or where scale or drawing size are critical for proper review, submit 2 paper copies for review.
5. Electronic Files:
    a. Unless indicated otherwise, submit 1 copy of each Submittal in PDF format.
    b. Scanned Submittals shall be produced in such a way as to not compromise the graphic quality or accuracy of scale, where applicable; and text shall be searchable.
    c. One copy of each Action Submittal will be returned to Contractor.
    d. Transmit Submittals via electronic mail (e-mail) or web-based collaboration and document sharing system, where used. Submittals that are transmitted electronically will be returned electronically.
6. Transmit Submittals to party and address identified by Engineer at preconstruction meeting.

C. Coordination and Timing: Coordinate preparation and processing of Submittals with performance of construction activities. Contractor is responsible for cost of delays caused by lack of coordination or tardiness of Submittals. Incomplete Submittals will be rejected.
1. Coordinate each Submittal with fabrication, purchasing, testing, delivery, other Submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of Submittals for related parts of the Work so processing will not be delayed because of need to review Submittals concurrently for coordination.
    a. Engineer reserves the right to withhold action on a Submittal requiring coordination with other Submittals until related Submittals are received.

D. Processing Time: Allow 15 full working days for Engineer to review each Submittal, including Resubmittals. Time for review shall commence on Engineer's receipt of Submittal. No extension of the Contract Time will be authorized because of failure to transmit Submittals enough in advance of the Work to permit processing, including Resubmittals. Engineer will advise Contractor when a Submittal being processed must be delayed for coordination.

E. Identification: Place a permanent label on each Submittal or generate a separate cover sheet.
1. Indicate name of firm or entity that prepared Submittal.
2. Provide space to record Contractor's review and approval markings and action taken by Engineer.
3. Include the following information:
    a. Project name.
    b. Date.
    c. Name and address of Engineer.
    d. Name and address of Contractor.
    e. Name and address of Subcontractor(s).
    f. Name and address of Supplier(s).
    g. Name of Manufacturer.
    h. Submittal number, including revision identifier.
    i. Drawing number and detail references, as applicable.
    j. Location(s) where product is to be installed, as applicable.
    k. Other necessary identification.

F. Deviations: Encircle or otherwise specifically identify deviations from the Contract Documents on Submittals. Submittals that include deviations that are not identified may be rejected. Engineer may or may not consider deviations. Deviations are not substitutions. Refer to Division 01 Section “Substitution Procedures” for procedures regarding requests for substitutions.

G. Transmittal: Package each Submittal individually and appropriately for transmittal and handling. Transmit each Submittal using a transmittal form. Engineer will reject Submittal(s) received from sources other than Contractor.

H. Resubmittals: Make Resubmittals in same form and number of copies as initial Submittal.
   1. Note date and content of previous Submittal.
   2. Clearly identify additions and revisions.
   3. Resubmit Submittals until they are marked, “Reviewed, No Exceptions Noted” or “Reviewed With Corrections Noted.”

I. Distribution: Furnish copies of Submittals with mark indicating, “Reviewed, No Exceptions Noted” or “Reviewed With Corrections Noted,” to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities.

J. Use for Construction: Unless otherwise indicated by Engineer, use only Submittals with mark indicating, “Reviewed, No Exceptions Noted” or “Reviewed With Corrections Noted.”

1.5 CONTRACTOR'S USE OF ENGINEER’S ELECTRONIC DRAWING FILES

A. At Contractor's written request, copies of Engineer’s electronic Drawing files may be provided to Contractor for Contractor's use in connection with Project, including Submittal preparation. Electronic files may be furnished by Engineer for the convenience of the Contractor. Conclusions or information obtained or derived from such electronic files will be at the Contractor’s sole risk. Materials furnished by Engineer that may be relied upon are limited to printed Contract Documents.

B. When Contractor uses Engineer’s electronic Drawing files to facilitate Submittal preparation, prepare Submittals to be project specific. Submittals that are not project specific, including Engineer’s Drawing files submitted on a new title block, will be rejected.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit project specific Action Submittals required by individual Specification Sections. Do not use highlighting that would not be reproducible. Include a table of contents or index with each Submittal. As part of electronic submittals, the table of contents or index shall include electronic bookmarks to the first page of the respective Section(s) identified.

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 indicate 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. Color charts as required by individual Specification Sections.
      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. Maintain copy of returned Submittal for Project records.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale where appropriate. Scale shall be sufficiently large to indicate pertinent features of the item and its method of connection to the Work.
1. Preparation: Fully illustrate requirements of the Contract Documents. Include the following information, as applicable:
a. Dimensions.
b. Identification of products.
c. Fabrication and installation drawings.
d. Colors and materials as applicable.
e. Roughing-in and setting diagrams.
f. Wiring diagrams showing field-installed wiring, including power, signal, control, and communication wiring. Differentiate between Manufacturer-installed and field-installed wiring.
g. Manufacturing instructions.
h. Templates and patterns.
i. Schedules.
j. Calculations.
k. Compliance with specified standards.
l. Notation of coordination requirements.
m. Notation of dimensions established by field measurement.
n. Relationship to adjoining construction clearly indicated.
2. Sheet Size: Submit Shop Drawings on sheets at least 8-1/2 inches x 11 inches but no larger than 36 inches x48 inches.
3. Maintain copy of returned Submittal for Project records.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements, and for a comparison of these characteristics between Submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components, such as accessories, together in one Submittal package.
2. Identification: On unexposed side of Samples, attach label that includes the following:
a. Generic description of Sample.
b. Product name and name of Manufacturer.
c. Sample source.
d. Number and title of appropriate Specification Section.
3. Samples for Initial Selection: Submit Manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available. Where Contract Documents indicate custom color or material, coordinate production of custom Samples with the Engineer and Manufacturer prior to submittal.
a. Number of Samples: Unless indicated otherwise, submit 2 full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from Manufacturer's product line. Engineer will return 1 Sample with options selected.
4. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, physically identical with material or product proposed for use, and that show full range of color and texture variations expected.
5. Samples include, but are not limited to, the following: Partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
6. Number of Samples: Unless indicated otherwise, submit 2 sets of Samples. Engineer will retain 1Sample set; remainder will be returned.
a. Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
b. If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

7. Disposition: Maintain sets of approved Samples at Site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used by Engineer to determine final acceptance of construction associated with each set.
    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples shall be in an undamaged condition at time of Substantial Completion.
    b. Samples not incorporated into the Work, or otherwise designated to become Owner's property, are the property of Contractor.

E. Operation and Maintenance Manuals:
1. General:
    a. Where manuals are required to be submitted covering items included in the Work, prepare such manuals in durable plastic binders approximately 8-1/2 inches x 11 inches in size and with at least the following:
        1) Identification on, or readable through, the front cover stating general nature of the manual.
        2) Include a table of contents or index with each Submittal, near the front of the manual. As part of electronic submittals, the table of contents or index shall include electronic bookmarks to the first page of the respective Section(s) identified.
        3) Complete instructions regarding operation and maintenance of equipment involved, including:
            a) Equipment function, normal operating characteristics, and limiting conditions.
            b) Assembly, installation, alignment, adjustment, and checking instructions.
            c) Operating instructions for start-up, routine and normal operating, regulation and control, shutdown, and emergency conditions.
            d) Maintenance instructions, including lubrication requirements where applicable.
            e) Guide to "troubleshooting".
            f) Parts lists and predicted life of parts subject to wear.
            g) Project specific outline and cross sections, assembly drawings, engineering data, and wiring diagrams. Wiring diagrams shall reflect final, as-installed conditions and include wire numbers.
            h) Test data and performance curves.
        4) Complete nomenclature of all replaceable parts, their part numbers, current costs, and name and address of nearest vendor of parts.
        5) Copies of guarantees and warranties issued.
        6) Copies of the reviewed Submittals.
        7) Copies of data concerning changes made during construction.
2. Extraneous Data: Where contents of the manuals include Manufacturer's catalog pages, clearly indicate the precise items included in this installation and delete all Manufacturers' data with which this installation is not concerned. Do not use highlighting that would not be reproducible.
3. Number of Copies Required: Unless otherwise specifically directed by Engineer, or stipulated in the pertinent Section of these Specifications:
    a. For review, submit 1 electronic copy.
    b. For record, deliver1 electronic copies to Engineer.
4. Schedule delivery of record copies of operation and maintenance manuals at least60 days prior to startup of respective equipment, unless otherwise specified.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by individual Specification Sections. Do not use highlighting that would not be reproducible. Include a table of contents or index with each Submittal. As part of electronic submittals, the table of contents or index shall include electronic bookmarks to the first page of the respective Section(s) identified.

B. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

C. 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/engineers and owners, and other information specified.

D. 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.

E. 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 Project.

F. 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.

G. Product Certificates: Prepare written statements on Manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

H. Material Certificates: Prepare written statements on Manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

I. 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.

J. 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.

K. 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.

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. 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.

P. Manufacturer's Field Reports: Prepare written information documenting tests and inspections of factory-authorized service representative. Include the following, as applicable:
   1. Name, address, and telephone number of factory-authorized service representative making report.
   2. Statement of substrate condition and acceptability of substrate for installation or application of product.
   3. Statement that products at 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. Document settings in writing.
   8. Other required items indicated in individual Specification Sections.

2.3 DELEGATED-DESIGN SUBMITTALS

A. Where design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated, which Contractor has coordinated with the balance of the Project.

B. Performance type design documents and calculations shall be prepared by a design professional as required by the individual Specification Section, licensed in the State where the Project is being constructed. Design documents shall be signed and sealed by the responsible design professional. Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Identify name and version of software, if any, used for calculations.

C. In addition to Shop Drawings, Product Data, and other required Submittals, submit two copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

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. Verify field dimensions and conditions; note corrections as necessary. Mark with approval stamp before submitting to Engineer.
   1. Approval Stamp: Stamp each Submittal with an approval stamp. Use the same stamp format for each Submittal. 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.

B. Submittals that are not approved and stamped by Contractor will be rejected.

3.2 ENGINEER’S REVIEW

A. Action Submittals: Engineer will review Action Submittals, make marks to indicate corrections or modifications required, and return Submittal. Engineer will stamp each Submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
   1. Reviewed, No Exceptions Noted: Submittal appears to conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
   2. Reviewed With Corrections Noted: Upon incorporation of review comments, it appears that Submittal will conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

3. Revise and Resubmit: Submittal has one or more specific segments that are incomplete, do not appear to conform to the information given in the Contract Documents, or are incompatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Contractor shall resubmit information for review to demonstrate understanding of comments and portions of Work to be provided. Except as noted, Contractor shall not proceed with Work related to Submittal.
4. Rejected, Resubmit: Submittal as a whole is incomplete, does not appear to conform to the information given in the Contract Documents, or is incompatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Contractor shall resubmit information for review to demonstrate understanding of comments and portions of Work to be provided. Contractor shall not proceed with Work related to Submittal.

B. Informational Submittals: Other Submittals required by the Contract Documents are for information only. Engineer will acknowledge receipt of Informational Submittals. Such Submittals include, but are not limited to:
1. Qualifications Data.
2. Certificates.
3. Test Reports.
4. Manufacturer’s Instructions.
5. Maintenance Data.
6. Field Reports.

C. Delegated-Design Submittals: Review of Delegated-Design Submittals by Engineer shall not relieve Contractor of Contractor’s sole responsibility for design and achieving specified performance.

D. Submittals not required by the Contract Documents will be returned without being reviewed.

E. Partial Submittals are not acceptable, will be considered non-responsive, and will be rejected.

3.3 RE-REVIEW COSTS

A. Compensation:
1. Should Engineer be required to review a Submittal more than twice because of failure of the Submittal to meet the requirements of the Contract Documents, Engineer will record Engineer's expenses for performing additional reviews.
2. Owner will compensate Engineer for these additional services and deduct the amount paid from payments to Contractor.

END OF SECTION 01 33 00

SECTION 01 35 53 - SECURITY PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Security measures including formal security program, entry control, personnel identification, and miscellaneous restrictions.

1.2 SECURITY PROGRAM

A. Protect Work , existing premises and GFIAA's operations from theft, vandalism, and unauthorized entry.

B. Initiate program in coordination with GFIAA's existing security system at project mobilization.

C. Maintain program throughout construction period until GFIAA acceptance precludes the need for Contractor security.

1.3 ENTRY CONTROL

A. Restrict entrance of persons and vehicles into Project site and existing facilities.

B. Allow entrance only to authorized persons with proper identification.

C. Contractor shall control entrance of persons and vehicles related to GFIAA's operations.

D. Coordinate access of GFIAA's personnel to site in coordination with GFIAA's security forces.

1.4 PERSONNEL IDENTIFICATION

A. Personnel working within restricted areas of the Airport will be required to obtain a badge from GFIAA.
   1. Contractor to coordinate and identify personnel needing badges.
   2. Provide a list of personnel at the time of comencing work.
   3. Procedures for obtaining badges is located at this link.
   4. Ensure that time is allowed for obtaining badging. The time required for badging will not be considered as a reason to change project schedule.

B. Provide identification badge to each person authorized to enter premises.

C. Require return of badges at expiration of their employment on the Work.

1.5 RESTRICTIONS

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Quality assurance.

B. Testing and inspection agencies and services.

C. Control of installation.

D. Manufacturers' field services.

E. Defect Assessment.

1.2 DEFINITIONS

A. Contractor's Quality Control Plan: Contractor's management plan for executing the Contract for Construction.

1.3 QUALITY ASSURANCE

A. Testing Agency Qualifications:
   1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
   2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
   3. Qualification Statement: Provide documentation showing testing laboratory is accredited under IAS AC89.

B. Contractor's Quality Control (CQC) Plan:
   1. Prior to start of work, submit a comprehensive plan describing how contract deliverables will be produced. Tailor CQC plan to specific requirements of the project. Include the following information:
      a. Management Structure: Identify personnel responsible for quality. Include a chart showing lines of authority.
         1) Include qualifications (in resume form), duties, responsibilities of each person assigned to CQC function.

1.4 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Contractor shall employ and pay for services of an independent testing agency to perform other specified testing.

B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

C. Contractor Employed Agency:

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.2 TESTING AND INSPECTION

A. Testing Agency Duties:
   1. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.
   2. Perform specified sampling and testing of products in accordance with specified standards.
   3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   4. Promptly notify Engineer and Contractor of observed irregularities or non-compliance of Work or products.
   5. Submit reports of all tests/inspections specified.

B. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.
   3. Agency may not assume any duties of Contractor.
   4. Agency has no authority to stop the Work.

C. Contractor Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.

D. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Engineer.

E. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.3 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment as applicable, and to initiate instructions when necessary.

B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.4 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not complying with specified requirements.

B. If, in the opinion of GFIAA, it is not practical to remove and replace the work, GFIAA will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 45 35 – TESTING SERVICES FOR BURIED UTILITIES, ROADWAYS, AND SITE PROJECTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes testing services as follows:
   1. Testing services which will be contracted and paid for directly by the Owner and performed by an independent testing agency selected by the Owner:
      a. Soil compaction tests.
      b. Verification of soil bearing capacity.
      c. Base and subbase compaction tests.
      d. Pavement compaction tests.
      e. Collecting and transporting soil samples to the independent testing agency's laboratory.
      f. Laboratory soil proctor tests.
      g. Concrete slump and air entrainment tests.
      h. Concrete cylinder compressive strength tests.
      i. Travel expense of the independent testing agency.
      j. Making concrete cylinders.
      k. Transporting cylinders to testing agency's laboratory and performing tests.
   2. Testing services and certifications which will not be contracted and paid for directly by Owner and should be included in the Contractor’s base Bid:
      a. Pipe leakage and pressure tests.
      b. Pipe material tests.
      c. Fill material from onsite and offsite.
      d. Fine and coarse aggregate certification tests.
      e. Bedding material certification tests.
      f. Bituminous pavement materials.
      g. Testing performed for the Contractor's convenience.
   3. Owner Paid Items:
      a. The Owner may elect to inspect or test or to employ either the Engineer or an independent testing agency to test materials on the Project other than those specified herein.
      b. The cost of this testing will be paid for by the Owner.

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

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. AASHTO: Provisional Standard - TP 23 Standard Test Method for Water Content of Freshly Mixed Concrete Using Microwave Oven Drying.
   2. ASTM Specifications, Tests and Test Methods:
      a. C31 - Making and Curing Concrete Test Specimens in the Field.
      b. C33 - Specification for Concrete Aggregates Including Appendix XI.
      c. C39 - Test for Compressive Strength of Cylindrical Concrete Specimens.
      d. C42 - Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
      e. C138 - Test for Unit Weight, Yield and Air Content of Concrete.
      f. C143 - Test for Slump of Portland Cement Concrete.
      g. C172 - Sampling Fresh Concrete.
      h. C173 - Test for Air Content of Freshly Mixed Concrete by the Volumetric Method.
      i. C192 - Making and Curing Concrete Test Specimens in the Laboratory.

j. C227 - Standard Test Method for Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method).
k. C231 - Test for Air Content of Freshly Mixed Concrete by the Pressure Method.
l. C289 - Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method).
m. C295 - Standard Guide for Petrographic Examination of Aggregates for Concrete.
n. C567 - Unit Weight of Structural Lightweight Concrete.
o. C1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
p. D698 - Laboratory Compaction Characteristics of Soil Using Standard Effort.
q. D1188 - Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens.
r. D1556 - Density of Soil In Place by the Sand-Cone Method.
s. D1557 - Moisture-Density Relations of Soils and Soils Aggregate Mixture Using 10 Pound Rammer and 18-Inch Drop.
t. D1586 - Penetration Test and Split Barrel Sampling of Soils.
u. D1883 - CBR (California Bearing Ratio) of Laboratory Compacted Soils.
v. D2166 - Unconfined Compressive Strength of Cohesive Soil.
w. D2167 - Density of Unit Weight of Soil In Place by the Rubber Balloon Method.
x. D2922 - Density of Soil and Soil Aggregates by Nuclear Methods.
y. D2937 - Density of Soil in Place by Drive Cylinder Method.
z. D2950 - Test Methods for Density of Bituminous Concrete in Place by Nuclear Methods.
aa. D3666 - Minimum Requirements for Agencies Testing and Inspecting Bituminous Paving Materials.
bb. D3740 - Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as used in Engineering Design and Construction.

3. ACI - American Concrete Institute:
   a. 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
   b. 211.1R - Report on Alkali-Aggregate Reactivity.
   c. 301 - Specification for Structural Concrete for Buildings.
   d. 318 - Building Code Requirements for Reinforced Concrete.
4. MDOT Standards: Michigan Cone Test for Determination of Maximum Unit Weight of Granular Soils.

1.4 TEST REQUIREMENTS

A. In accordance with:
   1. Laws and Regulations.
   2. Sections of these Specifications.
   3. Reference procedures and requirements.
   4. Pertinent standards for testing.

B. Testing Agency Qualifications:
   1. Approved by authorities having jurisdiction.
   2. Agency meeting the requirements of ASTM C1077, D3666, and D3740.
   3. Agency whose primary business is materials and construction testing.
   4. Approved by the Engineer or the Owner.
   5. Objective, competent and independent from the Contractor performing the work to be inspected.
   6. Having adequate equipment, periodically calibrated as required, to perform the special inspections.
   7. Employing experienced personnel educated in conducting, supervising and evaluating special inspections similar in complexity to that required for the Project.

1.5 RETESTING COSTS

A. Retesting:
   1. When initial special inspections of items except soil compaction indicate noncompliance with the Contract Documents, subsequent special inspections occasioned by the noncompliance shall be performed by the same special inspection agency, and the costs thereof will not be reimbursed.

2. Soil Compaction:
    a. The first retesting of soil compaction shall be paid for in accordance with the provisions of the Contract Documents.
    b. The second and subsequent retesting for soil compaction due to noncompliance with the Contract Documents shall be performed by the same special inspection agency, and the costs thereof will not be reimbursed.

1.6 REPORTS

A. Provide the Engineer's field representative and Contractor's superintendent with a draft copy of the daily report prior to leaving the Project Site each day on which testing is performed on the Site.

B. Provide typed copies of testing agency reports, inspections, and certifications within 5 business days to:
    1. The Engineer's Office: One copy.
    2. The Contractor's Office: One copy.

1.7 SCHEDULING TESTING

A. Coordinate and schedule the work of the independent testing agency.
    1. Notify the Engineer and the independent testing agency 48 hours prior to the expected time when testing services will be required.
    2. Provide access to the Work as necessary for the agency to properly perform its functions.

B. Establishing Schedule: By advance discussion with the Engineer and independent testing agency, determine the time required to perform tests and to issue findings.

C. Revising Schedule: When changes of construction schedule are necessary during construction, coordinate all such changes with the independent testing agency as required.

D. Adherence to Schedule: When the independent testing agency is ready to test according to the determined schedule, but is prevented from testing or taking specimens due to incompleteness of the Work, all extra costs for testing attributable to the delay will be paid by the Contractor.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 TESTING REQUIREMENTS

A. Fine and Coarse Aggregate and Bedding Material:
    1. Sieve test to ensure compliance with the materials specifications.
    2. Provide 1 test for each source of imported materials as directed by the Engineer.

B. Fill Material from Onsite and Offsite Sources: Sieve test to ensure compliance with the materials specifications.

C. Soil Compaction:
    1. Minimum Frequency of Testing:
        a. Within the Building Footprint: See Division 01 for requirements.
        b. Outside a Building Footprint: One test per 5,000 square feet of subgrade for each layer of fill.
        c. Utility Trenches: One test for every 200 linear feet of trench length at each lift.
        d. Utility Structures: One test under each manhole, vault or other structure.
        e. Curb and Gutter: One test for every 100 linear feet.
        f. Pavement Subgrade, Base Grade:
            1) One test for every 2,500 square feet for road construction.
            2) One test at every driveway or curb cut location.
            3) One test for every 500 square feet for road intersections.

2. Predominately Granular Soils:
   a. Perform necessary laboratory and field testing required to verify compaction of fill, bedding, trench backfill and structure backfill in accordance with ASTM D1557 or Michigan Cone.
   b. Verify the compaction of the first 12 inches of the existing subgrade below structures, utility structures, paved areas, and areas to be filled in accordance with ASTM D1557 or Michigan Cone.
3. Predominately Cohesive Soils:
   a. Perform necessary laboratory and field testing required to verify compaction of fill trench backfill and structure backfill in accordance with ASTM D698.
   b. Verify the compaction of the first 12 inches of the existing subgrade below structures, utility structures, paved areas, and areas to be filled in accordance with ASTM D698.
4. Independent testing agency shall inform the Engineer and the Contractor's onsite supervisor immediately of onsite test results.
5. Place no additional fill in areas where compaction results do not meet Specification requirements.

D. Testing Bituminous Paving:
   1. The testing agency shall provide quality control and testing services that will be monitored by the Engineer's field representatives continuously during paving.
   2. The testing agency shall take 1 mixture sample per day and 1 test per 1,000 tons of material placed.
      a. This sample shall be taken randomly from the back of the hauling unit.
      b. This sample shall be large enough to provide the Contractor, testing agency, and Engineer with an equal split of the sample.
      c. The testing agency shall test the samples for the following:
         1) 50 blow Marshall bulk specific gravity or a 50 gyration gyratory compactor bulk specific gravity (G_{mb}).
         2) Theoretical Maximum Density (TMD) (AASHTO T209) or maximum specific gravity of paving mixture (no air voids) (G_{mm}).
         3) % Asphalt binder.
         4) Aggregate gradation and % crushed aggregate.
      d. With the above information and the mix design aggregate effective specific gravity, calculate the following:
         1) Mixture air voids.
         2) Mixture voids in the mineral aggregate (VMA) using bulk specific gravity of aggregate (Gsb).
         3) % Asphalt binder.
   3. The results of these tests shall be compared to the approved mix design and must be within the tolerances indicated below or all additional truck loads of non-compliant material shall be removed from the Site.
      a. The material supplier shall then make recommendations to the Engineer of how the mixture will be revised to meet the Specifications.
      b. The results of these tests and the split samples must be presented to the Engineer before mixture production begins the following day.
      c. If the Engineer wishes to test the split samples, they may use the supplier's laboratory and equipment.
      d. The Engineer reserves the right to work with the supplier and modify the supplier's mix design to ensure the product meets the Drawings and Specification requirements.
      e. This may include increasing asphalt content and adjusting aggregate gradations within the bituminous mixture composition specification.

Testing/Verification Tolerances			
Parameter	Single test	Average of 2 or more tests	Comments
Air Voids	±1.00%	-1.0%+0.5%	
VMA	±1.20%	±1.20%	
TMD (G_{mm})	±0.019	±0.015	
Asphalt Binder	±0.4%	±0.3%	>0.4% less than JMF may be subject to reduced payment
%Fines/% Asphalt	Max 1.6	Max 1.6	Result must be less than 1.6
#4 sieve	±5.0%	±3.0%	
#30 sieve	±4.0%	±3.0%	
#200 sieve	2.0%	±1.0%	
Crushed Particles	±10%	±10%	>10% less than JMF may be subject to reduced payment

4. The Contractor shall have the testing agency's density technician and a density gage available whenever paving is occurring. This technician and gage shall monitor placement and compaction of asphalt to verify the maximum density possible is being achieved.
5. Density gage readings shall be taken at core locations prior to coring.
6. The testing agency shall take 1 core on each 25,000 square feet of new parking lot.
    a. The percent compaction of these cores shall be calculated using the TMD of the approved mix design (JMF) unless otherwise directed and the results used for determining compliance with this Specification.
    b. The daily average in place density:
        1) Low/medium Volume Roads: 95.0% of the mixture's TMD or greater with a minimum density of 94% of TMD.
        2) Heavy Volume Roads: 94% of the mixtures TMD or greater with a minimum density of 93% TMD.
    c. Areas that are not compacted to the specified daily average will be evaluated by the Engineer and may either be removed or subject to a price reduction.
7. Thickness: In place compacted thickness tested in accordance with ASTM D3549.
8. Surface Smoothness:
    a. Test finished surface of each hot mix asphalt course for smoothness, using 10-foot straightedge applied parallel with and at right angles to centerline of paved area, or by measuring depths of bird baths immediately after a rain.
9. Workmanship:
    a. Finished Surfaces, Especially in High Visibility Areas: Smooth, free of cracks, raveling or spalling holes, rake or roller marks and depressions, or bird baths.
    b. Problem Areas Identified: Correct by removing, paving or reheating and re-rolling if possible.
10. Test Reports:
    a. Summarize the results of the bituminous paving using the "Report of Verification/Acceptance Testing & Core Density."
    b. Electronically submit this document to the Project team on a daily basis prior to the placement of any subsequent pavement.

E. Concrete Testing:
1. Point of sampling and the method of securing the Samples:
    a. Determined by the independent testing agency.
    b. In accordance with ASTM C172.
2. Slump Tests:
    a. Perform slump tests in accordance with ASTM C143.
    b. Perform 1 slump test on the Site for each truckload of concrete.
    c. At the Engineer's request, also perform slump tests at batch plant before adding water reducer.
    d. Perform more slump tests if deemed necessary by the Engineer.
3. Perform 1 air-entraining test in accordance with ASTM C231 or C173 for each truckload of concrete.
4. Test the concrete unit weight in accordance with ASTM C138 or C567, as applicable.
5. Test the air content and fresh concrete temperature of each set of concrete cylinders.
6. Concrete Cylinder Testing:
    a. In accordance with ASTM C31 and C39.
    b. Take concrete cylinder Sample set as follows:
        1) Once for each 150 cubic yards (or fraction thereof) of each class of concrete placed each day, nor less than.
        2) Once for each 2,500 square feet of sidewalk or paving surface area placed each day.
    c. Concrete Cylinder Sample Set: Consist of 4 standard 6-inch cylinders.
    d. Handle cylinders carefully.
    e. Onsite Storage:
        1) Handle cylinders carefully.
        2) 12 hours, minimum, 48 hours maximum.
        3) Store at a temperature range of 60 to 80 degrees F and in a moist environment.
        4) Shield from direct sunlight and radiant heat.
        5) Construct heated or water bath enclosures, as applicable, if conditions require.
        6) Cylinder samples taken to establish adequate strength for form removal earlier than 28 days shall be cured in locations that represent the conditions under which the structural concrete will be cured.

f. Laboratory Curing: For duration of curing after onsite storage.
g. Test 1 of the cylinders at 7 days and 2 cylinders at 28 days. Save 1 cylinder as a spare.
h. Acceptance and evaluation of the concrete shall be based on ACI 301.

END OF SECTION 01 45 35

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary Controls: Barriers, enclosures, and fencing.

B. Security requirements.

C. Vehicular access and parking.

D. Waste removal facilities and services.

1.2 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.

C. Provide protection for plants designated to remain. Replace damaged plants.

D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.3 FENCING

A. Construction: Commercial grade chain link fence.

B. Provide 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks.

1.4 SECURITY - SEE SECTION 01 35 53

A. Provide security and facilities to protect Work, existing facilities, and GFIAA's operations from unauthorized entry, vandalism, or theft.

B. Coordinate with GFIAA's security program.

1.5 VEHICULAR ACCESS AND PARKING

A. Coordinate access and haul routes with governing authorities and GFIAA.

B. Provide and maintain access to fire hydrants, free of obstructions.

C. Provide means of removing mud from vehicle wheels before entering streets.

D. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

1.6 WASTE REMOVAL

A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

B. Provide containers with lids. Remove trash from site periodically.

C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.7 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.

B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore existing facilities used during construction to original condition.

E. Restore new permanent facilities used during construction to specified condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 51 00 - TEMPORARY UTILITIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary Utilities: Provision of electricity, lighting, heat, ventilation, and water.

1.2 TEMPORARY ELECTRICITY

A. Cost: By GFIAA.

B. Connect to GFIAA's existing power service.
   1. Do not disrupt GFIAA's need for continuous service.
   2. Exercise measures to conserve energy.

C. Provide temporary electric feeder from existing building electrical service at location as directed.

D. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required. Provide flexible power cords as required.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 55 26 – TRAFFIC CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the major items listed below:
   1. Maintaining traffic and parking.
   2. Temporary facilities for:
      a. Maintaining vehicular access.
      b. Maintaining pedestrian access.
      c. Traffic detours.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. MDOT:
      a. 2020 Standard Specifications for Construction.
      b. Standard Plans.
      c. Michigan Manual of Uniform Traffic Control Devices, as amended.

1.4 DEFINITIONS

A. Abbreviation for Michigan Manual of Uniform Traffic Control Devices: MMUTCD.

B. Terms:
   1. Traffic: Includes all users of the roadway, motorized and non-motorized.
   2. Traffic Control Device: Includes, but is not limited to, signs, pavement markings, traffic signals, traffic channelizing devices, flagging devices, and other devices designed to provide orderly and predictable movement of traffic, and assist vehicle operators in vehicle guidance and navigation tasks.

1.5 SEQUENCING AND SCHEDULING

A. Coordination with Construction Sequencing and Schedule:
   1. Adjustments to the proposed sequencing and scheduling may require changes to work described in this section, which must be approved by the Engineer and Owner. Such changes shall be at no additional cost to Owner.

1.6 SUBMITTALS

A. Drawings:
   1. Coordinate with alternative proposed sequencing and scheduling.
   2. Submit for:
      a. Alternative proposed detour routes.
      b. Alternative proposed closure details.
   3. Required Information:
      a. Dimensions.
      b. Locations of proposed traffic control devices.

1.7 MAINTENANCE

A. Maintenance Service:
   1. Inspect temporary traffic control devices daily during the course of the Work.
   2. Deficiencies in the location or condition of traffic control devices shall be corrected immediately.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All materials for temporary traffic control devices shall conform with the MDOT 2020 Standard Specifications for Construction and the MMUTCD, as amended.

2.2 TEMPORARY PAVEMENTS

A. Provide temporary pavements to maintain local and emergency access.

PART 3 - EXECUTION

3.1 GENERAL

A. Take necessary precautions including, but not limited to, provision of necessary traffic control devices, implementation of closures, construction of temporary facilities, and maintenance of detours as necessary for the safety of the general public, efficient movement of traffic, and the protection of the Work.

B. Temporary traffic controls shall be installed and maintained in conformity with applicable statutory requirements and as required by the governing roadway authority.

3.2 MAINTAINING ACCESS

A. Maintain local and emergency traffic at all times during the Work:

B. Pedestrian Access:
   1. Conduct Work to minimize obstruction to pedestrian traffic.
   2. Barricade and fence disturbed or obstructed pedestrian facilities
   3. Restore disturbed pedestrian facilities at the earliest possible date using temporary pavement as necessary.

C. Driveways:
   1. Conduct Work to minimize the duration of driveway closures.
   2. Provide written notice to property owners and occupants 48 hours prior to closing commercial driveways.
   3. Restore driveways using temporary pavement as required by the Engineer.

3.3 PARKING

A. Existing Parking Facilities:
   1. Maintain or restore existing public parking areas as early as possible; use temporary pavements as necessary.
   2. Do not park construction vehicles, park contractor employee vehicles, or store material in areas used for commercial parking.

3.4 PROTECTION

A. Existing Traffic Control Devices:
   1. Protect all existing traffic control devices in the work area except as indicated on the Drawings:
      a. Promptly replace damaged traffic control devices.
      b. With Owner’s preapproval, the Contractor may carefully remove, store, protect, and reinstall signs except as noted herein.

2. Do not remove, relocate, obstruct, or otherwise interfere with regulatory signs, including, but not limited to, stop signs, yield signs, and speed limit signs.
3. Maintain street name signs within the construction area for the duration of the project.

B. Existing Traffic Control Device Removal:
1. Existing traffic control devices to be removed shall remain the property of the Owner.
2. Carefully remove traffic control devices to prevent damage.
3. Stockpile at a location on site in location to be determined by the Owner.
4. Should the Owner decide not to retain ownership of the removed traffic control devices, dispose of the devices immediately.

END OF SECTION 01 55 26

SECTION 01 70 00 - EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Requirements for alterations work, including selective demolition.

C. Cutting and patching.

D. Surveying for laying out the work.

E. Cleaning and protection.

F. Starting of systems and equipment.

G. Demonstration and instruction of GFIAA personnel.

H. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

1.2 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
1. On request, submit documentation verifying accuracy of survey work.
2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in compliance with Contract Documents.
3. Submit surveys and survey logs for the project record.

C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences. Include design drawings and calculations for bracing and shoring.
2. Identify demolition firm and submit qualifications.
3. Include a summary of safety procedures.

D. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
1. Structural integrity of any element of Project.
2. Integrity of weather exposed or moisture resistant element.
3. Efficiency, maintenance, or safety of any operational element.
4. Visual qualities of sight exposed elements.
5. Work of GFIAA or separate Contractor.

1.3 QUALIFICATIONS

A. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to Engineer. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

B. For design of temporary shoring and bracing, employ a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

1.4 PROJECT CONDITIONS

A. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
   1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.

B. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.

C. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.5 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Notify affected utility companies and comply with their requirements.

C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

F. Coordinate completion and clean-up of work of separate sections.

G. After GFIAA occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of GFIAA's activities.

PART 2 PRODUCTS

2.1 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 25 00 S 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.3 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Engineer of any discrepancies discovered.

C. Contractor shall locate and protect survey control and reference points.

D. Control datum for survey is that established by GFIAA provided survey.

E. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

F. Promptly report to Engineer the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

G. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Engineer.

H. Utilize recognized engineering survey practices.

3.4 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

3.5 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as indicated.
   2. Report discrepancies to Engineer before disturbing existing installation.
   3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.

C. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

D. Clean existing systems and equipment.

E. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

F. Comply with all other applicable requirements of this section.

3.6 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. See Alterations article above for additional requirements.

C. Perform whatever cutting and patching is necessary to:
   1. Complete the work.

2. Fit products together to integrate with other work.
3. Provide openings for penetration of mechanical, electrical, and other services.
4. Match work that has been cut to adjacent work.
5. Repair new work damaged by subsequent work.
6. Remove samples of installed work for testing when requested.
7. Remove and replace defective and non-complying work.

D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

E. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

F. Restore work with new products in accordance with requirements of Contract Documents.

G. Patching:
1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
2. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.7 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.8 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

E. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.9 SYSTEM STARTUP

A. Coordinate schedule for start-up of various equipment and systems.

B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

D. Verify that wiring and support components for equipment are complete and tested.

E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

F. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.10 DEMONSTRATION AND INSTRUCTION

A. Demonstrate operation and maintenance of products to GFIAA's personnel two weeks prior to date of Substantial Completion.

B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.

C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

D. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.

3.11 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.12 FINAL CLEANING

A. Use cleaning materials that are nonhazardous.

B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

E. Clean site; sweep paved areas, rake clean landscaped surfaces.

F. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.13 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.

B. Notify Engineer when work is considered ready for Engineer's Substantial Completion inspection.

C. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Engineer's Substantial Completion inspection.

D. Conduct Substantial Completion inspection and create Final Correction Punch List containing Engineer's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Engineer.

E. Correct items of work listed in Final Correction Punch List and comply with requirements for access to GFIAA-occupied areas.

F. Notify Engineer when work is considered finally complete and ready for Engineer's Substantial Completion final inspection.

G. Complete items of work determined by Engineer listed in executed Certificate of Substantial Completion.

END OF SECTION

SECTION 01 74 00 – CLEANING AND WASTE MANAGEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes provisions for maintaining structures and the Site in a standard of cleanliness.

B. Related Sections: In addition to standards described in this Section, comply with requirements for cleaning as described in various other Sections of these Specifications.

1.3 QUALITY ASSURANCE

A. Inspection:
   1. Daily and more often if necessary.
   2. Conduct inspections to verify that requirements of cleanliness are being met.

1.4 DELIVERY, STORAGE AND HANDLING

A. Hazards Control:
   1. Volatile Wastes:
      a. Store in covered metal containers.
      b. Remove from premises daily.
      c. Provide secondary containment for storage of hazardous materials, as required by governing authorities or agencies.
   2. Prevent accumulation of wastes which create hazardous conditions.
   3. Provide adequate ventilation during use of volatile or noxious substances.

1.5 PROJECT CONDITIONS

A. Cleaning and Disposal:
   1. Conduct operations to comply with local ordinances and anti-pollution laws.
   2. Not Allowed:
      a. Burning or burying of rubbish or waste materials on Site.
      b. Disposal of volatile wastes in storm or sanitary sewers: Volatile wastes include, but are not limited to, mineral spirits, oil or paint thinner.
      c. Disposal of wastes into streams or waterways.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Compatibility:
   1. Compatible with the surface being cleaned.
   2. Recommended by the Manufacturer of the material being cleaned.
   3. As reviewed by Engineer.

PART 3 - EXECUTION

3.1 PROGRESS CLEANING

A. General:
1. Store Materials:
a. In an orderly arrangement allowing maximum access.
b. To allow unimpeded drainage and traffic.
c. Provide for the required protection of materials.
2. Do not allow accumulation of scrap, debris, waste material and other items not required for construction of the Work.
a. Remove from Site at least each week and more often if necessary.
b. Provide adequate storage for materials awaiting removal.
3. Observe requirements for fire protection and protection of the environment.

B. Site:
1. Daily, and more often if necessary:
a. Inspect the Site.
b. Pick up scrap, debris and waste material; remove such items to the place designated for their storage.
2. Weekly, and more often if necessary:
a. Inspect arrangements of materials stored on Site.
b. Restack or otherwise service arrangements to meet the requirements of paragraph 3.1.A.1 above.
3. At all times maintain the Site in a neat and orderly condition which meets the approval of Engineer.
4. Paved Surfaces: Keep clean.
5. Dust Control:
a. Control dust on or near the Work by the application of water or other approved means.
b. If Contractor fails to correct unsatisfactory conditions with 24 hours after due notification:
1) Owner may arrange for such work to be performed by other means.
2) Pay costs.

C. Buildings, Tanks, and Other Structures:
1. Weekly, and more often if necessary:
a. Inspect.
b. Pick up scrap, debris and waste material; remove such items to the place designated for their storage.
c. Sweep interior spaces clean. Clean shall be defined to be free from dust and other material capable of being removed by reasonable diligence using a hand-held broom.
2. Preparation for installation of succeeding material:
a. Clean the building, tank or other structure or pertinent portion thereof:
1) To the degree of cleanliness recommended by the Manufacturer of the succeeding material.
2) Using equipment and materials required to achieve the required cleanliness.
3. After installation of finish floor material:
a. Clean the finish floor daily at all times while work is being performed in the space in which finish materials have been installed.
1) Clean as used above shall be defined to be free from all foreign material which, in the opinion of Engineer, may be injurious to the finish floor material.
4. Schedule cleaning operations so that dust and other contaminants resulting from cleaning operations will not fall on wet, recently painted surfaces.

3.2 FINAL CLEANING

A. Definitions for Clean: The level of cleanliness generally provided by commercial building maintenance subcontractors using commercial quality building maintenance equipment and materials.

B. Prior to Completion of the Work:
1. Remove from the Site all tools, surplus materials, equipment, scrap, debris and waste.
2. Conduct final progress cleaning as described in Article 3.1 above.

C. Site:
   1. Unless otherwise specifically directed by Engineer:
      a. Hose down paved areas on Site and public sidewalks directly adjacent to the Site.
      b. Rake clean other surfaces of the grounds.
   2. Remove resultant debris.

D. Buildings, Tanks and Other Structures:
   1. Exterior:
      a. Visually inspect exterior surfaces.
      b. Remove traces of soil, waste material, smudges and other foreign matter.
      c. Remove traces of splashed materials from adjacent surfaces.
      d. If necessary to achieve a uniform degree of exterior cleanliness, hose down the exterior surface.
      e. In the event of stubborn stains not removable with water, Engineer may require light sandblasting or other cleaning at no additional cost to Owner.
   2. Interior:
      a. Visually inspect interior surfaces.
      b. Remove traces of soil, waste material, smudges and other foreign matter.
      c. Remove traces of splashed materials from adjacent surfaces.
      d. Remove paint droppings, spots, stains and dirt from finished surfaces using only the specified cleaning materials and equipment.
   3. Glass: Clean glass inside and outside.
   4. Polished Surfaces: To surfaces requiring the routine application of buffed polish, apply the specified polish as recommended by the Manufacturer of the material being polished.

E. Timing: Schedule final cleaning as approved by Engineer to enable Owner to accept a completely clean Project.

END OF SECTION 01 74 00

SECTION 01 77 00 – CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the instructions for and the responsibilities of each party in contract closeout.

B. Related Section includes Certificate of Substantial Completion.

1.3 SUBSTANTIAL COMPLETION

A. Contractor: When Contractor considers that the Work or any portion of the Work is ready for its intended use, Contractor shall submit:
   1. Written certification to Engineer and Owner that the Work, or designated portion of the Work, is substantially complete.
   2. A list of major items to be completed or corrected.
   3. Request that Engineer issue a certificate of Substantial Completion.

B. Engineer's Inspection: Engineer will make an inspection:
   1. Within 10 days after receipt of certification.
   2. Together with Owner and Contractor.

C. Engineer's Determination of Substantial Completion:
   1. Should Engineer consider the Work or designated portion of the Work substantially complete, the following steps shall be taken:
      a. Contractor shall prepare and submit to Engineer, a list of items to be completed or corrected as determined by the inspection.
      b. Engineer will prepare and deliver to Owner:
         1) A tentative certificate of Substantial Completion.
         2) A tentative list of items to be completed or corrected before final payment.
      c. Owner shall have 7 days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list.
      d. Engineer will, within 14 days after delivery of tentative certificate to Owner, decide:
         1) Not Substantially Complete: Engineer will issue written notice to Contractor stating reasons.
         2) Substantially Complete: Engineer will issue definitive certificate of Substantial Completion and a revised list of items to be corrected or completed.
   2. Should Engineer consider that the Work or designated portion of the Work is not substantially complete, the following steps shall be taken:
      a. Engineer shall notify Contractor in writing stating Engineer's reasons.
      b. Contractor shall complete the Work and send a second written notice to Engineer certifying that the Project, or designated portion of the Project, is substantially complete.
      c. Engineer and Owner will reinspect the Work.

D. Division of Responsibilities:
   1. Engineer:
      a. At the time of delivery of tentative certificate of Substantial Completion.
      b. Deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment with respect to:
         1) Security.
         2) Operation.
         3) Safety.
         4) Protection of the Work.
         5) Maintenance.

6) Heat.
7) Utilities.
8) Insurance.
9) Warranties.

2. Engineer's written recommendation on division of responsibilities shall be binding on Owner and Contractor until final payment unless Owner and Contractor agree otherwise in writing and so notify Engineer prior to Engineer's issuance of a definitive certificate of Substantial Completion.

1.4 FINAL INSPECTION

A. Contractor Certification: Prior to final inspection, Contractor shall submit written certification that:
1. The Contract Documents have been reviewed.
2. The Project has been inspected in compliance with the Contract Documents.
3. Work has been completed in accordance with the Contract Documents.
4. Equipment and systems have been tested in the presence of the Owner's representative and are operational.
5. The Project is complete and ready for final inspection.

B. Engineer's Inspection: The Engineer will make final inspection:
1. Within 10 days after receipt of certification.
2. Together with Owner and Contractor.

C. Engineer's Determination of Final Completion:
1. Should Engineer consider the Work complete and ready for final payment in accordance with the requirements of the Contract Documents, Engineer shall request Contractor to make Project closeout submittals.
2. Should Engineer consider the Work not complete and ready for final payment:
a. Engineer shall notify Contractor in writing stating the reasons.
b. Contractor:
1) Take immediate steps to remedy the stated deficiencies.
2) Send a second written notice to Engineer certifying that the Work is complete.
c. Engineer and Owner will reinspect the Work.

1.5 REINSPECTION COSTS

A. Should Engineer be required to perform second inspections because of failure of the Work to comply with the original certifications of Contractor, Owner will compensate Engineer for additional services and deduct the amount paid from payment or payments to Contractor.

1.6 ADDITIONAL INSPECTION COSTS

A. Substantial Completion: Owner will compensate Engineer for inspection services rendered between the scheduled date of Substantial Completion and the actual date of Substantial Completion and deduct the amounts paid from payment or payments to Contractor.

B. Final Completion: Owner will compensate Engineer for inspection services rendered between the scheduled date of final completion and the actual date of final completion and deduct the amounts paid from payment or payments to Contractor.

1.7 CLOSEOUT SUBMITTALS

A. Contractor:
1. Provide closeout submittals as required in the Contract Documents.
2. These submittals shall include, but not necessarily be limited to:
a. Project record documents.
b. Operation and maintenance manuals.
c. Guarantees.
d. Spare parts and maintenance materials.
e. Instruction in operation of all systems.

1.8 EVIDENCE OF PAYMENTS AND RELEASE OF LIENS

A. Affidavits:
   1. Submit with final Application for Payment an affidavit of payment of debts and release of claims.
   2. Affidavit shall include:
      a. Contractor's release or waiver of lien.
      b. Consent of surety of final payment
      c. Separate releases or waivers of liens for Subcontractors, Suppliers, and others with lien rights against property of Owner together with a list of those parties.

B. Execution: All submittals shall be duly executed before delivery to Engineer.

1.9 FINAL ADJUSTMENT OF ACCOUNTS

A. Final Statement: Submit a final statement of accounting, which reflects all adjustments, to Engineer. This statement shall contain the following:
   1. Original Contract Price.
   2. Additions and deductions.
   3. Total Contract Price as adjusted.
   4. Previous payments.
   5. Sum remaining due.

B. Final Change Order: Engineer will prepare a final Change Order reflecting approved adjustments to the Contract Price not previously made by Change Orders.

1.10 FINAL APPLICATION FOR PAYMENT

A. Contractor shall submit a final Application for Payment in accordance with the requirements of the Contract Documents.

B. Disposition of Final Application for Payment:
   1. If the final Application for Payment and the Work are acceptable in accordance with the Contract Documents:
      a. Engineer will, within 10 days after receipt of the Application for Payment:
         1) Submit to Owner a written recommendation for payment.
         2) Submit to Owner and Contractor a written notice that the Work is acceptable subject to the provisions of the General Conditions.
      b. Owner will, within 30 days after receipt of the Application for Payment and Engineer's recommendation in accordance with the Contract Documents, pay to Contractor the amount recommended.
   2. If the Application for Payment, the Work or both are unacceptable:
      a. Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment.
      b. Contractor shall make the necessary corrections and resubmit the Application for Payment.
   3. Final Completion Delayed:
      a. Upon receipt of Contractor’s final Application for Payment and recommendation by Engineer, Owner shall make payment of the balance due for that portion of the Work fully completed and accepted if Engineer confirms that final completion of the Work is significantly delayed through no fault of Contractor.
      b. Payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.
      c. Contractor shall submit with the Application for Payment written consent of surety if the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 77 00

SECTION 01 78 39 – PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes procedures for the maintenance, recording and submittal of Project record documents.

1.3 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Storage:
   1. Store documents and Samples in Contractor's field office apart from documents used for construction.
   2. Provide files and racks for storage of documents.
   3. Provide locked cabinet or secure storage space for storage of Samples.

B. Filing: File record documents in accordance with CSI Masterformat.

C. Maintenance:
   1. Maintain documents in a clean, dry, legible condition and in good order.
   2. Do not use record documents for construction purposes.

D. Availability: Make documents and Samples available at all times for inspection by Engineer.

1.4 RECORDING

A. Labeling: Label each document "PROJECT RECORD" in neat large printed letters.

B. Recording:
   1. Record actual revisions to the Work.
   2. Record information concurrently with construction progress.
   3. Do not conceal any work until required information is recorded.

C. Drawings:
   1. Legibly mark, with notes or graphic representations, to record actual construction.
      a. Depths of various elements of foundation in relation to approved datum.
      b. Horizontal and vertical locations of Underground Facilities and appurtenances, referenced to permanent surface improvements.
      c. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.
      d. Field changes of dimension and detail.
      e. Changes made by Field Order, Work Change Directive or Change Order.
      f. Details not on original Contract Drawings.
   2. After Engineer's review of the record drawings, transfer all marks to a set of hard copy or electronic documents provided by Engineer.

D. Specifications and Addenda:
   1. Legibly mark each Section to record:
      a. Manufacturer, trade name, catalog number, and Supplier of each Product and item of equipment actually installed.
      b. Changes made by Field Order, Work Change Directive or Change Order.

1.5 SUBMITTAL

A. Delivery:
   1. At Contract closeout, deliver record documents to Engineer for Owner.
   2. Submit only Contract Documents marked up. Three dimensional models, shop drawings, or other representations of the Project created by the Contractor from the Contract Documents will not be accepted.

B. Transmittal Letter:
   1. Accompany submittal with transmittal letter in duplicate, containing:
      a. Date.
      b. Project title and number.
      c. Contractor's name and address.
      d. Title and number of each Record Document.
      e. Signature of Contractor or their authorized representative.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 78 39

SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

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.

B. Excess Quantities and Sizes: Where quantities, sizes or other requirements on Drawings or Specifications are in excess of code requirements, Drawings or Specifications govern.

C. Conflicts: When conflicts exist between referenced Specifications or standards, more stringent requirements govern. No extra compensation for such compliance allowed.

1.2 SUMMARY

A. This Section includes the following:
1. Electrical equipment coordination and installation.
2. Sleeves for raceways and cables.
3. Sleeve seals.
4. Self adhered sheet waterproofing.
5. Grout.
6. Duct seal.
7. Duct seals and plugs.
8. Common electrical installation requirements.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with
1. NECA 1 - Standards Practices for Good Workmanship in Electrical Construction.
2. NEC – National Electrical Code (NFPA 70).
3. ASTM Standards:
   a. C836 – Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course
   b. D412 – Test Methods for Rubber Properties in Tension.
   c. D570 – Test Method for Water Absorption of Plastics.
   d. D1970 – Self Adhered Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection and Waterproofing.
   e. D5385 – Hydrostatic Pressure Resistance of Waterproofing Membranes.
   f. D6135 – Application of Self-Adhering Modified Bituminous Waterproofing.
   g. E96 – Test Methods for Water Vapor Transmission of Materials.
   h. E154 – Methods of Testing Materials for Use as Vapor Barriers Under Concrete Slabs and as Ground Cover in Crawl Spaces.
4. FAA --Advisory Circular 150/5370-10H – As applicable to construction and installation of conduit, cable, conductors, duct banks, excavation, backfill, manholes, and associated work.

1.4 DEFINITIONS

A. EPDM: Ethylene-propylene-diene terpolymer rubber.

1.5 SUBMITTALS

A. Product Data: For sleeve seals.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in a manner which will prevent deterioration, damage, contamination with foreign matter, and damage by weather or elements, and according to Manufacturer's directions.

C. Store materials indoors and protect from weather. When necessary to store outdoors, elevate materials above grade and enclose with durable, weather tight wrapping.

D. Reject damaged, deteriorated or contaminated material and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

1.7 COORDINATION

A. Coordinate arrangement, mounting, and support of electrical equipment:
   1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
   2. To ensure that mounting heights and locations of electrical equipment do not interfere with all other building appurtenances such as, but not limited to, containment areas, special coatings, and other equipment.
   3. To allow easy access and disconnection of electrical equipment while ensuring the least amount of interference with other installations.
   4. To allow right-of-way for piping and conduit installed at required slopes.
   5. To ensure that connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and outside of the dedicated working and access space of other equipment.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed.

D. Coordinate sleeve selection and application with selection and application of firestopping.

E. Coordinate installation of required self adhered sheet waterproofing with Construction Manager and other trades.

PART 2 - PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A53/A53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Sleeves for Rectangular Openings: Galvanized sheet steel.
   1. Minimum Metal Thickness:
      a. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches, thickness shall be 0.052 inch.
      b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE SEAL SYSTEMS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Advance Products & Systems, Inc.
      b. Calpico, Inc.
      c. Metraflex Co.
      d. Pipeline Seal and Insulator, Inc.
      e. Proco Products, Inc.
   2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.

3. Pressure Plates: Plastic.
4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 SELF ADHERED SHEET WATERPROOFING

A. Subject to the requirements of this section, provide one of the following products or reviewed equal:
1. Bituthene by W.R. Grace and Company.
2. Mel-Rol by W.R. Meadows, Inc.
3. CCW-701 by Carlisle Coatings and Waterproofing Div.
4. Duramem 700 SM by Pecora Corporation.

B. Membrane:
1. 60-mil thick, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated to 4-mil thick polyethylene film release liner on adhesive side and formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.
2. Physical Properties:
3. Tensile Strength: 250 psi minimum in accordance with ASTM D412, Die C, modified.
4. Elongation: 300% minimum in accordance with ASTM D412, Die C, modified.
5. Flexibility: Pass at minus 20 deg F in accordance with ASTM D1970.
6. Crack Cycling: Unaffected after 100 cycles of 1/8-inch movement as tested by ASTM C836.
7. Puncture Resistance: 40 lbf minimum in accordance with ASTM E154.
8. Hydrostatic Head Resistance: 150 feet minimum in accordance with ASTM D5385.
9. Water Absorption: 0.15% weight gain maximum after 48-hr immersion at 70 deg F in accordance with ASTM D570.
10. Vapor Permeance: 0.05 perms in accordance with ASTM E96, Water Method.

2.4 GROUT

A. Nonshrink; recommended for interior and exterior for sealing openings in non-fired-rated walls or floors.

B. Standard: ASTM C1107, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5,000 psi, 28-day compressive strength.

D. Packaging: Premix and factory packaged.

2.5 DUCT SEAL

A. Description: UL listed, pliable, non-hardening, non-corrosive, weather-proof putty material, designed as a moisture barrier for weather-sealing service entries, electrical cables, and conduit ducts.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. Arnco Corp. - Hydra-Seal.
b. Ilsco Corp. – DS Duct Seal.
c. JM Clipper – Duxseal.
d. OZ/Gedney Co. – DUX.
e. RectorSeal - Duct Seal Compound.
f. Thomas & Betts Corp. - DX.
g. Or equal.

2.6 DUCT SEALS AND PLUGS

A. Cable duct seals and plugs shall be designed to effectively seal conduits, reducing the cost of cable placement and maintenance in underground construction projects and routine work.
1. All plastic construction – corrosion proof.
2. Pull ‘Rope Eye’ attachment (can be supplied with security hex nut).
3. Water tight.
4. Simple to install.

5. Removable and reusable.
6. Full range of sizes.
7. Full range of forms (round, square).
8. Full range of supported cable count (simplex, duplex, triplex, quadplex and specials).

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. TE Connectivity.
2. Or equal.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1 and NEC.

B. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in a manner as to facilitate future disconnecting with minimum interference with other items in the vicinity.

D. All underground service lines (electric, data, natural gas, reserve conduits, etc.) are to be traceable either via embedded tracing wiring or added tracing wiring.

E. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

E. Cut sleeves to length for mounting flush with both surfaces of walls.

F. Extend sleeves installed in floors 2 inches above finished floor level.

G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable, unless otherwise indicated on the Drawings.

H. Seal space outside of sleeves with grout for penetrations of concrete and masonry. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.

I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint.

J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials.

K. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

L. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.3 SLEEVE-SEAL SYSTEM INSTALLATION

A. Install sleeve-seal systems onto sleeves of exterior concrete walls and slab-on-grade at raceway entries into buildings.

B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 INSTALLATION OF SELF ADHERED SHEET WATERPROOFING

A. Install self adhered sheets according to Manufacturer’s written instructions and recommendations in ASTM D6135.

B. Primers:
1. Apply primer to walls or deck at required rate and allow to dry.
2. Limit priming to areas that will be covered by sheet waterproofing in same day.
3. Re-prime areas exposed for more than 24 hours.

C. Membrane Application:
1. Apply and firmly adhere sheets over area to receive waterproofing from low point up to high point to ensure that side laps shed water.
2. Accurately align sheets and maintain uniform 2-1/2-inch minimum lap widths and end laps.
3. Overlap and seal seams and stagger end laps to ensure watertight installation.
4. Apply continuous sheets over sheet strips bridging substrate cracks and construction joints.
5. Seal exposed edges of sheets with mastic or sealant at terminations or install termination bars.
6. If waterproofing ties into other waterproofing, install sheets and auxiliary materials so that systems are fully watertight.

3.5 FIRESTOPPING

A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly.

3.6 DUCT SEAL INSTALLATION

A. Install duct seal materials in strict accordance with the Manufacturer’s instructions.

B. Obtain approval from Engineer prior to installing duct seal as the application may require duct seals and plugs to be utilized in lieu of duct seal.

3.7 DUCT SEALS AND PLUGS INSTALLATION

A. Where conduits penetrate into the building, seal duct openings at conduit termination points with duct seals and plugs for all conduits entering the building to prevent migration of water and gases into the building and to prevent the condensation of water vapor inside the enclosures where the conduits terminate.

B. Duct seals and plugs shall be applied after all cables have been installed.

C. Install duct seals and plug materials in strict accordance with the Manufacturer’s instructions.

D. Where conduit will be simultaneously exposed to different temperatures, such as where it passes through the outside wall of a heated building or between two different rooms, the inside of the conduit shall be sealed with duct seals and plugs.

E. All raceways that penetrate in to or out of manholes, vaults, buildings, freezers, coolers, roofs, or like installations shall require duct seals and plugs to be installed,

F. All open-ended riser conduits shall require duct seals and plugs to be installed.

END OF SECTION 26 05 00

SECTION 26 05 13 - MEDIUM-VOLTAGE CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the furnishing and installation of all medium-voltage (2,001V to 35,000V) cables and related splices, terminations and accessories.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the standards of the following organizations as applicable to materials, construction and testing of medium-voltage cables:
   1. AEIC – Association of Edison Illuminating Companies:
      a. AEIC CS8-2020 – Specification for Extruded Dielectric Shielded Power Cables Rated 5 through 46kV.
   2. IEEE – Institute of Electrical and Electronics Engineers:
      a. IEEE 48-2009 – Standard Test Procedures and Requirements for Alternating-Current Cable Terminations Used on Shielded Cables Having Laminated Insulation Rated 2.5 kV through 765 kV or Extruded Insulation Rated 2.5 kV through 500 kV.
      b. IEEE 386-2016 – Standard for Separable Insulated Connector Systems for Power Distribution Systems Rated 2.5 kV through 35 kV (ANSI).
      c. IEEE 404-2022 – IEEE Standard for Extruded and Laminated Dielectric Shielded Cable Joints Rated 2.5 kV to 500 kV(ANSI).
      d. IEEE 576-2000 – Recommended Practice for Installation, Termination, and Testing of Insulated Power Cable as Used in Industrial and Commercial Applications (ANSI).
      e. IEEE C2-2023 – National Electrical Safety Code (ANSI).
   3. ICEA – Insulated Cable Engineers Association:
      a. ICEA S-93-639-2017 – 5-46 kV Shielded Power Cable for Use in the Transmission and Distribution of Electric Energy.
      b. ICEA S-94-649-2021 – Concentric Neutral Cables Rated 5 Through 46KV.
      c. ICEA S-97-682-2023 – Utility Shielded Power Cables 5-46kV.
      d. ICEA T-31-610-2018 – Test Method for Conducting Longitudinal Water Penetration Resistance Tests on Blocked Conductors .
   4. NETA – InterNational Electrical Testing Association:
      a. NETA ATS-2021 – Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems.
   5. NFPA – National Fire Protection Association:
      a. NFPA 70-2017: National Electrical Code.
   6. UL – Underwriters Laboratories:
      a. UL 1072-2023: UL Standard for Safety Medium-Voltage Power Cables.

1.4 SUBMITTALS

A. Product Data: For each type of cable indicated, include splice and terminations for cables and cable accessories.

B. Qualifications Data: For testing agency.

C. Field quality-control test reports.

1.5 QUALITY ASSURANCE

A. Fabrication and Installation Personnel Qualifications:
   1. Trained and experienced in the fabrication and installation of the materials and equipment.
   2. Knowledgeable of the design and the reviewed submittals.

B. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
   1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Manufacturers: Firms regularly engaged in the manufacture of electrical conductor and cable products of the types and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver all materials in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in a manner which will prevent deterioration or damage, contamination with foreign matter, damage by weather or elements, and in accordance with Manufacturer's directions.

C. Store materials indoors and protect from weather. When necessary to store outdoors, elevate materials above grade and enclose with durable, watertight wrapping.

D. Reject damaged, deteriorated, or contaminated materials and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

PART 2 - PRODUCTS

2.1 15 KV CABLES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Kerite Co. (The).
   2. Okonite Company (The).
   3. Prysmian Group North America.
   4. Rome Cable Corporation.
   5. Southwire Company.

B. Materials:
   1. Cable Type: MV-105.
   2. Comply with UL 1072, AEIC CS 8, ICEA S-94-649.
   3. Conductor: Compressed, Class B, annealed uncoated copper.
   4. Conductor Shield: Extruded semi-conducting copolymer compound.
   5. Insulation: 105 degrees C rated Ethylene Propylene Rubber (EPR) in accordance with ICEA S-93-639 and UL 1072.
      a. Voltage Rating: 15 kV.
      b. Insulation Thickness: 133-% insulation level.
   6. Insulation Shield: Extruded semi-conducting copolymer compound applied directly over the insulation. Conductor shield, insulation, and insulation shield to be applied in one tandem operation.
   7. Shield: Uncoated helically applied 5 mil bare copper tape with a nominal overlap of 25%.
   8. Jacket: UL listed sunlight-resistant, extruded PVC jacket.

2.2 SPLICE KITS

A. Connectors and Splice Kits: Include all components required for complete splice of specific size, rating, and configuration of cable(s) to be spliced. Comply with IEEE 404; type as recommended by cable or splicing kit Manufacturer for the application. QS Series by 3M, or equal.

2.3 SOLID TERMINATIONS

A. Termination Kits: Include all components required for complete termination of specific size, rating, and configuration of cable(s) to be terminated. Terminations to be Class 1 complying with IEEE 48. Insulation class to be equivalent to that of cable. Include shield ground strap for shielded cable terminations. Type as recommended by cable or termination kit Manufacturer for the application. QT Series by 3M; or equal.

2.4 SEPARABLE INSULATED CONNECTORS

A. Description: Modular system, complying with IEEE 386, with disconnecting, single-pole, cable terminators and with matching, stationary, plug-in, dead-front terminals designed for cable voltage and for sealing against moisture.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. 3M.
2. ABB (Electrification Products Division).
3. Adalet.
4. DSG-Canusa.
5. Eaton.
6. Engineered Products Company.
7. G&W Electric Company.
8. MP Husky USA Cable Tray & Cable Bus.
9. nVent (Raychem).
10. Scott Fetzer Co. (The).
11. TE Connectivity Ltd.

C. Load-Break Cable Terminators: Elbow-type units with 200-A load make/break and continuous-current rating; coordinated with insulation diameter, conductor size, and material of cable being terminated.

D. Dead-Break Cable Terminators: Elbow-type unit with 600-A continuous-current rating; designed for de-energized disconnecting and connecting; coordinated with insulation diameter, conductor size, and material of cable being terminated.

E. Terminations at Distribution Points: Modular type, consisting of terminators installed on cables and modular, dead-front, terminal junctions for interconnecting cables.

F. Dead-Front Terminal Junctions: Modular bracket-mounted groups of dead-front stationary terminals that mate and match with above cable terminators. Two-, three-, or four-terminal units as indicated, with fully rated, insulated, watertight conductor connection between terminals and complete with grounding lug, Manufacturer's standard accessory stands, stainless-steel mounting brackets, and attaching hardware.
1. Protective Cap: Insulating, electrostatic-shielding, water-sealing cap with drain wire.
2. Portable Feed-Through Accessory: Two-terminal, dead-front junction arranged for removable mounting on accessory stand of stationary terminal junction.
3. Grounding Kit: Jumpered elbows, portable feed-through accessory units, protective caps, test rods suitable for concurrently grounding three phases of feeders and carrying case.
4. Standoff Insulator: Portable, single dead-front terminal for removable mounting on accessory stand of stationary terminal junction. Insulators suitable for fully insulated isolation of energized cable-elbow terminator.

2.5 ARC-PROOFING MATERIALS

A. Tape for First Course on Metal Objects: 10-mil-thick, corrosion-protective, moisture-resistant, PVC pipe-wrapping tape.

B. Arc-Proofing Tape: Fireproof tape, flexible, conformable, intumescent to 0.3 inch thick, compatible with cable jacket.

C. Glass-Cloth Tape: Pressure-sensitive adhesive type, 1/2 inch wide.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install cables according to IEEE 576. Install only in code conforming raceway.

B. Pull Conductors: Do not exceed Manufacturer's recommended maximum pulling tensions and sidewall pressure values.
   1. Where necessary, use Manufacturer-approved pulling compound or lubricant that will not deteriorate conductor or insulation.
   2. Use pulling means, including fish tape, cable, rope, and basket-weave cable grips that will not damage cables and raceways. Do not use rope hitches for pulling attachment to cable.
   3. Pull conductors together where more than 1 conductor is being installed in a raceway.

C. Unless otherwise indicated, install warning tape 12 inches above conduit containing cables.

D. In manholes, handholes, pull boxes, junction boxes, and cable vaults, train cables around walls by the longest route from entry to exit and support cables at intervals adequate to prevent sag.

E. Install cable splices at pull points and elsewhere as indicated; use standard kits. Keep splices to a minimum.

F. Install terminations at ends of conductors and seal cable ends with standard kits.

G. Arc Proofing: Unless otherwise indicated, arc proof medium-voltage cable at locations not protected by conduit, cable tray, direct burial, or termination materials. In addition to arc-proofing tape Manufacturer's written instructions, apply arc proofing as follows:
   1. Clean cable sheath.
   2. Wrap metallic cable components with 10-mil pipe-wrapping tape.
   3. Smooth surface contours with electrical insulation putty.
   4. Apply arc-proofing tape in 1 half-lapped layer with coated side toward cable.
   5. Band arc-proofing tape with 1-inch-wide bands of half-lapped, adhesive, glass-cloth tape 2 inches on center.

H. Ground shields of shielded cable at terminations, splices, and separable insulated connectors. Ground metal bodies of terminators, splices, cable and separable insulated-connector fittings, and hardware.

I. Identify cables according to Division 26 Section " Identification for Electrical Systems."

J. Testing: Engage a qualified testing and inspecting agency to perform the following field tests and inspections and prepare test reports:
   1. Perform each visual and mechanical inspection and electrical tests stated in NETA ATS. Certify compliance with test parameters.
   2. After installing medium-voltage cables and before electrical circuitry has been energized, test for compliance with requirements.
   3. Remove and replace malfunctioning cables and retest as specified above.

END OF SECTION 26 05 13

SECTION 26 05 20 - CONDUCTORS AND CABLES – 600V AND BELOW

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the furnishing and installation of all electrical conductors, cables, splices, and connectors.

B. Major Systems Include:
   1. 600V and below service entrance, feeders, and electrical distribution.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the standards of the following organizations as applicable to materials, construction and testing of wire cables:
   1. NEMA - National Electrical Manufacturer Association Standards.
   2. IEEE Standards.
   3. Insulated Cable Engineers Association - Standards.
   4. ASTM Standards.
   5. NEC - National Electrical Code (NFPA 70).

1.4 SUBMITTALS

A. Product Data: For each type of product.

1.5 QUALITY ASSURANCE

A. Fabrication and Installation Personnel Qualifications:
   1. Trained and experienced in the fabrication and installation of the materials and equipment.
   2. Knowledgeable of the design and the reviewed submittals.

B. Manufacturers: Firms regularly engaged in the manufacture of electrical conductor and cable products of the types and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.

C. Regulatory Agencies Requirements:
   1. FAA Advisory Circular 150/5370-10H – As applicable to construction and installation of conductors and cables.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver all materials in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in a manner which will prevent deterioration or damage, contamination with foreign matter, damage by weather or elements, and in accordance with Manufacturer's directions.

C. Store materials indoors and protect from weather. When necessary to store outdoors, elevate materials above grade and enclose with durable, watertight wrapping.

D. Reject damaged, deteriorated, or contaminated materials and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Except as otherwise indicated, provide conductors, cables, and connectors of Manufacturer's standard materials, as indicated by published product information; designed and constructed as recommended by the Manufacturer and as required for the installation.

B. Power Wire:
1. All conductors and cables shall be new with a minimum wire size of No. 12 AWG. Manufacturer's name, type, and size shall be permanently marked on the outer covering at regular intervals and delivered in complete coils or reels.
2. Provide factory fabricated conductors of size, rating, material, and type as indicated for each service. Where not indicated, provide proper selection as determined by installer to comply with installation requirements and with NEC standards, from only the following types and conductors:
   a. Above ground: Type THHN/THWN-2 dual rated, 600-Volt, 90 degrees C rated: Stranded copper for all sizes.
   b. Below ground: Type XHHW-2, 600-Volt, 90 degrees C rated. Stranded copper for all sizes.
   c. Bare Conductors: Stranded copper for all sizes.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
1. Install electrical conductors, cables, and connectors as indicated on the Drawings, in accordance with the Manufacturer's written instructions, the applicable requirements of NEC and the National Electrical Contractors Association's "Standard of Installation," and in accordance with recognized industry practices to ensure that products serve the intended functions.
2. Conductors and cables shall be sized in accordance with the Drawings or, in the absence thereof, in accordance with NEC requirements. Except where indicated herein, conductor sizes greater than No. 12 AWG are indicated on the Drawings.
3. Provide a dedicated grounded conductor (neutral) for each circuit that requires a neutral for proper operation. Unless indicated otherwise on the Drawings, shared neutrals are not allowed.
4. Provide an equipment grounding conductor in all raceways. Conductor shall be sized in accordance with the National Electrical Code.
5. Reference FAA Advisory Circular 150/5370-10H for all cable and conductor types certified for use on construction of airports.

B. Voltage Drop Compensation:
1. Provide No. 10 AWG conductors in lieu of No. 12 AWG conductors to compensate for voltage drop as follows:
   a. For each 277V, 20 ampere branch circuit that exceeds 200 feet in length between the branch circuit panelboard and the last outlet.
   b. For each 120V, 20 ampere branch circuit that exceeds 100 feet in length between the branch circuit panelboard and the last outlet.
2. When conductor size is increased to compensate for voltage drop, provide equipment grounding conductor increased in size in accordance with NEC.

C. Installation Procedures:
1. Install interior conductors after building is enclosed and water tight.
2. Each conduit shall be free of moisture and debris before conductors are installed.
3. Remove moisture from conduits by swabbing.
4. Install conductors so insulation is not damaged. Replace all conductors that are damaged.
5. Install conductors and cables only in code conforming raceway.
6. Pull conductors together where more than one conductor is being installed in a raceway.
7. Use heat shrink tubing for all instrument signal cable terminations.
8. Use manufacturer-approved pulling compound or lubricant, where necessary. Compound shall not deteriorate conductor and insulation. Compounds shall be UL listed.

9. Use a pulling means, including fish tape, cable or rope, and basket-weave wire/cable grips that will not damage the raceway or the wire.
10. Keep conductor splices to a minimum.
11. Install splices and taps which have equivalent or better mechanical strength and insulation as the conductor.
12. Use splice and tap connectors which are compatible with the conductor material.
13. Make all joints, splices, and connections only at accessible junction or outlet boxes, never inside conduit or fitting. Make splices in No. 10 AWG and smaller wire with insulated spiral mechanical connectors.
14. Make splices in No. 8 AWG and larger copper wire with compression type mechanical connectors.
15. All splices located in handholes, and wet locations shall be rated for wet locations.
16. Low voltage and signal cable splices located in handholes, and wet locations shall be sealed in 2-part epoxy sealing pack, 3M Scotchcast connector sealing pack 3570G.
17. Make conductor length for parallel feeds identical.
18. Where exposed cables are installed, cables shall be installed parallel and perpendicular to exposed structural members and building lines.
19. Do not lace, strap or tie feeder or branch circuit conductors together in panels, switchboards, variable speed drives, motor control centers, automatic transfer switches, boxes, and wireways.
20. All conductors and cables shall be identified in accordance with Division 26 Section “Identification for Electrical Systems.”
21. Use color coded conductors as follows:
    a. Phases: Black-red-blue (under 150V to ground).
    b. Phases: Brown-orange-yellow (over 150V to ground).
    c. Neutral: White (under 150V to ground).
    d. Neutral: Grey (over 150V to ground).
    e. Ground: Green identified (feeders); Green (branch circuits).
22. Support conductors in vertical raceways in accordance Division 26 Section “Hangers and Supports for Electrical Systems.”
23. Outlets:
    a. Leave at least 6 inches of free conductor at all outlets except where conductors are intended to loop without joints through outlets for fixtures or wiring device hook-ups.
    b. Free ends and loops at boxes and enclosures shall be pushed back into boxes and protected by blank cover plates or other means until interior painting and decorating work is completed.
24. Lights and outlets shall be grouped on circuits as indicated on the Drawings. Distinct types of circuits such as feeders, branch circuits, control circuits, and signal circuits, shall not be mixed in common conduit runs, but shall be run separately, although more than 1 circuit of the same system may be run in common conduit runs.
25. Conductor ampacity derating shall be adhered to for all conductors in accordance with the National Electrical Code.

3.2 FIELD QUALITY CONTROL

A. General:
1. Prior to energization, check conductors and cables for continuity of circuitry and for short circuits. Correct malfunctions when detected.
2. Subsequent to conductor and cable hook-ups, energize circuitry and demonstrate functioning in accordance with requirements.

END OF SECTION 26 05 20

SECTION 26 05 27 - GROUNDING AND BONDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the furnishing and installation of a complete and continuous grounding system.

1.3 SUBMITTALS

A. Test Reports: For grounding. Grounding electrode resistance test results.

1.4 DESIGN AND PERFORMANCE REQUIREMENTS

A. All equipment, raceway systems, interior wiring systems with neutrals, receptacles, and power outlets, motors and motorized equipment shall be grounded.

1.5 QUALITY ASSURANCE

A. Fabrication and Installation Personnel Qualifications:
   1. Trained and experienced in the fabrication and installation of the materials and equipment.
   2. Knowledgeable of the design.

B. Grounding system shall be in accordance with the current National Electrical Code (NEC).

C. Grounding system rods, connectors and clamps shall be UL labeled.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: A portion of the required materials for grounding systems are specified in the Division 26 – Electrical Sections.

B. Grounding Electrodes:
   1. Ground Rods: Copper-clad steel; 3/4-inch diameter by 10 feet in length.
   2. Where ground grids are required, they shall consist of copper clad steel driven rods with underground ring bus, sized as indicated on Drawings, of bare stranded copper interconnecting cable.
   3. Ground rods to be as manufactured by Copperweld; or equal.

C. Connectors:
   1. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions as manufactured by Thomas and Betts; or equal.
   2. Irreversible Compression Connectors: Compression connections shall be irreversible, cast copper, high conductivity as manufactured by Thomas and Betts; or equal.

PART 3 - EXECUTION

3.1 DISTRIBUTION SYSTEM GROUNDING

A. Provide a green, insulated, equipment grounding conductor in each raceway (metallic and non-metallic; rigid and flexible). Equipment grounding conductors shall be sized in accordance with Article 250 of the NEC.

B. Circuit Grounding: Install grounding bushings, grounding studs, and grounding jumpers at distribution centers, pull boxes, motor control centers, panelboards, load centers, and all like equipment.

C. Metallic Conduit: When bare grounding electrode conductors are enclosed in metallic conduit, the conduit shall be bonded to the grounding electrode conductor(s) at both ends utilizing equipment UL listed for this purpose.

D. Expansion Joints: Provide a bonding jumper around expansion fittings in metallic conduit to maintain ground continuity. Expansion fittings may include an internal bonding jumper constructed of a tinned copper braid, sized to meet UL fault current test requirements and complying with the bonding requirements of Article 250 of the NEC.

E. Separately Derived Systems: Grounding of separately derived systems, i.e., secondary transformers, shall be in accordance with Article 250 of the NEC. Use suitable ground lugs and clamps approved for this purpose.

3.2 FIELD QUALITY CONTROL

A. Tests:
   1. Measured resistance of grounding electrode system to ground shall be 5 Ohms or less. Perform Earth Ground Resistance (Fall of Potential) tests and provide additional grounding electrodes to grounding electrode system until measured resistance to ground is 5 ohms or less.
   2. Transmit test results to Engineer.

END OF SECTION 26 05 27

SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the furnishing and installation of hangers and supports for electrical equipment and systems.

1.3 DEFINITIONS

A. Electrical Supports: Angles, channels, brackets, and mounting accessories for supporting all conduit, cable tray, luminaires, switches, and other electrical equipment which are hung or mounted above floor.

1.4 DESIGN AND PERFORMANCE REQUIREMENTS

A. This Section defines general criteria for the selection and installation of supporting devices but does not cover all types specifically required for the Project.

B. Choose or design supporting devices in accordance with these general criteria.

1.5 QUALITY ASSURANCE

A. Fabrication and Installation Personnel Qualifications:
   1. Trained and experienced in the fabrication and installation of the materials and equipment.
   2. Knowledgeable of the design and the reviewed submittals.

B. Regulatory Agencies Requirements:
   1. Provide supporting devices listed by Underwriters' Laboratory for their application as installed.
   2. Comply with National Electrical Code (NFPA 70) as applicable to construction, installation, and requirements for supporting devices.
   3. Comply with Metal Framing Manufacturers Association Standard Publication (MFMA-4); factory-fabricated components for field installation.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver all materials in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in a manner which will prevent deterioration or damage, contamination with foreign matter, damage by weather or elements, and in accordance with Manufacturer’s directions.

C. Store materials indoors and protect from weather. When necessary to store outdoors, elevate materials above grade and enclose with durable, watertight wrapping.

D. Reject damaged, deteriorated, or contaminated material and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Conduit Supports:
   1. Where information indicated on Drawings conflicts with information herein, the more stringent requirements shall take precedence and the better quality or greater quantity of work shall be provided.
   2. Single Runs: Galvanized conduit straps or ring bolt type hangers with spring clips. Do not use plumber's perforated straps.
   3. All supports, such as, but not limited to, metal channel (strut) framing systems, angles, straps, hangers, etc. shall match the raceway type that is being supported. For example, galvanized conduit requires galvanized metal channel (strut) framing systems and straps, PVC, PVC conduit requires PVC channel (strut) framing systems and straps.
   4. In general, all hardware, such as anchors, nuts, bolts, washers, threaded rod, etc. shall match the conduit type: Galvanized steel hardware shall be used with galvanized steel rigid metal conduit.
   5. Multiple Runs: Conduit rack with 25% spare capacity.
   6. Vertical Runs: Channel support with conduit fittings.
   7. Manufacturers:
      a. Cooper B-Line; a division of Eaton Corporation.
      b. ERICO International Corporation.
      c. Power-Strut; Power Engineering Co., Inc.
      d. GS Metals Corp.
      e. Michigan Hanger Co., Inc.; O-Strut Div.
      f. National Pipe Hanger Corp.
      g. Thomas & Betts Corporation.
      h. Unistrut; a brand of Atkore International, Inc.
      i. Wesanco Channel Systems; ZSi-Foster, Inc.
      j. Or equal.

B. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
   1. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened Portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials where used. See item 2.1 A 5 above for clarification.
      a. Manufacturers:
         1) Hilti, Inc.
         2) ITW Construction Products.
         3) MKT Fastening, LLC.
         4) Or equal.
   2. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
   3. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
   4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM F3125/F3125M, Grade A325.
   5. Toggle Bolts: Steel springhead type.
   6. Hanger Rods: Threaded steel.

C. Supports for Conductors in Vertical Conduit:
   1. Install in compliance with NEC article 300.19.
   2. Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

PART 3 - EXECUTION

3.1 SELECTION

A. Comply with the following standards for selection and installation of hangers and supports, except where requirements on Drawings or in this Section are stricter:
   1. NECA NEIS 101.
   2. NECA NEIS 105.

B. Penetration Firestopping Systems: Provide firestopping materials for penetrations through fire-rated walls, ceilings, and assemblies.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
   1. Secure raceways and cables to these supports with single-bolt conduit clamps using spring friction action for retention in support channel.

3.2 INSTALLATION OF SUPPORTS

A. General:
   1. Layout to maintain headroom, neat mechanical appearance, and to support equipment loads.
   2. Secure Engineer's approval before welding or bolting to steel framing or anchoring to concrete structure.
   3. Where equipment is to be suspended from cast-in-place concrete construction, set approved concrete inserts in formwork to receive hanger rods. Where equipment is to be suspended from metal deck and beam or joist construction, support equipment from beams or joists only.
   4. Do not use existing supports without approval from Engineer and Owner.

B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination must be weight of supported components plus 200 lb.

C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
   1. To Wood: Fasten with lag screws or through bolts.
   2. To New Concrete: Bolt to concrete inserts.
   3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
   4. To Existing Concrete: Expansion anchor fasteners.
   5. To Steel:
      a. Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
      b. Spring-tension clamps.
   6. To Light Steel: Sheet metal screws.
   7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.

D. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

B. Field Welding: Comply with AWS D1.1/D1.1M. Submit welding certificates.

END OF SECTION 26 05 29

SECTION 26 05 34 - RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the furnishing and installation of conduits and fittings for electrical wiring.

1.3 SUBMITTALS

A. Product Data:
   1. For raceways and fittings.
      a. Name of Manufacturer.
      b. Model number.
      c. Details of construction and installation.
      d. Electrical specifications and ratings.
      e. Dimensional data.

1.4 QUALITY ASSURANCE

A. Fabrication and Installation Personnel Qualifications:
   1. Trained and experienced in the fabrication and installation of the materials and equipment.
   2. Knowledgeable of the design.

B. Regulatory Agencies Requirements:
   1. ACI – American Concrete Institute: Standards pertaining to conduits embedded in concrete (Section 6.3 in ACI 318 – Building Code Requirements for Structural Concrete and Section 6.3 in ACI 350R – Environmental Engineering Concrete Structures.)
   2. NEMA – National Electrical Manufacturer's Association – Standards pertaining to raceways.
   3. NEC – National Electric Code – As applicable to construction and installation of conduit system.
   4. FAA Advisory Circular 150/5370-10H –As applicable to construction and installation of conduit system.
   5. Provide conduit which is listed and labeled by Underwriters' Laboratories.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver all materials in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in a manner that will prevent deterioration or damage (e.g., bending, end damage, finish scoring), contamination with foreign matter, damage by weather or elements, and in accordance with Manufacturer's directions.

C. Store materials indoors and protect from weather. When necessary to store outdoors, elevate materials above grade and enclose with durable, watertight wrapping. Provide color coded end cap thread protectors on exposed threads of threaded metal conduit.

D. Reject damaged, deteriorated, or contaminated material and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Rigid Metal Conduit (RMC):
   1. Galvanized Steel RMC: Galvanized steel, heavy wall conduit with threaded fittings, 3/4-inch trade size minimum, insulated bushings.

B. Rigid Nonmetallic Conduit (RNMC):
   1. Schedule 40, rigid polyvinylchloride, rated for 90 degrees C conductors, 3/4-inch trade size minimum, solvent cement connectors and couplings.
   2. Nonmetallic strap hangers allowing thermal expansion movement.
   3. Conduit to meet NEMA TC-2; fittings to meet NEMA TC-3.
   4. Expansion Coupling: Nonmetallic to compensate for thermal expansion.

C. High Density Polyethylene (HDPE):
   1. Conduit to meet the following standards:
      a. UL 651A.
      b. UL 651B.
      c. ASTM F2160, ASTM D3035 and ASTM D3350.
      d. NEMA TC-7.
   2. Conduit shall be factory-lubricated, low-friction, schedule 40, HDPE conduit.
   3. Conduit shall be capable of being coiled on reels in continuous lengths, transported, stored outdoors, and subsequently uncoiled for installation; without affecting its properties or performance.
   4. Conduit shall be of smooth wall construction.
   5. Manufacturer: Blue Diamond, Carlon; or equal.
   6. Splice Couplings:
      a. The use of splice couplings shall be minimized by optimizing conduit usage between pull box and pole locations.
      b. Aluminum couplings or butt fusion couplings may be used in accordance with Manufacturer's recommendations.
      c. Splice couplings must form a tight seal with a breaking force greater than 250 pounds.

D. Joint Compound for RMC: Listed for use in cable connector assemblies and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

E. Conduit Hubs for RMC:
   1. Suitable for environment served.
   2. Grounding screw.
   3. O-ring gasket.
   4. Material: Malleable Iron with zinc electroplate.
   5. Manufacturer:
      a. Cooper Myers Hubs.
      b. Thomas & Betts.
      c. Killark.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Unless otherwise specified or indicated on the Drawings, conceal conduit to the extent possible.
   1. In finished areas where conduit cannot physically be concealed due to existing conditions, provide surface metal raceway. Finished areas are, but not always: above grade, heated spaces with finished walls (e.g., painted, drywall, etc.), finished floors (e.g., painted concrete, carpet, tile, etc.), and finished ceilings (e.g., drywall, suspended ceiling grids, wood, etc.).
   2. Do not conceal conduit in Corrosive Locations.

B. Exposed conduit permitted in:
   1. Parking garage.

C. Install conduit products in accordance with:
   1. The Drawings.
   2. The Manufacturer's written instructions.
   3. Applicable requirements of NEC and National Electrical Contractors Association's "Standard of Installation."
   4. Recognized industry practices to ensure that products serve intended function.

D. Conduit Joints: Cut square, reamed smooth and drawn up tight.

E. Threaded Conduit Joints: Apply listed anti-corrosion/anti-seize compound to threads of raceway and fittings before making up joint. Follow compound manufacturer’s written instructions.

F. Bends:
   1. Number per run for conduit that support feeder and branch circuits: Do not exceed the equivalent of 4 quarter bends (360 degrees) between pull points.
   2. Make bends and offsets so as not to reduce the inner diameter of the conduit.
   3. To the extent possible, avoid using large junction boxes as 90-degree junctions.

G. Routing:
   1. Concealed Conduits: Run in a direct line with long sweep bends and offsets.
   2. Exposed Conduits: Run parallel to, and at right angles to, building lines.
   3. Secure to boxes and cabinets with locknuts and bushings in such a manner that each system is electrically continuous throughout.

H. Cap conduit ends to prevent entrance of foreign materials during construction.

I. Provide insulated bushings on threaded conduit run terminations. Where entering the bottom of open-bottom switchboards, motor control centers, transformers, primary switches, and similar equipment provide bonding bushings and bonding jumpers.

J. Where entering the bottom of open-bottom equipment (i.e., switchboards, panelboards, motor control centers, transformers, and similar equipment) conduit shall not be installed flush with the floor/equipment pad and shall not rise more than 3 inches above the bottom of the enclosure.

K. Conduit entering control panels shall not obstruct internal components and shall allow for neat and workmanlike wire management.

L. Completely install conduit systems before installing conductors.

M. Refer to Division 26 Section “Common Work Results for Electrical” for sealing underground and above grade conduit that is exposed to temperature differences to prevent the passage of air and condensation.

N. Support:
   1. Where information on Drawings conflicts with information herein, the more stringent requirements shall take precedence and the better quality or greater quantity of work shall be provided.
   2. Adequately support conduit from structural elements of the building.
   3. Do not drill or tap structural building steel without approval from Engineer.
   4. Do not rest raceways or wiring systems on, nor support it from, ceiling suspension systems, ceiling tiles or mechanical equipment including, but not necessarily limited to ductwork and fans.
   5. Conduit shall be supported in accordance with the NEC and Division 26 Section “Hangers and Supports for Electrical Systems.”

O. Provide conduit expansion couplings where conduits cross building or structure expansion joints.

P. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200 pound (90 kg) tensile strength. Label and leave at least 12 inches of slack at each end of pull wire.

Q. Bends in conduit larger than 2-inch need to use factory fittings this includes, but is not limited to, duct banks.

R. Rigid Nonmetallic Conduit Installation:
   1. Provide separate grounding conductor in accordance with Division 26 Section “Grounding and Bonding.”
   2. Support conduit in accordance with the NEC.
   3. Provide expansion couplings where length change due to temperature variation exceeds 1/4-inch.
   4. When penetrating concrete surfaces or grade, make a transition to rigid steel conduit 6 inches (minimum) below the surface. Provide corrosion protection by coating the RMC with a bituminous coating from inside the encasing material to 4 inches of exposed conduit; vinyl corrosion protection tape may be installed but must be reviewed with the Engineer prior to installation.
   5. Provide rigid steel elbows in all conduits that are underground or encased in concrete.
   6. In areas of assembly, where RNMC is installed, conduits shall be encased in a minimum of 2 inches of concrete.
   7. Where RNMC is embedded in concrete, conduit shall be securely fastened and supported in accordance with the NEC to prevent damage during concrete pours.

S. Firestopping: Firestop all conduit penetrations of fire rated barriers by using approved material to ensure integrity of the rating.

T. Underground Installation:
   1. As indicated on the Drawings, including the excavating, pumping, backfilling, shoring and removal of surplus excavated material.
   2. Underground Obstructions:
      a. Locate all that may interfere with excavation.
      b. Be responsible for damage to existing underground systems and assume all cost of repairing the same.
   3. Backfilling:
      a. Use only clean sand thoroughly compacted to prevent settling of trenched areas.
      b. In the event that backfilled areas do settle, fill and compact to finish grade, and repair all damage caused by settling.
   4. Repair all disturbed surface to match existing.
   5. Unless otherwise indicated on the Drawings, install top of conduit 30 inches below grade when located outside the walls of the building.
   6. Provide warning ribbon 12 inches above conduits.

U. Embedment in Concrete:
   1. Where conduit is embedded in concrete, follow the requirements of Section 6.3 in ACI 318 – Building Code Requirements for Structural Concrete and Section 6.3 in ACI 350R – Environmental Engineering Concrete Structures.
   2. Review proposed routing of embedded conduit with Engineer prior to installation.
   3. Embedded conduit shall be installed between top and bottom reinforcement, in a manner that prevents concrete from entering the conduit system.

3.2 CONDUIT SCHEDULE

A. Where information on Drawings conflict with information herein, the more stringent requirements take precedence, and the better quality or greater quantity of work shall be provided.

B. Feeders, Branch Circuits and System Conduits:
   1. Underground and In or Below Concrete: RMC, RNMC.
   2. Above Slab or Grade:
      a. Exposed Conduit Below 10'-0" AFF: RMC where subject to physical damage.
      b. Exposed Conduit Above 10'-0" AFF: RMC.
      c. Wet Locations: RMC.
   3. Underground Duct Banks:
      a. Encased In Concrete: RNMC, HDPE.
      b. Not Encased In Concrete: RNMC, HDPE.

C. Provide seal-off fittings in all conduit runs that enter/leave Hazardous Locations and where entering enclosures in accordance with the NEC. Fill seal-off fittings with sealing compound prior to Substantial Completion.

D. Provide cable seals on all cable terminations in Hazardous Locations in accordance with the NEC.

E. Provide expansion fittings as necessary to accommodate thermal expansion and contraction.

F. For conduits that enter NEMA Type 2, 3, 3R, 4, 4X, and 12 enclosures, provide conduit hubs with O-ring gaskets. Hubs shall be suitable for the environment served and shall match the conduit type. Grounding hubs shall be used with nonmetallic enclosures.

END OF SECTION 26 05 34

SECTION 26 05 35 - BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the furnishing and installation of all electrical boxes and the major items listed below:
   1. Junction boxes.
   2. Pull boxes.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. NEMA - National Electrical Manufacturer's Association: Standards as applicable to nonmetallic fittings for underground installation.
   2. NECA - National Electrical Contractor's Association's: Applicable portions of "Standard of Installation".

1.4 QUALITY ASSURANCE

A. Fabrication and Installation Personnel Qualifications:
   1. Trained and experienced in the fabrication and installation of the materials and equipment.
   2. Knowledgeable of the design and the reviewed submittals.

B. Regulatory Agencies Requirements:
   1. Provide boxes which are listed and labeled by Underwriters' Laboratories.
   2. NEC - National Electrical Code (NFPA 70) - As applicable to construction and installation of electrical boxes.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver all materials in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in a manner which will prevent deterioration or damage, contamination with foreign matter, damage by weather or elements, and in accordance with Manufacturer's directions.

C. Store materials indoors and protect from weather. When necessary to store outdoors, elevate materials above grade and enclose with durable, watertight wrapping.

D. Reject damaged, deteriorated, or contaminated materials and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Junction and Pull Boxes: Sheet steel junction and pull boxes, with screw-on covers; of the type and shape and size to suit each respective location and installation; with welded seams and equipped with stainless steel nuts, bolts, screws, and washers. Damp location and exterior boxes shall be stainless steel.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
1. Install electrical boxes as indicated, in compliance with NEC requirements and in accordance with the Manufacturer's written instructions and recognized industry practices to ensure that the boxes and fittings serve the intended purposes.
2. Provide knockout closures to cap unused knockout holes where blanks have been removed.
3. Locate boxes and conduit bodies so as to ensure accessibility of electrical wiring.
4. Secure boxes rigidly to the substrate upon which they are being mounted, or solidly embed boxes in concrete or masonry.
5. All boxes shall have covers installed at completion of construction.

END OF SECTION 26 05 35

SECTION 26 05 43 - UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the furnishing and installation of the major items listed below for conduit duct banks:
   1. Switchgear pad vaults.
   2. Duct banks concrete encased.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

B. Preinstallation Coordination Meeting(s): For underground ducts and raceways. Conduct meeting(s) at Project site before beginning excavation work.

1.4 ACTION SUBMITTALS

A. Product Data:
   1. Name of Manufacturers and Model numbers.
   2. Duct-bank materials, including spacers and miscellaneous components.
   3. Ducts, conduits, and their accessories, including elbows, end bells, bends, fittings, and solvent cement.
   4. Switchgear pad vaults.
   5. Underground-line warning tape.

B. Layout Drawings: For switches and duct banks. Plans shall be to scale and identify invert elevations where duct banks enter manholes and buildings.

C. Field Quality-Control Submittals: Field quality-control reports.

1.5 INFORMATIONAL SUBMITTALS

A. Manufacturers' Published Instructions: Record copy of official installation and testing instructions issued to Installer by manufacturer.

B. Source Quality-Control Submittals: Source quality-control reports.

1.6 QUALITY ASSURANCE

A. General: All concrete work including precast shall meet ACI Standards.

B. Regulatory Agencies Requirements:
   1. FAA Advisory Circular 150/5370-10H – As applicable to the construction and installation of Underground Ducts and Raceways for Electrical Systems.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver all materials in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in a manner which will prevent deterioration or damage, contamination with foreign matter, damage by weather or elements, and in accordance with Manufacturer's directions.

C. Store materials indoors and protect from weather. When necessary to store outdoors, elevate materials above grade and enclose with durable, watertight wrapping.

D. Reject damaged, deteriorated, or contaminated material, and immediately remove from Site. Replace rejected materials with new materials at no additional cost to Owner.

PART 2 - PRODUCTS

2.1 CONDUIT

A. As specified in Division 26 Section “Raceways for Electrical Systems.”

2.2 DUCT ACCESSORIES

A. Duct Spacers: Factory-fabricated, rigid, PVC interlocking spacers; sized for type and size of duct with which used and selected to provide minimum duct spacing indicated while supporting duct during concreting or backfilling.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. ABB, Electrification Business.
      b. Allied Tube & Conduit; Atkore International.
      c. Cantex Inc.
      d. IPEX USA LLC.
      e. PenCell Plastics; brand of Hubbell Utility Solutions; Hubbell Incorporated.
      f. Underground Devices, Inc.
      g. Or Equal.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate layout and installation of duct, duct bank, and switches with final arrangement of other utilities, site grading, and surface features as determined in field. Notify Engineer if there is conflict between areas of excavation and existing structures or archaeological sites to remain.

B. Coordinate elevations of duct and duct-bank entrances into manholes, handholes, and boxes with final locations and profiles of duct and duct banks, as determined by coordination with other utilities, underground obstructions, and surface features. Revise locations and elevations as required to suit field conditions and to ensure that duct and duct bank will drain to manholes and handholes, and as approved by Engineer.

3.2 SELECTION OF UNDERGROUND DUCTS

A. Duct for Electrical Feeders: Schedule 40 PVC, concrete encased unless otherwise indicated.

B. Duct for Electrical Branch Circuits: PVC-40 direct buried unless otherwise indicated.

C. Underground Ducts Crossing Paved Paths, Walks, and Driveways: PVC-40 encased in reinforced concrete.

D. Underground Ducts Crossing Roadways Schedule 40 PVC, encased in reinforced concrete.

E. Stub-ups: Concrete encased, Schedule 40 PVC or RMC.

3.3 SELECTION OF UNDERGROUND ENCLOSURES

A. Manholes: Precast concrete.
   1. Units Located in Roadways and Other Deliberate Traffic Paths by Heavy or Medium Vehicles: H-20 structural load rating in accordance with AASHTO HB 17.
   2. Units Not Located in Deliberate Traffic Paths by Heavy or Medium Vehicles: H-10 load rating in accordance with AASHTO HB 17.

3.4 INSTALLATION OF DUCTS AND DUCTBANKS

A. Reference Standards:
   1. Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NEMA TCB 2 for installation of underground ducts and duct banks.
   2. Consult Engineer for resolution of conflicting requirements.

B. Special Techniques:
   1. Where indicated on Drawings, install duct, spacers, and accessories into duct-bank configuration shown. Duct installation requirements in this Section also apply to duct bank.
   2. Slope: Pitch duct minimum slope of 1:300 down toward manholes and away from buildings and equipment. Slope duct from high point between two manholes to drain in both directions.
   3. Expansion and Deflection Fittings: Install expansion and deflection fitting in each duct in area of disturbed earth adjacent to manhole.
   4. Install expansion fitting near center of straight-line duct with calculated expansion of more than 3/4 inch.
   5. Curves and Bends:
      a. Use 5-degree angle couplings for slight changes in direction. Use manufactured long sweep bends with minimum radius of 60-inch, both horizontally and vertically, at other locations unless otherwise indicated.
      b. Field bending must be in accordance with NFPA 70 minimum radii requirements, except bends over 45 degrees must be made with minimum radius of 60 inch. Use only equipment specifically designed for material and size involved. Use PVC heating bender for bending PVC conduit.
   6. Joints: Use solvent-cemented joints in nonmetallic duct and fittings and make watertight in accordance with manufacturer's published instructions. Stagger couplings so those of adjacent duct do not lie in same plane. Couple steel conduits to ducts with adapters designed for this purpose and encase coupling with minimum 3 inch of concrete for minimum of 12 inch on each side of coupling.
      a. Install insulated grounding bushings on steel raceway terminations that are less than 12-inch below grade or floor level and do not terminate in hubs.
   7. Duct Terminators for Entrances to Concrete Handholes: Use manufactured, cast-in-place duct terminators, with entrances into structure spaced approximately 6-inch o.c. for 4-inch duct, and vary proportionately for other duct sizes.
      a. Begin change from regular spacing to terminator spacing 10 ft from terminator, without reducing duct line slope and without forming trap in line.
   8. Building Wall Penetrations: Make transition from underground duct to steel raceway at least 10 ft outside building wall, without reducing duct line slope away from building and without forming trap in line. Use fittings manufactured for transition to steel raceway type installed. Install steel raceway penetrations of building walls as specified in Division 26 Section "Common Work Results for Electrical."
   9. Sealing: Provide temporary closure at terminations of duct with pulled cables. Seal spare duct at terminations. Use sealing compound and plugs to withstand at least 15 psig hydrostatic pressure.
   10. Pulling Cord: Install 200 lbf test nylon cord in empty ducts.

C. Concrete: In accordance with Division 03 Section “Structural Concrete.”

D. Earthwork: In accordance with Division 31.

3.5 FIELD QUALITY CONTROL

A. Tests and Inspections:
   1. Demonstrate capability and compliance with requirements on completion of installation of underground duct, duct bank, and utility structures.
   2. Pull solid aluminum or wood test mandrel through duct to prove joint integrity and adequate bend radii, and test for out-of-round duct. Provide minimum 12-inch-long mandrel equal to duct size minus 1/4 inch. If obstructions are indicated, remove obstructions and retest.

END OF SECTION 26 05 43

SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the furnishing and installation of proper identification for electrical system components.

B. Items requiring identification or labeling include:
   1. Cables and conductors.
   2. Conduit systems.
   3. Distribution Equipment:
      a. Enclosed circuit breakers.
      b. Switchgear.
   4. High voltage equipment.

1.3 SUBMITTALS

A. Nameplate schedule identifying each device to be labeled and project specific label text.

1.4 QUALITY ASSURANCE

A. Reference GRFIA Facilities Projects Design Standards and Sheet E001 for items requiring identification and labeling.

PART 2 - PRODUCTS

2.1 ELECTRICAL LABELS

A. Provide engraved laminated plastic nameplate to identify each piece of electrical equipment:
   1. Nameplate shall have 3/8-inch minimum letters.
   2. Punched or drilled for mechanical fasteners.
   3. Colors of labels and letters shall be as indicated in the Typical Label Examples on the Drawings.

B. Provide printed labels by Brady or T&B to identify conductors.

C. "DANGER - HIGH VOLTAGE KEEP OUT" signs shall be provided with white letters on a red background.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
   1. Attach nameplates directly to each piece of electrical equipment. In finished areas of building, install nameplates behind enclosure door where possible.
   2. Where several conductors pass through a pull box, junction box, or enclosure, provide wire labels. Group wires before labeling.
   3. Provide "DANGER - HIGH VOLTAGE KEEP OUT" signs on doors of all rooms containing equipment such as medium voltage switches, transformers, junction and pull boxes for medium voltage cables, and on medium voltage equipment mounted outdoors, such as pad-mounted transformers and switches.

B. Cables and Conductors:
   1. Cables and conductors shall be color-coded in accordance with Division 26 Section “Conductors and Cables – 600V and Below.”
   2. All conductors and cables for power, lighting, control, supervision, low voltage systems, etc. shall be labeled with the source and circuit number and/or match the identification provided in the manufacturer’s submittals and O&M manuals. If none of the identifiers are suitable or available, the Contractor shall devise a clear and understandable identification labeling system. Without exception, all cables and conductors shall be clearly labeled.
   3. Labeling shall occur everywhere cables and conductors are terminated or spliced.
   4. Medium voltage cabling shall be identified at every accessible location, including vaults, manholes, and switches using nomenclature specified in the project drawings. Tags shall be supplied by Tech Products Inc. and feature high-quality, 1-inch raised lettering, designed to withstand harsh environments. Each tag shall be mounted in a durable poly tag holder and securely fastened to the cable with stainless steel cable ties.

C. Conduit Systems:
   1. Provide label inside each junction and pull box identifying circuit numbers for all conductors contained inside the box. Labeling shall be printed neatly with permanent, waterproof, black ink marker.

D. Distribution Equipment: For each of the following pieces of electrical distribution equipment, provide label attached to enclosure cover. Labels shall comply with Gerald R. Ford International Airport’s Facility Project Design Standards. Refer to the typical label examples in the Drawings:
   1. Disconnect Switches.
   2. Enclosed Circuit Breakers.
   3. Primary Switchgear.
   4. Switchboards.
      a. Provide label near each feeder/branch breaker identifying name of equipment served, number of poles, and circuit breaker size (example, “TRANSFORMER TX-LP1, 3P80”).
   5. Transformers.
   6. Panelboards.
      a. Equip interior of enclosure door with a circuit directory frame, typewritten card, and transparent plastic cover. Directory shall identify load description for each circuit, including spares. Hand lettering is not acceptable.

END OF SECTION 26 05 53

SECTION 26 08 13 - ELECTRICAL TESTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes electrical testing.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. NFPA 70 – National Electrical Code.
   2. NFPA 70E – Standard for Electrical Safety in the Workplace.
   3. InterNational Electrical Testing Association (NETA) – Standard for Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems, ANSI/NETA ATS-(Latest Edition).
   4. IEEE - Institute of Electrical and Electronics Engineers.

1.4 SUBMITTALS

A. Within 30 days after Notice to Proceed, submit certification of the qualifications of the Electrical Testing Firm (ETF).

B. Within 30 days after Notice to Proceed, submit a complete project-specific list (based on project-specific nomenclature), of all equipment to be tested and the descriptions of the tests to be performed, for approval.

C. For items to be tested, a test report shall be generated for each piece of electrical equipment, device, installation and system as indicated in the Specifications and shall include the following:
   1. Check list of visual and mechanical inspections.
   2. Check list of electrical tests performed.
   3. Test reports, including test values where applicable, for all required electrical tests.
   4. Obvious indication on the first page of the test report, where test results fall outside of the limits of recommended values.
   5. Summary and interpretation of test results.
      a. Describe the problem in detail.
      b. Offer suggestions for correction or potential solution.
   6. Signed and dated by the testing firm stating that all required tests have been completed.

D. Test reports shall be furnished to the Architect/Engineer within 14 days of completion of each test on an ongoing basis for approval. Final copies of the approved reports shall be included in the Contractor's Operation and Maintenance (O&M) Manual.

E. Submit a final report of testing and inspection at the completion of the project. Include the following:
   1. Summary of the project.
   2. Description of the equipment tested (based on project-specific nomenclature for all applicable equipment).
   3. Visual and mechanical inspection report for each piece of equipment.
      a. Report shall include a clear statement or verbiage that all visual and mechanical inspections have been performed in accordance with the NETA guidelines for all equipment and or items listed in the approved Submittal of a project specific list indicated in paragraph 1.4 B.
   4. Description of the NETA required electrical tests.

5. Test results as described in the latest edition of NETA.
    a. Include a pass or fail grade as compared to the reference tables provided in ANSI/NETA ATS-(Latest Edition) and industry standards for all individual tests.
    b. Report shall include all test results. This includes all failed tests and retests.
    c. Infrared report shall include all pictures taken of all equipment, not just equipment with issues. If issues are found, the report shall include a picture of the issue and a picture after the problem has been resolved.
6. Conclusions and recommendations.
7. Appendix including appropriate test forms.
8. Identification of the test equipment used, including model number, and calibration date.
9. Signature of test engineer.

1.5 QUALITY ASSURANCE

A. The ETF shall be a third-party NETA certified testing organization.

B. The ETF shall function as an unbiased testing authority, professionally independent of the manufacturers, suppliers, and installers of equipment or systems evaluated by the testing firm unless the ETF indicated above allows the installing contractor to perform the testing.

C. The ETF shall be regularly engaged for minimum of 5 years in testing of electrical materials, devices, electrical installations, and systems for purpose of preventing injury to persons or damage to property and other equipment.

D. The ETF shall have successfully completed not less than 5 acceptance testing, inspection and calibration projects of similar scope to this Project.

E. The ETF shall meet OSHA criteria for accreditation of testing laboratories, 29 CFR Parts 1907, 1910, and 1936, or be a Full Member company of NETA (unless paragraph 1.5 A allows the installing contractor to perform the testing).

F. The ETF lead, on-site, technical person shall be currently certified by NETA or National Institute for Certification in Engineering Technologies (NICET) in electrical power distribution system testing, unless paragraph 1.5 A allows the installing contractor to perform the testing.

G. The ETF shall only utilize engineers and technicians who are regularly employed by the firm for testing services.

H. The ETF shall have a calibration program to maintain applicable test instrumentation within rated accuracy. Accuracy shall be traceable to National Institute of Standards and Technology (NIST) in an unbroken chain. Instruments shall be calibrated as follows:
    1. Field Instruments: 6 months maximum.
    2. Laboratory Instruments: 12 months maximum.
    3. Specialty Leased Equipment: 12 months maximum.
    4. Dated calibration labels shall be visible on test equipment.

I. Submit certification of the above qualifications; refer to the SUBMITTALS Paragraph of this Section.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 VISUAL INSPECTIONS

A. The ETF shall perform all visual and mechanical inspections in accordance with ANSI/NETA ATS-(Latest Edition) “Testing and Test Procedures” chapters in addition to the list below for all applicable electrical equipment to be installed at the Site.

B. The ETF prior to testing, shall perform the following visual and mechanical inspections (in addition to the NETA requirements listed above).:
   1. The equipment is installed in accordance with manufacturer's installation instructions and the current National Electrical Code (NEC).
   2. The equipment is installed completely and properly.
   3. The equipment is free from damage and defects.
   4. Shipping blocks and restraints have been removed.
   5. Electrical terminations have been properly torqued to manufacturer's recommendations and torque marks applied.
   6. The equipment has been properly aligned.
   7. The equipment has been properly lubricated.
   8. The ventilation louvers are open and unobstructed.
   9. The equipment is ready to be tested.

3.2 TEST PROCEDURES

A. Many electrical tests will need to be performed prior to making terminations and connections and ahead of system start-up. The electrical contractor is required to coordinate this work with all parties involved to avoid delays in construction or obtaining permanent power.

B. The ETF shall perform all test procedures on-site, no exceptions allowed. It will not be acceptable to remove equipment or components and ship items off-site to be tested then ship items back to the site to be reinstalled.

C. All disassembly and reassembly of equipment for testing purposes shall be performed or witnessed by the approved testing agency.

D. The ETF shall perform test procedures in accordance ANSI/NETA ATS-(Latest Edition) "Inspection and Test Procedures" chapters (see list below; not all may be applicable for this project) for all applicable electrical equipment to be installed at the Site.
   1. 7. INSPECTION AND TEST PROCEDURES.
      a. 7.1 Switchgear and Switchboard Assemblies.
      b. 7.2.1.1 Transformers, Dry-Type, Air-Cooled, Low-Voltage, Small. Test all dry type transformers 75kVA and above.
      c. 7.2.1.2 Transformers, Dry-Type, Air-Cooled, Large.
      d. 7.3.2 Cables, Low-Voltage, 600-Volt Maximum. Test all cables 100A and above.
      e. 7.3.3 Cables, Medium- and High-Voltage. Test all medium voltage cables using VLF and Tan Delta testing.
      f. 7.5.1.1 Switches, Air, Low-Voltage.
      g. 7.5.1.2 Switches, Air, Medium-Voltage, Metal-Enclosed.
      h. 7.5.1.3 Switches, Air, Medium- and High-Voltage, Open.
      i. 7.5.2 Switches, Oil, Medium-Voltage.
      j. 7.5.3 Switches, Vacuum, Medium-Voltage.
      k. 7.5.4 Switches, SF6, Medium-Voltage.
      l. 7.6.1.1 Circuit Breakers, Air, Insulated-Case/Molded-Case. Test all circuit breakers 100A and above.
      m. 7.6.1.2 Circuit Breakers, Air, Low-Voltage Power. Test all circuit breakers 100A and above.
      n. 7.6.1.3 Circuit Breakers, Air, Medium-Voltage.
      o. 7.6.2 Circuit Breakers, Oil, Medium- and High-Voltage.
      p. 7.6.3 Circuit Breakers, Vacuum, Medium-Voltage.
      q. 7.6.4 Circuit Breakers, SF6.
      r. 7.10.1 Instrument Transformers, Current Transformers.
      s. 7.10.2 Instrument Transformers, Voltage Transformers.
      t. 7.11.1 Metering Devices, Electromechanical and Solid-State.
      u. 7.11.2 Metering Devices, Microprocessor-Based.
      v. 7.13 Grounding Systems.
      w. 7.14 Ground-Fault Protection Systems, Low-Voltage.
      x. 7.16.1.1 Motor Control, Motor Starters, Low-Voltage.
      y. 7.17 Adjustable Speed Drive Systems.
      z. 7.18.1.1 Direct-Current Systems, Batteries, Flooded Lead-Acid.
      aa. 7.18.1.2 Direct-Current Systems, Batteries, Vented Nickel-Cadmium.

bb. 7.18.1.3 Direct-Current Systems, Batteries, Valve-Regulated Lead-Acid.
cc. 7.18.2 Direct-Current Systems, Chargers.
dd. 7.19.1 Surge Arresters, Low-Voltage.
ee. 7.19.2 Surge Arresters, Medium- and High-Voltage.
ff. 7.22.2 Emergency Systems, Uninterruptible Power Systems.
gg. SYSTEM FUNCTION TESTS AND COMMISSIONING
hh. THERMOGRAPHIC SURVEY
    1) Equipment that requires thermographic survey, includes but is not necessarily limited to Within 30 days after Notice to Proceed, submit a complete project-specific list (based on project-specific nomenclature), of all equipment to be tested for approval.
        a) Low Voltage switchgear.
        b) Medium voltage switchgear
        c) High voltage switchgear.
        d) Motor control centers.
        e) Switchboards.
        f) Panelboards.
        g) Liquid-filled transformers.
        h) Dry-type transformers.
        i) Low voltage cables.
        j) Medium voltage cables.
        k) Switches.
        l) Circuit Breakers.
        m) Metering devices.
        n) Motor controllers.
        o) Variable speed controllers.
        p) Engine generator emergency system.
        q) Transfer switches.
        r) Etc.

3.3 CORRECTION ACTION

A. Equipment that fails a test shall be repaired or replaced as needed and retested. Both the failed test and the passing test shall be submitted for approval and included in the contractors O&M Manual. For failed test, add note to refer to follow-up test.

END OF SECTION 26 08 13

SECTION 26 13 21 – MEDIUM VOLTAGE PADMOUNT SWITCHGEAR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the furnishing and installation of all medium voltage padmount switchgear for outdoor applications.

B. Division of Work: In accordance with the General Conditions, Contractor is responsible for dividing the Work among the Subcontractors and Suppliers and for delineating the work to be performed by specific trades. The following are suggestions as to how the Work may be divided. This is not a complete list of all the work.
   1. General Contractor shall install all required concrete pads:
      a. As indicated on the Drawings.
      b. As specified herein.
      c. As directed by electrical Subcontractor.
   2. Electrical Subcontractor:
      a. Arrange and pay for concrete pads.
      b. Coordinate pad locations and openings with the Contractor.

1.3 REFERENCES

A. Except as herein specified, or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. ANSI C57.12.28.
   2. ASTM Standards:
      a. B 117 - Test Method for Salt Spray (Fog) Testing.
      b. D 523 - Test Method for Specular Gloss.
      c. D 714 - Test Method for Evaluating Degree of Blistering Paints.
      d. D 1654 - Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
      e. D 2247 - Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
      f. D 2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
      g. D 3359 - Test Methods for Measuring Adhesion by Tape Test.
      h. D 4060 - Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
      i. D 4214 - Test Method for Wet Abrasion Resistance of Interior Paints.
      j. G 53 - Practice for Operating Light-and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials.
   3. NEC Article 490.
   4. NEMA (National Electrical Manufacturers Association) Standards.

1.4 SUBMITTALS

A. Shop Drawings:
   1. Name of Manufacturer.
   2. Model number.
   3. Details of construction and installation.
   4. Switch configuration.
   5. Assembly drawings, including elevations, plans, sections, dimensions, weight, and conduit entry locations.
   6. Electrical Ratings:
      a. kV.
      b. BIL.
      c. Amperage.

d. Interrupt and short circuit ratings.
e. Fusing.
7. Color and finish.
8. Options and accessories.

B. Operation and Maintenance Manuals:
1. Equipment function, normal operating characteristics, and limiting conditions.
2. Assembly, installation, alignment, adjustment, and checking instructions.
3. Operating instructions for start-up, routine and normal operating, regulation and control, shutdown, and emergency conditions.
4. Maintenance instructions.
5. Guide to “troubleshooting.”
6. Parts list and predicted life of parts subject to wear.
7. Project specific outline and cross sections, assembly drawings, engineering data, and wiring diagrams.
8. Test data and performance curves.

C. Manufacturer’s Installation Instructions: include recommended commissioning, acceptance testing, and startup procedures, instructions, and guidelines.

1.5 QUALITY ASSURANCE

A. Fabrication and Installation Personnel Qualifications:
1. Trained and experienced in the fabrication and installation of the materials and equipment.
2. Knowledgeable of the design and the reviewed submittals.

B. Regulatory Agencies Requirements: Each medium voltage padmount switchgear shall carry the Underwriters' Laboratory label.

C. All equipment and materials provided under this contract must comply with the requirements of the Buy American Act (BABA) to the fullest extent possible. The contractor shall ensure that all iron, steel, manufactured goods, and construction materials are produced in the United States unless a waiver is obtained, or the product qualifies for an exception as outlined in the Act.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver material in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in a manner which will prevent deterioration or damage, contamination with foreign matter, damage by weather or elements, and in accordance with Manufacturer's directions.

C. Store materials indoors and protect from weather. When necessary to store outdoors, elevate materials above grade and enclose with durable, watertight wrapping.

D. Lift equipment only via lifting lugs provided for that purpose.

E. Avoid mechanical shock of any kind which would damage enclosure or equipment.

F. Reject damaged, deteriorated or contaminated materials and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

1.7 PROJECT CONDITIONS

A. Provide temporary temperature/humidity control for all installed, energized medium voltage padmount switchgear in a manner which will maintain atmospheric moisture content inside the medium voltage padmount switchgear at an acceptable minimum.

1.8 WARRANTY

A. Manufacturer shall furnish for each medium voltage padmount switchgear: 2-Year Unconditional Warranty:
   1. Beginning on date of delivery to Contractor.
   2. Contingent on Manufacturer approved installation.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Manufacturers:
   1. S & C Electric Company - PMH Series.
   2. Or equal.

B. General:
   1. Outdoor, metal enclosed switchgear assembly consisting of a single, pad-mounted freestanding enclosure containing interrupter switches, power fuses and accessory components, all completely factory assembled and tested.
   2. Ratings:
      a. Nominal Voltage: 14.4.
      b. Insulation Level - (BIL) (KV): 95.
      c. Bus Rating - Continuous (AMPS): 600.
      d. Switch:
         1) Continuous (AMPS): 600.
         2) Loadbreak (AMPS): 600.
         3) Momentary (AMPS): 20,000.
         4) Fault Closing (AMPS): 20,000.
            a) Duty cycle of 2 fault closing operations without damage to switch.
      e. Fuses:
         1) Interrupting Rating (MVA) (Nominal): 300.
         2) Maximum Continuous (AMPS): 1/2 to 200.

2.2 FABRICATION

A. Enclosure:
   1. All welded unit of 11 gage steel.
   2. Design with rugged tamper-resistant construction.
   3. Provide doors with full length hinges and 3-point latching.
   4. Penta-star style door lock mechanism with padlock provisions.
   5. Provide roof with no drip insulation (undercoating).
   6. Store switch-operating handles inside of a recessed pocket.
   7. Finish: Dark green color.
   8. Finish shall pass the following tests:
      a. 4000 hours of exposure to salt-spray testing in accordance with ASTM B117 with:
         1) Underfilm corrosion not to extend more than 1/32-inch from the scribe; and
         2) Loss of adhesion from bare metal not to extend more than 1/8-inch from the scribe.
      b. 1000 hours of humidity testing in accordance with ASTM D2247 with no blistering as evaluated in accordance with ASTM D714.
      c. 500 hours of accelerated weathering testing in accordance with ASTM G53 with no chalking as evaluated in accordance with ASTM D659, and no more than 15% reduction of gloss as evaluated in accordance with ASTM D523.
      d. Crosshatch adhesion testing in accordance with ASTM D3359 Method B with no loss of finish.
      e. 160-inch-pound impact adhesion testing in accordance with ASTM D2794 with no chipping or cracking.
      f. Scab corrosion testing for 35 cycles with exposure to specific salt mist, temperature, and relative humidity conditions for designated time intervals followed by the air blow-off adhesion test in accordance with ASTM D 1654 with creepage from the scribe not to extend more than 1/16-inch and no unusual surface failure.
      g. Oil resistance testing consisting of a 72-hour immersion bath in mineral oil with no shift in color, no streaking, no blistering, and no loss of hardness.

h. 3000 cycles of abrasion testing in accordance with ASTM D4060 with no penetration to the substrate.

B. Insulation System:
1. Air dielectric.
2. Porcelain insulators.
3. Cycloaliphatic epoxy insulators.

C. Barriers:
1. A plexiglass barrier window shall permit visual inspection of switch position without removing barriers.
2. Segregation barrier for each compartment.
3. Interphase barriers for all switches and fuses.
4. Semi-dead front removable insulating barriers in front of switches.
5. Barriers shall be able to slide into gap of open switch to permit work on cable termination while the rest of the enclosure is energized.

D. Switches:
1. Group-operated quickmake/quickbreak from an external removable handle.
2. Single blade, no auxiliary or shunt interrupting devices.
3. Air interrupter.
4. Switch Handle: Key interlocked with fuse access doors.
5. Switch Rating: 600A.

E. Fusing:
1. S & C Electric Company, type SML-20.
2. Build an individual 200 ampere hotstick operated, single pole interrupter into the stationary mounting.
3. With visual means of detecting a blown fuse.

F. Grounding Provisions: Provide grounding pad in each compartment.

G. Configuration: Configure model(s) required as indicated on the Drawings.

H. Accessories:
1. One set of 3 spare refills for each size of fuse used.
2. Fuse refill holder inside gear.
3. Fiberglass vault for cable routing.
4. One set of three 15 -KV distribution class lightning arrestors.

2.3 ASSOCIATED EQUIPMENT

A. Nameplates:
1. Provide permanent nameplates on each outside and inside door, reading: "DANGER HIGH VOLTAGE".
2. Type: Sign 139SG as manufactured by Seton Name Plate Corporation, New Haven Connecticut 06505.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
1. In conformance with the Shop Drawings reviewed by Engineer.
2. Where indicated, in accordance with the equipment Manufacturer's written instructions and recognized industry practices, to ensure that equipment complies with the requirements and serves the intended purposes.

B. Fiberglass Vaults:
1. Set medium voltage padmount switchgear on vault (see Drawings for additional details).
2. Provide openings in vault for passage of conduits.

3. Obtain anchor bolt plan from Manufacturer and set anchor bolts in vault accordingly. Equipment shall be permanently fastened to pad in accordance with Manufacturer's instructions and seismic requirements of the Site.

C. Connections: Connect surge arrestors to incoming cables and to ground grid.

D. Grounding:
1. Provide a ground rod grid around medium voltage padmount switchgear in accordance with Division 26 Section "Grounding and Bonding" and as indicated on the Drawings.
2. Extend a ground lead into switchgear ground lug.

E. Storage: Store spare fuse refills in the pockets inside the doors.

F. Technical Literature: Turn over all technical literature and Manufacturer's warranty to Owner and obtain a signed receipt.

3.2 FIELD QUALITY CONTROL

A. Manufacturer's field service:
1. Arrange and pay for Manufacturer's authorized representative to:
   a. Provide services indicated below.
   b. Minimum onsite time: 2 days.
   c. Additional time, as required.
2. Schedule the following:
   a. As soon as practicable after installation. Schedule shall be coordinated with related Work.
   b. At times approved by Engineer and Owner.
3. Manufacturer's representative:
   a. Check work.
   b. Provide startup services as recommended by Manufacturer, including all items listed in commissioning, acceptance testing, and startup procedures, instructions, and guidelines.
   c. Assist with testing.
   d. Demonstrate operation and maintenance of equipment to Owner's personnel.
   e. Review operation and maintenance manual with Owner's personnel. Two2-hour review sessions shall be scheduled to coordinate with schedules of Owner's personnel (i.e., day/morning and afternoon/evening shifts). Each review session shall accommodate up to 8 individuals. Submit detailed outline for each review session prior to scheduling.
   f. Owner reserves the right to videotape review sessions. Videotaping will be done by Owner.
4. Promptly make all changes and additions required by Manufacturer's representative.

B. Independent Testing Agency: Engage a qualified, independent testing agency to perform tests and inspections and prepare test reports. Agency shall be a member of InterNational Electrical Testing Association (NETA) or be a nationally recognized testing laboratory (NRTL).

C. Field Performance:
1. Performance Testing (to be performed by Independent Testing Agency):
   a. All test instruments shall have been calibrated within the last 12 months, traceable to standards of NIST, and adequate for making positive observation of test results. Calibration records shall be available for examination upon request.
   b. Perform visual, mechanical, and electrical inspections and testing for medium voltage padmount switchgear as specified in the latest edition of NETA Acceptance Testing Specification (ATS). Certify compliance with test parameters.

3.3 CLEANING

A. Shipping Protection: Remove all shipping and packing protection.

B. Cleaning: Clean interior and exterior of medium voltage padmount switchgear and leave them free of dust and particles that accumulated during construction prior to turning system over to Owner.

3.4 INFRARED SCANNING

A. Immediately prior to Substantial Completion, perform an infrared scan of each power wiring termination and each bus connection.

B. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan 11 months after date of Substantial Completion.

C. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

D. Record of Infrared Scanning: Prepare a certified report that identifies terminations and connections checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 26 13 21

SECTION 31 10 13 – SITE PREPARATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the major items listed below:
   1. Clearing Site of above-grade trees, shrubs, grass, and plant life.
   2. Removal of the following man-made items:
      a. Walls.
      b. Fences.
      c. Sheds.
      d. Similar improvements as indicated on the Drawings.
   3. Removal of roots and stumps.
   4. Removal of exposed rocks, boulders and debris.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the Work of this Section shall comply with the following:
   1. State DOT Current Standards:
      a. Specifications for Construction.
      b. Standard Plans.

1.4 DEFINITIONS

A. Terms: Surface Improvements: Pavement, walks, drives, curbs, curb and gutter, improved lawns, monuments, property irons, reference points and similar improvements.

1.5 SUBMITTALS

A. Permit to Store or Dump Removed Materials:
   1. On property owned, leased or occupied by someone other than Owner.
   2. Submit prior to storing or dumping.
   3. Permit shall absolve Owner from responsibility for storing or dumping.

1.6 QUALITY ASSURANCE

A. Trimming: Trimming of limbs and branches and the painting of tree wounds shall be actively supervised by a member of one of the following:
   1. ASCA - American Society of Consulting Arborists.
   2. ISA - International Society of Arboriculture.
   3. NAA - National Arborist Associations.

B. Interference:
   1. Ensure that Site preparation work does not unduly interfere with pedestrian and vehicular traffic.
   2. Obtain Engineer's and governing authority's approvals prior to closing a public street.

1.7 PROJECT CONDITIONS

A. Burning: Not permitted.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 PREPARATION

A. Soil Erosion Control: Provide soil erosion control in accordance with Division 31 Section “Erosion and Sedimentation Controls” prior to starting Site preparation work.

B. Protection of Trees and Shrubs:
   1. Protect trees and shrubs which are to remain from permanent damage by construction operations.
   2. Prevent vehicles from driving within area under dripline of trees which are to remain.

C. Maintain designated temporary roadways, walkways, and detours for vehicular and pedestrian traffic.

3.2 APPLICATION

A. Clearing:
   1. Remove items requiring removal under this Section from area indicated on Drawings.
   2. Remove roots rocks and boulders to a depth of 2 feet below existing grade in the following areas:
      a. Proposed buildings or structures.
      b. Proposed pavements and walks.
      c. Other areas where compaction of the subgrade is required.

B. Removal of Sod: Cut to a straight line at the expected excavation limits with sod cutter.

C. Prevent Construction Operations from Damaging or Disturbing:
   1. Trees or roots of trees which are to remain.
   2. Surface improvements which are to remain.

3.3 DISPOSAL OF EXCESS MATERIAL

A. General:
   1. Remove and properly dispose of all material not needed to complete Project.
   2. Dispose of excess material at a location off the Site.
   3. Dispose of excess topsoil at a location off the Site.
   4. Disposal of materials shall not violate laws, rules, regulations and the like regarding the filling of flood plains, wetlands and other environmentally sensitive areas.
   5. Provide adequate controls to maintain disposal sites in a neat and safe conditions by periodic leveling of material, the control of erosion and such other practices as are necessary.

END OF SECTION 31 10 13

SECTION 31 22 00 – GRADING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the furnishing and installation of the major items listed below:
   1. Excavation.
   2. Cutting and filling.
   3. Rough and finish grading.
   4. Disposal of excavated materials.
   5. Topsoil.
   6. Excess water control.
   7. Pavement subgrade.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. AOAC - Association of Official Agricultural Chemists: Methods of Testing.
   2. ASTM Standards:
      a. D422 - Method for Particle-Size Analysis of Soils.
      b. D698 - Laboratory Compaction Characteristics of Soil Using Standard Effort.
      c. D1557 - Laboratory Compaction Characteristics of Soil Using Modified Effort.
      d. D2487 - Classification of Soils for Engineering Purposes.
   3. State DOT Current Standards:
      a. Specifications for Construction.
      b. Standard Plans.

1.4 DEFINITIONS

A. Terms:
   1. Driving Surface: A pavement, curb, or sidewalk.
   2. Excavation:
      a. Removing the following materials from their present location:
         1) Native below-grade material such as soil, rocks, boulders less than 1/2 cubic yard in volume, and buried trees.
         2) Man-made items such as, but not necessarily limited to:
            a) Bituminous and concrete paving.
            b) Curbs.
            c) Riprap.
            d) Head walls.
            e) Underground utilities.
            f) Manholes and catch basins.
            g) Foundations.
            h) Sidewalks.
   3. Fill: Soil, native material, imported material or other material which is placed over the subgrade, or excavated areas; under roadways, parking areas, walks, buildings, or structures; and anywhere else on the Site.
   4. Grading: The act of moving soil from one location on the Site to another to achieve the contours and elevations as indicated on the Drawings and as herein specified.
   5. Hardpan:
      a. Cemented soil layers.
      b. Is not hard clay layers that are not cemented.
   6. Imported Material: Soil material which is purchased by Contractor and hauled onto the Site.

7. Native Material: Soil and other natural earth materials, except rock, which are existing on the Site prior to the start of Work.
8. Pavement: Any combination of subbase, base course and concrete, bituminous or aggregate surface course, including shoulders, placed on a subgrade. Includes roadways, parking areas, driveways, and bituminous seal coat.
9. Rock Excavation:
    a. Excavation of igneous, metamorphic or sedimentary rock or hardpan which cannot be excavated without continuous drilling or blasting or continuous use of a ripper or other special equipment.
    b. Excavation of boulders of 1/2 cubic yard or more in volume.
10. Structure: A building, retaining wall, tank, footing, slab, or other similar construction.
11. Subbase: The layer of material placed on the subgrade as part of the pavement structure.
12. Subgrade:
    a. Below structures and below fill on the Site: The top elevation of the undisturbed native material after all topsoil is stripped off and excavation is completed.
    b. Below driving surfaces: The bottom elevation of the subbase.
13. Surface Improvement: All improvements beyond what might be encountered in an open unimproved field.
14. Undercut: Excavation of native material from below the bottom of footings, floors, structures, and subbases.
15. Utility Structure: Manhole, catch basin, valve chamber, junction chamber, water main valve, or other similar utility appurtenance.
16. Other Definitions: Other earthwork terms not defined in the Contract Documents shall be as defined in state DOT Standard Specifications for Construction.

1.5 QUALITY ASSURANCE

A. Testing will be performed in accordance with Division 01 Section “Testing Services for Buried Utilities, Roadways, and Site Projects” and the Contractors Quality Control Plan.

B. Compaction:
1. Predominately Granular Soils:
    a. Density shall be determined by using the modified Proctor method, ASTM D1557.
    b. Compact fill to at least 95% maximum density.
    c. The first 12 inches of subgrade below all driving surfaces, structures, utility structures, and fill on the Site:
        1) Shall be tested for density.
        2) Compact to at least 95% maximum density if the existing density is below 95%.
2. Predominately Cohesive Soils:
    a. Density shall be determined by using the standard Proctor method, ASTM D698.
    b. Compact fill to at least 98% maximum density.
    c. The first 12 inches of subgrade below all driving surfaces, structures, utility structures, and fill on the Site:
        1) Shall be tested for density.
        2) Compact to at least 98% maximum density if the existing density is below 95%.

1.6 PROJECT CONDITIONS

A. Dust Control:
1. Use all legal means necessary to control dust on and near the Work and on and near all off-site borrow areas if such dust is caused by Contractor's operations during performance of the Work or if resulting from the condition of the Site when earthwork operations are suspended.
2. Treat haul roads, delivery roads, temporary site access roads and other surfaces as required to prevent dust from being a nuisance to the public, neighbors, and concurrent performance of other work on the Site.
3. Scrape, broom, or vacuum adjacent streets to remove tracked dirt every Friday afternoon, or more often as necessary if directed by Engineer. Utilize vacuum if dust from brooming is excessive in opinion of Engineer.

B. Existing Structures, Utility Structures, and Utilities:
   1. Call MISS DIG to locate all existing underground utilities prior to starting excavation.
   2. Where utilities, utility structures, or structures are encountered which are in active use:
      a. Provide adequate protection for them.
      b. Be responsible for damages to them.
   3. Provide stand-by utility service if temporary removal is necessary for a period exceeding 2 hours.
   4. Where utility service connections to occupied buildings must be temporarily disconnected, give 48 hours notice to the affected occupants of the time and duration of the anticipated shut off.
   5. Notify Fire Department 48 hours in advance if water main or fire supply line shutoff is required.
   6. Raise, lower, or move underground utilities, utility structures, or structures which interfere with the utility, utility structure, or structure being constructed as part of this Work.

C. Special Filling Requirements:
   1. Comply with the regulations of the state DOT, county road, and railroad company engineering departments with regard to placing fill and compaction in their respective rights-of-way.
   2. Obtain necessary permits for filling activities off Site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:
   1. Approval Required: All material shall be subject to the approval of Engineer or independent testing laboratory.
   2. Notification: For approval of imported material, notify Engineer or independent testing laboratory at least 1 week in advance of intention to import material, designate the proposed borrow area, and permit Engineer or independent testing laboratory to sample as necessary from the borrow area for the purpose of making acceptance tests to prove the quality of the material.

B. Material Sources and Uses:
   1. Imported Material:
      a. Fill in undercut.
      b. Fill below structures, utility structures, or driving surfaces.
      c. Stone stabilization course.
   2. Native material, unless quantity is not sufficient; then shall be imported material.
      a. Fill not below structures, utility structures, or driving surfaces.
      b. Topsoil.

C. Fill In Undercut: MDOT 902, Granular Material Class II.

D. Fill below structures, utility structures, or driving surfaces: MDOT 902, Granular Material Class II.

E. Stone Stabilization Course:
   1. Crushed Stone: 1-1/2 inches maximum size.
   2. Filter Fabric:
      a. By Mirafi; Amoco; Exxon; Nicolon; or equal.
      b. Monofilament polypropylene woven fabric.
      c. Equivalent opening size of 70.

F. Fill Not Below Structures, Utility Structures, or Driving Surfaces:
   1. Native material.
   2. Exclusive of gray or blue clay, peat, organic matter, or frozen lumps.
   3. Containing no rocks or lumps over 3 inches in greatest dimension.
   4. Obtain approval for using native material as fill from Engineer or independent testing laboratory.

G. Topsoil:
1. Fertile, friable soil, containing a minimum of 2.5% and maximum 12% of organic matter as determined by the Loss on Ignition Test, AOAC, with not more than 50% clay and not more than 55% sand as determined in accordance with ASTM D422.
2. At least 90% of the material shall pass the No. 10 sieve and shall be free of refuse or all material toxic to plant growth, free of subsoil and stumps, roots, brush, stones or similar objects larger than 1-inch diameter.
3. Ordinary sods and herbaceous growth, like grass, need not be removed, but shall be thoroughly broken up and intermixed with soil during handling operations.
4. Topsoil, unless otherwise specified or approved, shall have, according to Methods of Testing by the AOAC, acidity range of approximately 5.5 pH to 7.6 pH or as approved by Engineer prior to delivery.

2.2 OTHER MATERIALS

A. All other materials, not specifically described but required for proper completion of the work of this Section, shall be as selected by Contractor subject to the approval of Engineer or independent testing laboratory.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Topsoil:
1. Remove all topsoil to depth at which subsoil is encountered, from all areas under buildings, driving surfaces, and from all areas which are to be cut to lower grades or filled.
2. With Engineer's approval, topsoil to be used for finish grading may be stored on the Site.
3. Other topsoil may be used for fill in noncritical areas with approval of Engineer.

B. Obstructions:
1. Remove and dispose of buried trees, rocks, boulders, driving surfaces, pipes and the like, as required for the performance of the Work.
2. Exercise care in excavating around catch basins, inlets, and manholes.
3. Avoid removing or loosening castings or pushing dirt into utility structures.
4. Repair or replace damaged or displaced castings; remove dirt entering utility structures during the performance of the Work at no additional cost to Owner.

C. Cutting Paved Surfaces and Similar Improvements:
1. All cuts shall be a minimum of 1-foot wider than trench on each side. When the remaining width of paved surface is less than 4 feet, remove the entire paved surface.
2. Before removing pavement, mark the pavement neatly, paralleling pipe lines and existing street lines. Space the marks the width of the trench.
3. Concrete:
   a. Pavements: Saw cut if over 3 feet from expansion or construction joint, otherwise remove to joint.
   b. Sidewalks: Remove to joints.
   c. Curb and gutter: Remove to joints.
4. Final surface Course Bituminous: Saw cut joints unless otherwise approved by Engineer.
5. Do not disturb or damage the adjacent pavement. If the adjacent pavement is disturbed or damaged, remove and replace the damaged pavement.
6. Contractor may tunnel under curbs that are encountered. Replace curb disturbed by construction.
7. Dispose of materials removed.

D. Utilities To Be Abandoned:
1. When pipes, conduits, sewers, or other utilities or utility structures are removed from the excavation leaving dead ends in the ground, fully plug such ends with brick and mortar.
2. Entirely remove abandoned utility structures unless otherwise specified or indicated on the Drawings.
3. Remove from the excavation all materials which can be readily salvaged and store at a location designated by Owner.
4. All salvageable materials will remain the property of Owner unless otherwise indicated by Owner.

E. Undercut:
   1. If soft material, which in the opinion of Engineer or independent testing laboratory is not suitable, is encountered below a structure, utility structure, or driving surface, Engineer may order the removal of this soft material and its replacement with specified material in order to make a suitable foundation for the construction of the structure, utility structure, or driving surface.
   2. All undercutting made at the order of Engineer will be paid for on the basis of the actual quantity of material excavated. Do not proceed further until instructions are received and necessary measurements made for purposes of establishing additional volume of excavation.
   3. No extra payment will be made if removal is required as a result of poor dewatering techniques.
   4. Undercutting which is specifically indicated on the Drawings or herein specified, shall be included in the base Bid.
   5. Soil removed may be used as fill in areas not below driving surfaces, structures, or utility structures.
   6. Compact subgrade at bottom of undercut prior to placing fill.
   7. Place and compact specified fill in undercut.
   8. Lateral extent of undercut shall be a horizontal distance equal to the depth of undercut below structure, utility structure, or driving surface.

F. Excavating:
   1. All excavation shall be by open cut from the surface except as herein specified or as indicated on the Drawings.
   2. If required because of excess water conditions, place stone stabilization course prior to proceeding with construction. Place filter fabric over stone stabilization course.

G. Rock Excavation:
   1. Notify Engineer prior to removal if rock is encountered.
   2. Where rock is encountered within the excavation, expose the surface of the rock sufficient to permit adequate measurements to be taken before the rock excavation is started.

3.2 FILL

A. General:
   1. Do not place fill until the subgrade been examined by Engineer or independent testing laboratory.
   2. Place fill in even layers not exceeding 10 inches in depth and thoroughly compact as herein specified.
   3. Do not place additional fill until compaction on a lift complies with specification requirements.
   4. If an analysis of the soil being placed shows a marked difference from 1 location to another, the fill being placed shall not be made up of a mixture of these materials.
   5. Handle each different type of material continuously so that field control of moisture and density may be based upon a known type of material.
   6. Do not place fill following a heavy rain without first making certain on isolated test areas that compaction can be obtained without damage to the already compacted fill.
   7. Do not place fill on frozen subgrade.

B. Compaction:
   1. Select compaction equipment to achieve the required compaction without damaging adjacent structures, utility structures, or driving surfaces.
   2. Suggested Equipment Selections:
      a. If soil is predominantly granular, use pneumatic tired or vibratory drum rollers loaded to not less than 325 pounds in accordance with rated inch of tire width.
      b. For clay fills, compact each layer with sheepsfoot rollers. Rollers shall have staggered rows of feet projecting not less than 7 inches from drum and shall be loaded to produce at least 200 pounds per square inch of tamping area in contact with the ground.
      c. Compact around structures and utility structures with hand operated vibrating compactors for granular soils and Barco rammer type compactors for clay soils.

C. Moisture:
   1. Compact all fill with the moisture content as specified.
   2. If fill material is too wet, provide and operate approved means to assist the drying of the fill until suitable for compaction.
   3. If fill material is too dry, provide and operate approved means to add moisture to the fill layers.

3.3 GRADING

A. General:
   1. Perform all rough and finish grading required to attain the elevations indicated on the Drawings.
   2. Perform rough grading to an accuracy of ± 0.10 feet.
   3. Perform finish grading to an accuracy of ± 0.05 feet.
   4. Comply with all excavating and fill requirements specified herein during grading operations.

B. Grading Around Buildings: Control the grading around buildings so the ground is pitched to prevent water from running into the excavated areas of a building or damaging other Site features.

C. Treatment After Completion of Grading:
   1. After grading is completed, permit no further excavation, filling, or grading, except with the approval of Engineer.
   2. Use all means necessary to prevent the erosion of freshly graded areas during construction and until such time as permanent drainage and erosion control measures have been installed.

D. Topsoil: All graded areas, outside of buildings and driving surfaces, shall receive 4 inches of topsoil.

3.4 EXCESS WATER CONTROL

A. Regulations and Permits: Comply with soil erosion control permits in accordance with Mich. P.A. 451, Part 91 of 1994, the Natural Resource and Environmental Protection Act, and all pertinent rules, laws, and regulations.

B. Unfavorable Weather:
   1. Do not place, spread, or roll any fill material during unfavorable weather conditions.
   2. Do not resume operations until moisture content and fill density are satisfactory to Engineer or independent testing laboratory.

C. Pumping and Drainage:
   1. Provide, maintain, and use at all times during construction adequate means and devices to promptly remove and dispose of all water from every source entering the excavations or other parts of the Work.
   2. Dewater by means which will ensure dry excavations, preserve final lines and grades, and do not disturb or displace adjacent soil. Use wells, portable pumps, temporary underdrains or other methods as is necessary.
   3. Perform Pumping and Drainage:
      a. In such a manner to cause no damage to property or structures and without interference to the rights of the public, owners of private property, pedestrians, vehicular traffic, or the work of other contractors.
      b. In accordance with all pertinent laws, rules, ordinances and regulations.
   4. Do not overload or obstruct existing drainage facilities.
   5. Provide berms or channels to prevent flooding of subgrade. Promptly remove all water collected in depressions.

3.5 DISPOSAL OF EXCESS EXCAVATED MATERIAL

A. General:
   1. Remove and properly dispose of all excavated material not needed to complete filling and grading.
   2. Dispose of excess excavated material at a location off the Site.
   3. Dispose of excess topsoil at a location off the Site.
   4. Disposal of all materials shall not violate laws, rules, regulations and the like regarding the filling of flood plains, wetlands and other environmentally sensitive areas.
   5. Provide adequate controls to maintain disposal sites in a neat and safe conditions by periodic leveling of material and such other practices as are necessary.
   6. Provide all soil erosion control measures necessary to prevent soil erosion and sedimentation of wetlands, rivers, ditches, or similar low lying areas.

3.6 CLEANUP

A. Upon completion of the work of this Section, remove all excess excavated material, trash, and debris resulting from construction operations. Remove equipment and tools. Leave the Site in a neat and orderly condition acceptable to Engineer, and in accordance with Division 01 Section “Cleaning and Waste Management.”

END OF SECTION 31 22 00

SECTION 31 23 03 – EXCAVATION AND FILL FOR UTILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the furnishing and installation of the major items listed below:
   1. Excavation and trenching in earth and in rock.
   2. Disposal of items from clearing and unsuitable or excess excavated materials.
   3. Complete drainage of excavations.
   4. Temporary or permanent sheeting, bracing and shoring of excavations.
   5. Installation of normal and special foundations, bedding and backfill materials.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. ASTM Standard Specifications:
      a. D1556 - Density and Unit Weight of Soil In Place by the Sand-Cone Method.
      b. D1557 - Laboratory Compaction Characteristics of Soil Using Modified Effort.
      c. D2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
      d. D2922 - Density of Soil and Soil-Aggregate in Place by Nuclear Methods.
   2. State DOT Current Standards: Specifications for Construction.

1.4 DEFINITIONS

A. Terms:
   1. Bedding: The material placed around a utility between 4 inches below to 12 inches above the utility the full width of the trench.
   2. Driving Surface: A pavement, curb, or sidewalk.
   3. Excavation:
      a. Removing the following materials from their present location:
         1) Native below-grade material such as soil, rocks, boulders less than 1/2 cubic yard in volume, and buried trees.
         2) Man-made items such as, but not necessarily limited to:
            a) Bituminous and concrete paving.
            b) Curbs.
            c) Riprap.
            d) Head walls.
            e) Underground utilities.
            f) Manholes and catch basins.
            g) Foundations.
            h) Sidewalks.
   4. Extra Earth Excavation: Excavation of native material from below the normal trench bottom.
   5. Foundation Material: The material placed in a trench undercut to replace extra earth excavation.
   6. Hardpan:
      a. Cemented soil layers.
      b. Is not hard clay layers that are not cemented.
   7. Imported Material: Soil material which is purchased by Contractor and hauled onto the Site.
   8. Native Material: Soil and other natural earth materials, except rock, which are existing on the Site prior to the start of Work.
   9. Normal Trench Bottom: The surface of the undisturbed native material at an elevation 4 inches below the bottom of the utility.

10. Pavement: Any combination of subbase, base course and concrete, bituminous or aggregate surface course, including shoulders, placed on a subgrade. Includes roadways, parking areas, driveways, and bituminous seal coat.
11. Rock Excavation:
    a. Excavation of igneous, metamorphic or sedimentary rock or hardpan which cannot be excavated without continuous drilling and blasting or continuous use of a ripper or other special equipment.
    b. Excavation of boulders of 1/2 cubic yard or more in volume.
12. Special Foundations:
    a. Specially constructed systems for support of underground utilities such as timber piling, concrete foundations and surcharge techniques.
    b. Extra earth excavation and placing imported or native materials are not special foundations.
13. Structure: A building, retaining wall, tank, footing, slab, or other similar construction.
14. Suitable Material:
    a. Native material excavated from the trench and approved as backfill by Engineer or independent testing laboratory.
    b. Not used under or within 1 on 1 slope of driving surfaces or structures.
    c. Placed between the top of the bedding or trench backfill as indicated on the Drawings and the bottom of the surface restoration.
15. Trench Backfill:
    a. The material placed between the top of bedding and the bottom of suitable material, the surface restoration or driving surface, as indicated on the Drawings.
    b. Used under and within 1 on 1 slope of driving surfaces or structures.
16. Utility Structure: Manhole, catch basin, valve chamber, junction chamber, water main valve, or other similar utility appurtenance.
17. Other Definitions: Other earthwork terms not defined herein or in the Contract Documents shall be as defined in state DOT Standard Specifications for Construction.

1.5 DESIGN AND PERFORMANCE REQUIREMENTS

A. Trench Bottom Suitability:
1. Be responsible for the suitability of the normal trench bottom in supporting the utility, bedding and backfill.
2. Notify Engineer and await Engineer's decision if a possible unsuitable condition exists.
3. Poor dewatering techniques or lack of excess water control shall not be a reason for additional payment for remedial measures.

B. Trench Wall Stability:
1. Be responsible for the trench configuration, including sheeting, shoring and bracing necessary to support trench side walls from collapsing.
2. Be responsible for the structural design and stability of a pipe-laying box if utilized on the Project to prevent trench walls from collapsing.

1.6 QUALITY ASSURANCE

A. Testing: Testing will be performed in accordance with Division 01 Section "Testing Services for Buried Utilities, Roadways, and Site Projects." and the Contractor’s Quality Control Plan.

B. Compaction:
1. Determine density by the modified Proctor method, ASTM D1557.
2. Compact granular trench backfill and bedding to at least 95% maximum density.
3. Compact suitable backfill material to at least 90% maximum density.
4. The first 12 inches of native material at the bottom of utility trenches:
    a. Test for density.
    b. Compact to at least 95% maximum density (modified proctor) if the existing density is below 95% maximum density (MP).
    c. Compact clay soil to at least 98% maximum density in accordance with standard proctor ASTM D698, if below 98% maximum density (SP).

1.7 SUBMITTALS

A. Action Submittals: For imported materials:
   1. Source.
   2. State DOT classification.
   3. Sieve Analysis.

1.8 PROJECT CONDITIONS

A. Dust Control:
   1. Use all legal means necessary to control dust on and near the Work and on and near off-site borrow areas if such dust is caused by Contractor's operations during performance of the Work or if resulting from the condition of the Site when earthwork operations are suspended.
   2. Moisten or otherwise treat haul roads, delivery roads, temporary site access roads and other surfaces as required to prevent dust from being a nuisance to the public, neighbors, and concurrent performance of other work on the Site.
   3. Scrape, broom, or vacuum adjacent streets to remove tracked dirt every Friday afternoon, or more as necessary if directed by Engineer. Utilize vacuum if dust from brooming is excessive in opinion of Engineer.

B. Existing Structures, Utility Structures, and Utilities:
   1. Call MISS DIG to locate existing underground utilities prior to starting excavation.
   2. Where utilities, utility structures or structures are encountered which are in active use:
      a. Provide adequate protection for them.
      b. Be responsible for damage to them.
   3. Provide stand-by utility service if temporary removal is necessary for a period exceeding 2 hours.
   4. Where utility service connections to occupied buildings must be temporarily disconnected, give 48 hours notice to the affected occupants of the time and duration of the anticipated shutoff.
   5. Notify Fire Department 48 hours in advance if water main or fire supply line shutoff is required.
   6. Raise, lower, or move underground utilities, utility structures or structures which interfere with the utility or utility structure being constructed as part of this Work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:
   1. Approval Required: Material shall be subject to the approval of Engineer or independent testing laboratory.
   2. Notification: For approval of imported material, notify Engineer or independent testing laboratory at least 1 week in advance of intention to import material, designate the proposed borrow area, and permit Engineer or independent testing laboratory to sample as necessary from the borrow area for the purpose of making acceptance tests to prove the quality of the material.

B. Material Sources and Uses:
   1. Imported Material:
      a. Foundation material.
      b. Bedding.
      c. Pea stone.
      d. Trench backfill.
   2. Native material unless quantity is not sufficient; then shall be imported material: Suitable material.

C. Foundation Material for Crushed Stone: 1-1/2-inch maximum size.

D. Bedding:
   1. For Pipes Less Than 36 Inches:
      a. MDOT 902 Granular Material Class II modified to 100% passing a 1/2-inch sieve.
      b. MDOT 902 Coarse Aggregate 17A.

2. For Pipes 36 Inches and Larger:
   a. Pea stone bedding to spring line.
   b. Geotextile filter fabric over pea stone.
   c. MDOT Granular Material Class II to 1 foot above pipe.
3. For Utility Structures:
   a. Sand gravel fill of such gradation that 100% will pass a 1/2-inch sieve and not more than 10% by weight is lost by washing, or
   b. MDOT 902 Granular Material Class II modified to 100% passing a 1/2-inch sieve.

E. Pea Stone: Clean stone with 100% passing a 3/8-inch sieve and 100% being retained on a No. 8 sieve.

F. Trench Backfill: MDOT 902 Granular Material Class II.

G. Suitable Material:
1. Native Material Which is Used as Backfill:
   a. Exclusive of gray or blue clay, peat, organic matter, or frozen lumps.
   b. Containing no rocks or lumps over 3 inches in greatest dimension.
   c. Having a moisture content such that material is capable of being compacted to 90% maximum density.
2. MDOT 902 Granular Material Class II if native material is not adequate in opinion of Engineer.

H. Concrete Encasement of Utilities:
1. Only as indicated on the Drawings.
2. MDOT Grade M.

2.2 OTHER MATERIALS

A. Other materials, not specifically described but required for proper completion of the work of this Section, shall be as selected by Contractor subject to the approval of Engineer or independent testing laboratory.

PART 3 - EXECUTION

3.1 GENERAL

A. Excavating, Backfilling and Compacting:
1. For Structures: In accordance with other Division 31 Sections.
2. For Utility Structures: In accordance with this Section.

B. Obstructions:
1. Remove and dispose of buried trees, rocks, boulders, driving surfaces, pipes and the like, as required for the performance of the Work.
2. Exercise care in excavating around catch basins, inlets and manholes.
3. Avoid removing or loosening castings.
4. Repair and replace damaged or displaced castings; remove dirt entering utility structures during the performance of the Work at no additional cost to Owner.

C. Cutting Paved Surfaces and Similar Improvements:
1. Cut pavement prior to excavating.
2. Cuts shall be a minimum of 1-foot wider than trench on each side. When the remaining width of paved surface is less than 4 feet, remove the entire paved surface.
3. Before removing pavement, mark the pavement neatly, paralleling pipe lines and existing street lines. Space the marks the width of the trench.
4. Concrete:
   a. Pavements: Saw cut if over 3 feet from expansion or construction joint, otherwise remove to joint.
   b. Sidewalks: Remove to joints.
   c. Curb and Gutter: Remove to joints.
5. Final Surface Course Bituminous: Saw cut joints unless otherwise approved by Engineer.
6. Do not disturb or damage the adjacent pavement. If the adjacent pavement is disturbed or damaged, remove and replace the damaged pavement.

7. Contractor may tunnel under curbs that are encountered. Replace curb disturbed by construction.
8. Dispose of materials removed.

D. Utilities to be Abandoned:
1. When pipes, conduits, sewers or utility structures are removed from the trench leaving dead ends in the ground, fully plug such ends with brick and mortar.
2. Entirely remove abandoned utility structures unless otherwise specified or indicated on the Drawings.
3. Remove from the excavation materials which can be readily salvaged and store on the Site.
4. Salvageable materials will remain the property of Owner unless otherwise indicated by Owner.

E. Extra Earth Excavation:
1. If soft material, which in the opinion of Engineer or independent testing laboratory is not suitable, is encountered below the normal trench bottom or below a utility structure Engineer may order the removal of this soft material and its replacement with specified material in order to make a suitable foundation for the construction of the utility or utility structure.
2. Extra earth excavation made at the order of Engineer will be paid for on the basis of the actual quantity of material excavated. Do not proceed further until instructions are received and necessary measurements made for purposes of establishing additional volume of excavation.
3. No extra payment will be made if removal is required as a result of poor dewatering techniques.
4. Special foundations shall be determined on an individual basis by Engineer in cooperation with Contractor, unless otherwise provided in the Contract Documents.

3.2 EXCAVATION AND TRENCHING

A. General:
1. By open cut from surface unless designated otherwise.
2. Slope sides of trench adequately for protection of the Work and safety of workers.

B. Maximum Length of Open Trench: 200 feet.

C. Width:
1. Minimum Clearance on Each Side of Utility:
   a. To 16 Inches Diameter: 8 inches.
   b. Greater Than 16 Inches Diameter: Pipe outside diameter times 1.25 plus 12 inches.
2. Maximum Width of Trench at Top of Bedding:
   a. Up Through 30-Inch Diameter Utility: 16 inches plus utility diameter.
   b. Greater Than 30-Inch Diameter Utility: 24 inches plus utility diameter.
3. Maximum Width of Trench at Ground Surface:
   a. Not outside of the property line or easement.
   b. As required for protection of the Work and safety of workers.
   c. Use sheeting, bracing and shoring if required.
4. Provide sufficient space in the trench to permit the joint to be properly made.

D. Depth:
1. Excavate to provide the elevations, grades, and depths of cover indicated on the Drawings and herein specified.
2. The 4 inches of required bedding material below the utility may be omitted if:
   a. Approved by Engineer.
   b. Contractor arranges and pays for testing of the native material.
   c. The native material complies with MDOT 902 Granular Material Class II material, modified so that 100% passes a 1/2-inch sieve.
   d. The material is compacted as specified herein.
3. Excavate to the normal trench bottom elevation with an accuracy of ± 0.10 feet.

E. Rock Excavation:
1. Where rock excavation is encountered within the excavation, expose the surface of the rock sufficient to permit adequate measurements to be taken before the rock excavation is started.
2. Notify Engineer prior to removal if rock is encountered.
3. No utility shall be within 6 inches of rock.

4. Blasting:
    a. Only with permission of Engineer and in accordance with laws and regulations applying thereto.
    b. Secure permit if required.
    c. Notify utility and public agencies.
    d. Explosives shall be used with extreme care by experienced workers only.
    e. Hours shall be fixed by Engineer.
    f. Contractor solely responsible for safety, damage and control of blasting operations.

F. Bedding:
1. Place the bedding material up to 1/8 the height of the utility. Compact as herein specified.
2. Accurately shape the bedding material to fit the pipe shape. Recess the bedding to relieve the pressure on the bell or other projecting utility joint.
3. After laying out the utility, tamp additional bedding in place up to the midpoint of the utility. Use hand-operated compactors to achieve the required compaction.
4. Place additional bedding up to 12 inches above the top of the utility. Use hand operated compactors to achieve required compaction.
5. Place bedding in maximum lifts of 10 inches.
6. No payment shall be made for aggregate or stone bedding when used for Contractor convenience.
7. Provide concrete encasement at utilities so indicated on the Drawings.

G. Trench Backfill:
1. Use backfill material as each Drawing detail indicates and as the material is defined herein.
2. Place backfill in 12-inch lifts and compact as herein specified. Engineer will consider greater lifts if testing indicates that the required compaction is being achieved.

H. Utility Structures:
1. Place and compact specified bedding below utility structures.
2. Backfill around utility structures shall be of the same type backfill as that required for the trench in accordance with these Contract Documents.
3. Place backfill in 12-inch lifts and compact as herein specified.

3.3 DISPOSAL OF EXCESS EXCAVATED MATERIAL

A. General: Contractor responsibility and expense.

B. Disposal Sites:
1. Material desired by Owner shall be disposed of by Contractor in the following priority order:
    a. At locations designated by the Contract Documents.
    b. At locations on or within 2 miles of the Project Site designated by Owner after construction starts.
    c. At locations on the Project Site by written arrangement with individual property owners.
    d. Owner may choose not to accept certain materials, including but not necessarily limited to, items from clearing, muck, peat, marl and whole or broken man-made items removed by construction.
2. Material not desired by Owner shall be disposed of in a location determined by Contractor.
3. Disposal of materials shall not violate laws, rules, regulations and the like regarding the filling of flood plains, wetlands and other environmentally sensitive areas.
4. Provide adequate controls to maintain disposal sites in a neat and safe condition by periodic leveling of material, and such other practices as are necessary.
5. Provide soil erosion control measures necessary to prevent soil erosion and sedimentation of wetlands, rivers, ditches, or similar low lying areas.

3.4 EXCESS WATER CONTROL

A. Regulations and Permits: Comply with soil erosion control permit in accordance with Mich. P.A. 451, Part 91 of 1994, the Natural Resource and Environmental Protection Act, and all pertinent rules, laws, and regulations.

B. Unfavorable Weather:
1. Do not place, spread or roll fill material during unfavorable weather conditions.
2. Do not resume operations until moisture content and fill density are satisfactory to Engineer or independent testing laboratory.

C. Pumping and Drainage:
   1. Provide, maintain and use at all times during construction adequate means and devices to promptly remove and dispose of water from every source entering the excavations or other parts of the Work.
   2. Dewater by means which will ensure dry excavations, preserve final lines and grades, and do not disturb or displace adjacent soil. Use wells, portable pumps, temporary underdrains, or other methods as necessary.
   3. Perform Pumping and Drainage:
      a. In such a manner to cause no damage to property or structures and without interference to the rights of the public, owners of private property, pedestrians, vehicular traffic, or the work of other contractors.
      b. In accordance with pertinent laws, rules, ordinances, and regulations.
   4. Do not overload or obstruct existing drainage facilities.

D. General:
   1. Keep excavations dry during construction.
   2. Remove water by use of wells, well points, portable pumps, bailing, drains, underdrains or other acceptable methods.
   3. Provide crushed stone or gravel as required to aid dewatering operations.
   4. Divert or temporarily reroute existing sewers and drainage of discharge lines to adequate and acceptable outlets during construction. Contractor responsible to ascertain availability of outlets.
   5. Divert surface water from entering excavations by construction and maintenance of channels or berms.
   6. Sediment traps and other soil erosion control measures shall prevent soil particles from entering any sewer, watercourse or similar conveyance.
   7. Protect utilities, utility structures, and structures, existing and new, from hydrostatic uplift.

3.5 SHEETING, SHORING AND BRACING EXCAVATIONS

A. General:
   1. Furnish, put in place and maintain sheeting, bracing and shoring as may be required to properly support the sides of excavations and to prevent movement of earth which could in any way injure the Work or adjacent property.
   2. Exercise care in the removal of sheeting, shoring, bracing and timbering to prevent collapse or caving of the excavation faces being supported and damage to the Work and adjacent property.
   3. A pipe-laying box may be used in lieu of sheeting.

B. Sheeting:
   1. Do not install by jetting.
   2. Remove as backfilling proceeds, unless ordered left in place by Engineer. Use care to fill and compact voids created by removal, especially below mid-height of utility.
   3. Sheeting Left in Place:
      a. Requires written approval of Engineer.
      b. Cut off minimum of 2 feet below finished grade.

3.6 CLEANUP

A. Upon completion of the work of this Section, remove all excess excavated material, trash, and debris resulting from construction operations. Remove equipment and tools. Leave the Site in a neat and orderly condition acceptable to Engineer, and in accordance with Division 01 Section “Cleaning and Waste Management.”

END OF SECTION 31 23 03

SECTION 31 25 00 – EROSION AND SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the furnishing, installation and maintenance of soil erosion and sedimentation control (SESC) measures.
   1. Minimum SESC measures/Best Management Practices (BMP) are indicated on the Drawings. These measures are to be installed correctly before any grading or excavating begins on the Site. Contractor may add additional BMP's as required by their operations, such as temporary stock piles, equipment storage etc.
   2. Stage Construction and stabilization activities to minimize the amount of disturbed area at any one time.
   3. Remove sediment caused by erosion from storm water before it leaves the Site or enters waters of the state.
   4. Place soil piles away from drainage courses. Soil piles must be protected from precipitation and wind with non-erosive covers or other BMP's.
   5. Provide anti-tracking areas for haul roads and equipment. Sweep streets, parking areas regularly as needed.
   6. Dust control must be implemented on all sites exposed to wind erosion.
   7. Keep copies of permits and inspections on Site at all times.

B. This section also includes requirements for Contractor supplied Certified Storm Water Operator.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. Soil erosion and sedimentation control rules and guidelines of:
      a. State of Michigan R323.2190 National Permit for stormwater discharge from Construction (Michigan's "Permit by Rule").
      b. Michigan Natural Resources and Environmental Protection Act, Part 31 of Act 451 of 1994 Soil Erosion and Sedimentation Control (Water Resources Protection Act).
      c. Part 91, Soil Erosion and Sedimentation Control, of the Natural Resources and Environmental Protection Act (Soil Erosion and Sedimentation Control (SESC).
      d. EGLE Nonpoint Source Best Management Practices Manual.
   2. ASTM Standards:
      a. A974 - Standard Specification for Welded Wire Fabric Gabions and Gabion Mattresses (Metallic-Coated or Polyvinyl Chloride (PVC) Coated).
      b. C33/C33M - Standard Specification for Concrete Aggregates.
      c. D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
      d. D4751 -Standard Test Method for Determining Apparent Opening Size of a Geotextile.
      e. D4992 - Standard Practice for Evaluation of Rock to be Used for Erosion Control.
      f. D5313 - Standard Test Method for the Evaluation of Durability of Rock for Erosion Control Under Wetting and Drying Conditions.
      g. D6092 - Standard Practice for Specifying Standard Sizes of Stone For Erosion Control.
      h. D6459 – Standard Test Method for Determination of Erosion Control Blanket (ECB) Performance in Protecting Hillslopes from Rainfall-Induced Erosion.
      i. D6461, D6462 - Standard Practice for Silt Fence Materials and Installation.
      j. D6599 - Practice for Construction of Live Fascines on Slopes.
      k. D6711 - Practice for Specifying Rock to Fill gabions, Revet Mattresses, and gabion Mattresses.

1.4 SUBMITTAL

A. Action Submittals (Manufacturers information):
   1. Mulch blankets.
   2. Geotextile fabric.
   3. Silt Fence.
   4. Inlet Protection.
   5. Seed mixtures.
   6. Tacking Agents.
   7. Fertilizer.
   8. Turbidity curtain.

B. Informational Submittals:
   1. Name and certification number of certified storm water operator that will be responsible for Site inspections.
   2. Sequence of Construction in sufficient detail as requested by Engineer.

1.5 QUALITY ASSURANCE

A. Performance Standard:
   1. Compliance with the Soil erosion Control Permit (Part 91) and the Michigan Permit by Rule. The SESC measures indicated on the Drawings and specified here in are a minimum requirement. If more SESC measures are required to comply with the permit, notify the Engineer responsible for preparation of the SESC plan for plan amendment. Additional SESC measures required due to the Contractor's operations will not be considered for additional payment.

B. SESC Preconstruction Meeting:
   1. Conduct a field evaluation of the Site with the Engineer, Certified Storm Water Operator, the Local Enforcing Agent, and the Contractor's Superintendent after all initial SESC measures are installed and prior to any excavation work.
   2. This meeting shall be scheduled and organized by the Contractor.
   3. Review the installed SESC measures by walking the Site and confirm compliance to the Permit and the approved SESC Plan.
   4. Review the location for display of the permit.
   5. Review location for SESC inspection log.

C. Stop Work Order:
   1. Owner reserves the right to issue a Stop Work Order if soil erosion and sedimentation controls are not properly installed or maintained.
   2. Work performed under a Stop Work Order will not be considered for payment.
   3. Costs resulting from delay due to issuance of a Stop Work Order shall be the responsibility of Contractor.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in a manner which will prevent deterioration, damage, contamination with foreign matter, damage by weather or elements, and in accordance with manufacturer's directions.

C. Reject damaged, deteriorated or contaminated material and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

PART 2 - PRODUCTS

2.1 SOIL EROSION AND SEDIMENTATION CONTROL MATERIALS

A. Stabilized Construction Entrance:
   1. Stabilize a pad of clean crushed stone located at points where traffic will be accessing a construction site. Minimize construction access points to locations as indicated on the Drawings.

2. Stone Size - Use ASTM C33, size No. 2 (2-1/2-inch to 1-1/2-inch) or 3 (2 inch to 1 inch). Use clean crushed angular stone. Crushed concrete of similar size may be substituted, but will require more frequent upgrading and maintenance.
3. Place on woven geotextile fabric if underlying soils are soft. TerraTex GS, or equal.
4. Thickness: Not less than 6 inches.
5. Width: Not less than full width of points of ingress or egress or a minimum of 20 feet.
6. Length: 50 feet minimum where the soils are course grained (sands or gravels) or 100 feet minimum where soils are fine grained (clays or silts), except where the traveled length is less than 50-feet or 100 feet respectively. These lengths may be increased where field conditions dictate. Stormwater from up-slope areas shall be diverted away from the stabilized pad where the slope of the access road exceeds 5%, a stabilized base of Hot Mix Asphalt Base Course.

B. Temporary Vegetation:

Seed Type	Lower Peninsula (south of US10)*	Lower Peninsula (north of US10)*	Upper Peninsula*	Seeding Rate
Oats, Barley	4/1 to 9/15	4/15 to 8/1	5/1 to 8/1	2 lbs/1,000 sft
Annual Rye	8/1 to 10/15	8/1 to 10/10	8/1 to 11/1	3 lbs/1,000 sft
Wheat	9/20 to 10/15	9/10 to 10/10	9/10 to 10/1	3 lbs/1,000 sft
Buckwheat	6/1 to 7/15	6/1 to 7/15	6/15 to 7/15	2 lbs/1,000 sft
Perennial Ryegrass	8/1 to 10/15	8/1 to 10/1	8/1 to 10/1	1 lbs/1,000 sft
*Seasonal Limitation Dates				

C. Permanent Vegetative Cover:
1. Grade as needed and feasible to permit the use of conventional equipment for seedbed preparation, seeding, mulch application, and mulch anchoring.
2. Immediately prior to seeding and topsoil application, the subsoil shall be evaluated for compaction.
3. Topsoil should be handled only when it is dry enough to work without damaging the soil structure. A uniform application to a depth of 4 inches (unsettled) is required on all sites. Topsoil shall be amended with organic matter, as needed, in accordance with the Standard for Topsoiling.

D. Mulch Blanket:
1. 4H:1V: Straw; North American Green S-75; LANDLOK S1; or equal
2. 3H:1V: Straw; North American Green S-150; LANDLOK S2; or equal.
3. 2H;1V: Straw and Coconut: North American Green SC-150; North American Green P-300, LANDLOK SC2; or equal.
4. 1.5H:1V: Coconut: North American Green C-125; LANDLOK C2; or equal.
5. Anchoring Staples or Pins:
6. Hardwood stakes at least 6 inches long; or
7. North American Green Bio-Stake blanket pins at least 6 inches long;
8. Steel anchoring pins are not allowed without written permission of the Engineer.

E. Hydro-Mulch:
1. Biodegradable, Hydraulic Mulch (HM) composed of 100% recycled cellulose fibers and a tackifier.
2. Terra-Mulch Cellulose with Tacking Agent 3.

F. Tacking Agents:
1. Materials: Polyacrylamide, acrylamide copolymer, hydro-colloid polymers, marker dye.
2. pH Range: 7.0 ±0.2.
3. Surface Tension: 73.9 dynes/cm, based on simulated field application after 5 minutes of mechanical agitation.
4. Viscosity: 102 CPS ±2, Saybolt value, based on 30 pounds per 1,000 gallons of water and 197 CPS ±2, Saybolt value, based on 60 pounds per 1,000 gallons of water, based on simulated field application after 5 minutes of mechanical agitation.
5. University tested to reduce erosion 68.6% and reduce water runoff 21.7% on a 45% slope without having to cure (dry out), effective immediately after hydro-seeding application.
6. Terra-Mulch Tacking Agent 3 by Profile Products LLC.

G. Riprap:
   1. Stone for riprap shall consist of field stone or crushed quarry stone of approximately rectangular shape. The stone shall be hard and angular and of such quality that it will not disintegrate on exposure to water or weathering. The specific gravity of the individual stones shall be at least 2.5.
   2. Recycled rubble concrete may be used provided it has a density of at least 150 pounds per cubic foot.
   3. The riprap shall be composed of a well-graded mixture such that 50% of the mixture by weight shall be larger than the d50 size as determined from the design procedure. A well-graded mixture as used herein is defined as a mixture composed primarily of the larger stone sizes, but with a sufficient mixture of other sizes to fill the progressively-smaller voids between the stones. The diameter of the largest stone size in such a mixture shall be 1.5 times the d50 size. The d75 should be 1.25 times the d50 and the d15 should be 0.5 times the d50 size.

H. Geotextile Fabric for Riprap:
   1. Synthetic Industries, Terra Tex HD, or equal.
   2. Woven, high strength polypropylene.
   3. Grab Tensile Strength: 315 pounds (min) in accordance with ASTM D4632 (min).
   4. Apparent Opening Size: 40 US sieve (max) in accordance with ASTM D4751 (max).
   5. Water Flow Rate: 4 gpm/sft (min) in accordance with ASTM D4491 (min).

I. Silt Guard:
   1. Above Ground Filters:
      a. Frame and Filter Assembly: Silt Saver, Inc.; or equal.
      b. Nonwoven polypropylene filter with needle punched holes.
      c. High density polyethylene frame.
      d. 60-inch frame, high flow filter.
      e. Filter Material: 120 gpm/sft (min).
      f. Apparent Opening Size (AOS): 40 US Std. Sieve.
      g. Tensile Strength (ASTM D4632): 410/300 (min).
   2. Inlet Protection (Catch Basins):
      a. Siltsak; by ACF Environmental, Inlet Pro Sediment Bag High Flow; by Hanes Geo Components; or equal.
      b. Geotextile fabric silt sump.
      c. Grab tensile strength: 250 to 275 pounds in accordance with ASTM D4632 (min).
      d. Zero gallons per minute per square foot (GPM/SF), water flow rate in accordance with ASTM D4491 (min).
      e. Apparent Opening Size (AOS): 40 US Sieve.
      f. Manufactured to meet size of inlet.

J. Dewatering Filter Bags:
   1. Ultratech International, Inc.: Ultra Dewatering Bag, SedCatch dewatering Bag; or equal.
   2. Manufactured with pump pipe connection sized to match pump hose.
   3. Nonwoven Geotextile, Needle Punched Polypropylene, 8 oz/syd (min).
   4. Grab Tensile: 205 pounds in accordance with ASTM D4632 (min).
   5. Flow Rate: 90 gpm/sft in accordance with ASTM D4491 (min).
   6. Apparent Opening Size (AOS): 80 US Sieve.

K. Geotextile Silt Fence:
   1. Synthetic Industries, Terra TexSF-90,
   2. Woven, high strength polypropylene.
   3. Grab Tensile Strength: 124/101 lbs (min) in accordance with ASTM D4632 (min).
   4. Apparent Opening Size (AOS): 30 US sieve (max) in accordance with ASTM D4751 (max).
   5. Water Flow Rate: 10gpm/sft (min) in accordance with ASTM D4491 (min).
   6. Wood Stakes, Hardwood: 1.5-inch x 1.5-inch x 48-inch (min), 6 foot spacing (max) with 3/8-inch thick lath fastening bar.

L. Sediment Logs:
   1. Curlex Sediment Logs by American Excelsior Co, SEDIMAX-SW; or equal.
   2. 9-inch sediment log diameter, 10 or 25 foot length.
   3. 40 GPM/sft in accordance with ASTM D5141.
   4. Inner Core: Great Lakes Aspen excelsior with interlocking barbs.

M. Coir Logs:
   1. Granite Environmental; or equal.
   2. 12-inch coir log diameter, 10 foot length.
   3. Bristle Coir Twine: 2-inch x 2-inch openings.
   4. Inner Core: Mattress Coir.

N. Filtration Logs:
   1. SEDIMAX-FR by Tensar; or equal.
   2. 9-inch log Diameter, 50 foot length.
   3. Inner core: 70% straw (1.2lbs/syd), 30% coconut (0.5 lbs/syd) fiber matrix.
   4. Netting must be constructed from 100% biodegradable woven natural organic fiber netting.

PART 3 - EXECUTION

3.1 GENERAL

A. Standards:
   1. Achieve Effective Erosion Control to prevent erosion of Site slopes and ditches.
   2. Achieve effective control of sedimentation to prevent any offsite discharge or tracking of Site soils.
   3. Maintain soil erosion and sedimentation controls until the Site is stable. Definition of stable site is final concrete and/or asphalt paving is complete, and all turf areas have 80% growth.
   4. Do not remove temporary soil erosion and sedimentation control measures until Site is determined to be stable by the Engineer.
   5. Sweep streets weekly, or more frequently if required, or directed by Engineer.
   6. No water may be discharged off Site which has a turbidity of greater than 200 NTU.

3.2 DUST CONTROL

A. Prevent blowing and movement of dust from exposed soil surfaces, prevent on Site and off Site damage and health hazards and improve traffic safety:
   1. The following methods should be considered for controlling dust.
      a. Watering.
      b. Mulches.
      c. Temporary Vegetative Cover.
      d. Spray-on Adhesives: Keep traffic off these areas.

3.3 CONSTRUCTION ENTRANCE DRIVE

A. Employ water truck and street sweeper as necessary to keep sediment off of on Site and off Site roadways. The entrance must be maintained in a condition which will prevent tracking or flowing of sediment onto roadways. This may require periodic top dressing with additional stone or additional length as conditions demand and repair and/or cleanout of any measures used to trap sediment. All sediment spilled, dropped, washed, or tracked onto roadways (public or private) or other impervious surfaces must be removed immediately.

B. Where accumulation of sediment is inadequately cleaned or removed by conventional methods, a power broom or street sweeper will be required to clean paved or impervious surfaces. All other access points which are not stabilized must be blocked off.

3.4 INLET PROTECTION

A. Install on existing inlets prior to any grading or excavation. Install on new inlets as soon after installation as practical.

B. Inspect frequently, especially after any rain event. Maintain repair, and replace promptly, as needed.

C. Remove barrier only when the area draining toward the inlet has been stabilized.

3.5 SOIL ROUGHENING

A. On all slopes 1:3 or steeper, grade the slope with a dozer taking a vertical path so that the track marks on the slope create a horizontal roughened grooved condition to help prevent erosion of the slope.

3.6 TEMPORARY VEGETATIVE COVER

A. General:
   1. Provide temporary seed if permanent measures will not be placed within 15 days of initial disturbance and area will not undergo further earth change within 15 days of initial disturbance.
   2. Seed: Apply uniformly at a minimum rate of 3 to 5 pounds per 1,000 square feet.
   3. Mulch:
      a. Mulching is required on all seeding. Mulch will protect against erosion before grass is established and will promote faster and earlier establishment. The existence of vegetation sufficient to control soil erosion must be deemed compliance with this mulching requirement.
      b. Straw: Unrotted small grain straw, free of seeds
      c. Application: Spread mulch uniformly by hand or mechanically so that at least 85% of the soil surface is covered. For uniform distribution of hand-spread mulch 75 to 100 pounds per 1,000 square feet. Anchoring must be accomplished immediately after placement to minimize loss by wind or water. This may be done by one of the following methods, depending upon the size of the area, steepness of slopes.
         1) Peg and Twine. Drive 8 to 10 inch wooden pegs to within 2 to 3 inches of the soil surface every 4 feet in all directions. Stakes may be driven before or after applying mulch. Secure mulch to soil surface by stretching twine between pegs in a crisscross and a square pattern. Secure twine around each peg with two or more round turns.
         2) Mulch Nettings: Staple paper, jute, cotton, or plastic nettings to the soil surface. Use a degradable netting in areas to be mowed.
         3) Crimper (mulch anchoring coulter tool): A tractor-drawn implement, somewhat like a disc harrow, especially designed to push or cut some of the broadcast long fiber mulch 3 to 4 inches into the soil so as to anchor it and leave part standing upright. Straw mulch rate must be 3 tons per acre. No tackifying or adhesive agent is required.
         4) Liquid Mulch-Binders (May be used to anchor straw mulch):
            a) Applications should be heavier at edges where wind may catch the mulch, in valleys, and at crests of banks. The remainder of the area should be uniform in appearance.
            b) Organic and Vegetable Based Binders: Naturally occurring, powder-based, hydrophilic materials when mixed with water formulates a gel and when applied to mulch under satisfactory curing conditions will form membraned networks of insoluble polymers. The vegetable gel must be physiologically harmless and not result in a phytotoxic effect or impede growth of turf grass. Use at rates and weather conditions as recommended by the manufacturer to anchor mulch materials.
            c) Synthetic Binders: High polymer synthetic emulsion, miscible with water when diluted and, following application of mulch, drying and curing, shall no longer be soluble or dispersible in water. Binder must be applied at rates recommended by the manufacturer and remain tacky until germination of grass.
            d) Wood-fiber or paper-fiber mulch: must be made from wood, plant fibers or paper containing no growth or germination inhibiting materials, used at the rate of 1,500 pounds per acre (or as recommended by the product manufacturer) and may be applied by a hydroseeder. Mulch must not be mixed in the tank with seed. Use on flatter slopes and during optimum seeding periods in spring and fall.

3.7 PERMANENT VEGETATIVE COVER

A. General:
   1. Seed all disturbed areas within 5 days of final grading.
   2. Apply uniformly at a minimum rate of 3 to 5 pounds per 1,000 square feet.
   3. Mulch as indicated on the Drawings or as needed to effectively control soil erosion.

3.8 MULCH BLANKET

A. Direction of installation, staple patterns and other requirements in accordance with Manufacturer's directions, and Project Drawing detail sheets.

B. Location: Where indicated on the Drawings or as specified.

3.9 HYDRO MULCH

A. Apply in accordance with manufacturer, Application Rate: 2,000 pounds per acre.

3.10 TACKING AGENTS

A. Fiber Mulch Binding:
   1. Flat to 5:1 Slope: 20 pounds per acre.
      a. 4:1 to 3:1 Slope: 30 pounds per acre.
      b. 3:1 to 2:1 Slope: 40 pounds per acre.
      c. Greater than 2:1 Slope: 60 pounds per acre.
   2. Straw Mulch Binding: 30 pounds Tacking Agent III and 150 pounds cellulose fiber per 1,000 gallons of water per acre, or 50 pounds Tacking Agent III per 1,000 gallons of water per acre.

3.11 GEOTEXTILE SILT FENCE

A. Space posts 6 feet center-to-center or closer. Extend at least -12 inches into the ground. Posts shall be constructed of hardwood with a minimum diameter thickness of 1-1/2 inches.

B. Wire Backed silt fence: A metal fence with 6 inch or smaller wire mesh openings and at least 2 feet high may be utilized, fastened to the fence posts, to provide reinforcement and support to the geotextile fabric. Place posts 6 feet on center.

C. Bury geotextile fabric at least 6 inches deep in the ground. Extend The fabric at least 3 feet above the ground. The fabric must be securely fastened to the posts using a system consisting of metal fasteners (nails or staples) and a high strength reinforcement material (nylon webbing, grommets, washers, etc.) placed between the fastener and the geotextile fabric. The fastening system must resist tearing away from the post. Install silt fence in accordance with manufacturer's instructions, and Project Drawing detail sheets.

D. Location: Where indicated on the Drawings or as needed to prevent offsite movement of soil.

3.12 FIBER ROLLS

A. Vertical spacing on slopes:
   1. As indicated on the Drawings, or
   2. 1:1 slopes: 10 feet apart.
   3. 2:1 slopes: 20 feet apart.
   4. 3:1 slopes: 30 feet apart.
   5. 4:1: slopes: 40 feet apart.

3.13 RIPRAP

A. Place no bends or curves at the intersection of the conduit and apron or scour hole will be permitted.

B. There must be no over fall from the end of the apron to the receiving channel.

3.14 DEWATERING

A. If during construction excavated facilities need to be dewatered to facilitate or complete the construction process and the water pumped out of the excavated areas contain sediments, these sediments must be removed prior to discharging to receiving bodies of water. This standard does not address the removal of ground water through well points etc.

B. Pumping system must include adequate sized perforated riser pipes, stone filters and sediment pumping bags to achieve desired results. Place the suction hose from the pump inside the inner pipe to begin dewatering. Place the discharge hose in a stabilized area downslope of unstabilized areas to prevent erosion.

C. Sediment Tank / Silt Control Bags may be used when sediment laden water is pumped to trap and retain the sediment. A sediment tank or a silt control bag is to be used when excavations are deep, and space is limited and where direct discharge of sediment laden water to stream and storm drainage systems is to be avoided.
   1. Locate containers (tanks or bags) for ease of clean-out and disposal of the trapped sediment and to minimize interference with construction activities and pedestrian traffic. Do not place bags directly into receiving waters.
   2. Tank size: The following formula should be used in determining the storage volume of the tank: 1 cubic foot of storage for each gallon per minute of pump discharge capacity. Typical tank configuration is indicated on Standard Detail. Tanks may be connected in series to increase effectiveness.

3.15 BUILDING PROJECT CONSTRUCTION

A. During construction conform to the following general rules:
   1. Minimize the amount of earth disturbed at any one time.
   2. Establish a construction sequence which includes adequate erosion control.
   3. As much as practical, direct stormwater away from the construction area. Direct diverted stormwater to a stable on-Site area.
   4. Collect runoff from the Site in sediment basins, traps or through filters.
   5. Establish an inspection and maintenance schedule, paying special attention to the beginning of the various stages of construction.

3.16 AIRBORNE SEDIMENT

A. Dust Control:
   1. Use legal means necessary to control dust on and near the Work and on and near off Site borrow areas if such dust is caused by Contractor's operations during performance of the Work or if resulting from the condition of the Site when earthwork operations are suspended.
   2. Treat haul roads, delivery roads, temporary Site access roads and other surfaces as required to prevent dust from being a nuisance to the public, neighbors, and concurrent performance of other work on the Site, and as directed by Engineer.
   3. Periodically scrape and broom adjacent streets and paved areas to remove tracked dirt.

B. Wind Erosion:
   1. Erect and maintain barriers to prevent migration of windblown sediment offsite.
   2. Conduct operations in such a manner as to minimize the amount of Site area exposed to wind erosion.
   3. Be responsible for removal of windblown sediments deposited off Site, including costs for cleaning or repairs required due to sediment deposition and removal.

END OF SECTION 31 25 00

SECTION 32 11 23 – AGGREGATE BASE COURSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes furnishing and installation of the major items listed below:
   1. Base course.
   2. Subbase.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the Work of this Section shall comply with the following:
   1. ASTM Standard Test Methods:
      a. D1556 - Density and Unit Weight of Soil In Place by the Sand-Cone Method.
      b. D1557 - Laboratory Compaction Characteristics of Soil Using Modified Effort.
      c. D2922 - Density of Soil and Soil-Aggregate In Place by Nuclear Methods.
   2. State DOT Current Standards: Specifications for Construction.

1.4 DEFINITIONS

A. Terms:
   1. Base Course: The layer of specified material of designed thickness placed on a subbase or a subgrade to support a surface course.
   2. Pavement Structure: Combination of subbase, base course, and surface course, including shoulders, placed on a subgrade.
   3. Plan Grade: Vertical control grade indicated on the Drawings.
   4. Roadbed: The portion of the roadway between the outside edges of finished shoulders, or the outside edges of berms back of curbs or gutters, when constructed.
   5. Roadside: The portion of the right-of-way outside of the roadway.
   6. Roadway: The portion of the right-of-way required for construction, limited by the outside edges of slopes and including ditches, channels, and all structures pertaining to the Work.
   7. Shoulder: The portion of the roadway contiguous with the traveled way for accommodation of stopped vehicles, for emergency use, and for lateral support of base and surface courses.
   8. Subbase: The layer of specified material of designed thickness placed on the subgrade as a part of the pavement structure.
   9. Subgrade: The portion of the earth grade upon which the pavement is to be placed.

1.5 SUBMITTALS

A. Action Submittals: For aggregate:
   1. Source.
   2. MDOT classification.
   3. Sieve analysis.

1.6 QUALITY ASSURANCE

A. Testing of Aggregate Materials: In accordance with Division 01 Section " Testing Services for Buried Utilities, Roadways, and Site Projects."

B. Compaction:
   1. Determine density by the modified Proctor method, ASTM D1557.
   2. Compact subbase and base course to at least 98% maximum density at a moisture content not greater than optimum.

1.7 PROJECT CONDITIONS

A. Dust Control:
   1. Use all legal means necessary to control dust on and near the Work and on and near off-site borrow areas if such dust is caused by Contractor's operations during performance of the Work or if resulting from the condition of the Site when earthwork operations are suspended.
   2. Moisten or otherwise treat haul roads, delivery roads, temporary Site access roads and other surfaces as required to prevent dust from being a nuisance to the public, neighbors, and concurrent performance of other work on the Site.

B. Existing Utility Structures:
   1. Where utility structures are encountered which are in active use:
      a. Provide adequate protection.
      b. Be responsible for damage.
   2. Adjust utility structures to meet plan grade.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:
   1. Approval Required: Material shall be subject to the approval of independent testing laboratory.
   2. Notification: For approval of materials, notify independent testing laboratory at least 1 week in advance of intention to import material, designate the proposed stockpile area, and permit independent testing laboratory to sample as necessary from the stockpile area for the purpose of making acceptance tests to prove the quality of the material.

B. Subgrade: In accordance with Division 31 Section “Grading.”

C. Material Source: Imported Material:
   1. Subbase.
   2. Base course.

D. Subbase:
   1. MDOT 902, Granular Material Class II.
   2. Thickness compacted in place: 12 inches.

E. Aggregate Base Course:
   1. MDOT 902, Dense Graded Aggregate 21AA.
   2. Thickness Compacted in Place: 8 inches.

PART 3 - EXECUTION

3.1 PREPARATION

A. Subgrade:
   1. Prepared in accordance with Division 31 Section “Grading.”
   2. Maintain in a smooth and compacted condition until the subbase or base course has been placed.
   3. Proof roll subgrade prior to placing subbase or base course.
   4. No base course shall be placed on the subgrade until it has been approved by Engineer.

3.2 INSTALLATION

A. Subbase:
1. Smooth, spread and compact.
2. Place in one layer, provided that the depth of the compacted layer does not exceed 15 inches.
3. Where the specified depth of subbase is more than 15 inches, place material in layers of approximately equal thickness.
4. Construct to the grade and cross section as indicated on the Drawings.
5. Should the subgrade at any time prior to or during the placing of subbase become soft or unstable to the extent that rutting occurs in the subgrade or to the extent that subgrade material is forced up into the subbase materials, the operation of hauling and placing subbase shall be immediately discontinued. Where subgrade material has become mixed with the subbase material, the mixed material shall be removed and disposed of. After the subgrade has been corrected to the specified condition, new subbase material shall be placed and compacted as specified above.
6. Shape to specified crown and grade within a tolerance of plus 1-inch and maintain in smooth condition.
7. Do not place on a frozen, soft, unstable or rutted subgrade.
8. Remove, dispose of and replace subbase material, at Contractor's expense, if it becomes mixed with subgrade material.
9. Proof roll subbase prior to installation of base course.

B. Base Course:
1. Do not place aggregate base on frozen, soft, unstable or rutted subgrade, subbase, or aggregate base.
2. Additives may be used to ease compaction, shaping, and maintenance of the aggregate surface.
3. Do not rut or distort the subbase material or aggregate base during spreading.
4. Place in uniform layers to such a depth that when compacted, the course will have the thickness indicated on the Drawings.
5. The compacted depth of each layer shall not be more than 6 inches nor less than 3 inches.
6. Compact each layer of aggregate.
7. Place aggregate shoulder material in conjunction with the top layer of aggregate base material.
8. Shape to the crown and grade within a tolerance of ± 0.05 feet unless otherwise specified. The surface of each spreading operation shall be continuously maintained in a smooth condition.
9. Roll the shaped surface, when required, to provide thorough compaction.
10. Where the existing surface is very irregular, the use of a scarifier may be required. Wetting may be required to facilitate shaping the surface and to assist in providing compaction.
11. Remove, dispose of and replace aggregate base material, at the Contractor's expense, if it becomes mixed with the subbase or subgrade material.
12. Final shaping and compacting shall be accomplished by use of a subgrade machine operating on crawler tracks, or by the use of a maintainer or surface planer, with a rigid frame.
13. If the subgrade, subbase, or aggregate base is damaged due to the Contractor's operations or by traffic, restore to the specified condition at Contractor's expense.

END OF SECTION 32 11 23

SECTION 32 12 16 – ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the furnishing and installation of the Hot Mix Asphalt (HMA) base course, HMA leveling course, and HMA surface course.

1.3 REFERENCES

A. Comply with standards in effect as of the date of the Contract Documents except for those having different revision dates as referenced in the codes or as indicated on the Drawings.

B. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. ASTM - Current Standards:
      a. D977 - Standard Specification for Emulsified Asphalt.
      b. D979 – Sampling Bituminous Paving Mixtures.
      c. D1188 - Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens.
      d. D2041 – Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixture
      e. D2950 - Test Method for Density of Bituminous Concrete in Place by Nuclear Method.
      f. D2995 - Estimating Application Rate of Bituminous Distributors.
   2. Asphalt Institute (AI):
      a. MS-2 Mix Design Methods.
      b. SP-1 Performance Grade Asphalt Binder Specification and Testing.
      c. IS-210 Procedures for Improving the Precision of HMA Volumetric Calculations.
   3. AASHTO – Current Standards:
      a. M 323 Standard Specification for Superpave Volumetric Mix Design.
      b. MP-1 Superpave Performance-Graded Binder Specification.
      c. MP-15 Use of Recycled Asphalt Shingles as an Additive in HMA Mixtures.
      d. PP-53 Design Considerations When Using Recycled Asphalt Shingles in New HMA Mixtures.
      e. T 245 – Resistance to Plastic Flow of Bituminous Mixtures using a Marshall Apparatus.
      f. T 283 - Moisture Susceptibility of Asphaltic Concrete Mixtures.
      g. T 304 - Uncompacted Void Content of Fine Aggregate, Method A.
      h. T 312: Preparing and Determining the Density of Hot-Mix Asphalt Specimens by Means of the Superpave Gyratory Compactor.
   4. United States Department of Transportation - Federal Highway Administration:
      a. Manual on Uniform Traffic Control Devices (MUTCD).
   5. State DOT Current Standards:
      a. Standard Specifications for Construction.
      b. Standard Plans.
      c. Design Pavement Guidelines
      d. Manual on Uniform Traffic Control Devices.

1.4 SUBMITTALS

A. HMA Mix Design:
   1. Job Mix Formula (JMF) previously approved by state DOT.
      a. Michigan DOT Form 1931
      b. Other States: Submit state DOT form indicating preapproved DOT mix design and required documentation.

2. Job Mix Formula (JMF) not previously approved by state DOT:
   a. Michigan: MDOT 1855 mod form or Form 1911 with regression table.
   b. Other States: Submit DOT or other suitable bituminous mix design communication with all required information to evaluate mix design in accordance with current standards
3. Aggregates:
   a. Source, type, gradation and other required information to evaluate aggregates in accordance with current standards.
   b. Certification that aggregates used in HMA mix meet DOT specifications.

B. Quality Assurance/Control Submittals: Contractor's Quality Control Plan for projects with more than 1,500 tons or greater than 1 day paving

C. Provide a detailed schedule for construction.

1.5 QUALITY ASSURANCE

A. Pre-Paving Meeting:
1. Required for projects greater than 1,500 tons or more than 1 day paving;
2. Optional for projects less than 1,500 tons or 1 day paving.
3. Meeting held at a time mutually agreed upon with Engineer, Owner (optional), Contractor and subcontractors involved in the paving work.
4. Discussion of proposed schedule and methods of accomplishing all phases of the paving work.
5. Minutes distributed to all in attendance.

B. Installation Personnel Qualifications:
1. Trained and experienced in the fabrication and installation of the materials and equipment.
2. Knowledgeable of the design.

C. Testing of HMA Materials:
1. In accordance with Division 01 Section "Testing Services for Buried Utilities, Roadways, and Site Projects."
2. In accordance with approved Contractor's Quality Control Plan.
3. In accordance with all applicable standards.

D. Weight Slips: Furnish weight slips to Engineer, or engineer's representative for material incorporated in the Project to verify that the required tonnage has been applied.

1.6 DELIVERY, STORAGE AND HANDLING

A. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation.

B. Reject damaged, deteriorated or contaminated material and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Reclaimed Asphaltic Materials (RAM):
1. Reclaimed Asphalt Pavement (RAP) and/or Fractionated Reclaimed Asphalt Pavement (FRAP) as percent of total weight of the mixture:
   a. HMA Base: Maximum 35%. State DOT blending requirements; AASHTO M323.
   b. HMA Binder/Leveling: Maximum 25%. Use virgin binder one grade softer, for both high and low temperature, than specified if RAP greater than 20%.
   c. HMA Surface: Maximum 20%. No change in binder selection.
   d. HMA Mixtures With Polymer Asphalt: Maximum 10%.
   e. Greater than 25% RAP/FRAP or Combination: Use virgin asphalt binder grade in accordance with State DOT blending requirements and AASHTO M 323.

2. Reclaimed Asphalt Shingles (RAS):
    a. In accordance with State DOT requirements.
    b. May replace up to 5% of RAP/FRAP component in HMA mixture.
    c. Maximum Particle size = 1/2 inch.
    d. Maximum deleterious materials = 1.5%
3. Bond Coat: SS-1h, CSS-1h.
4. Terminal Drive:
    a. Base Course:
        1) HMA Mixture: MDOT 3C.
        2) Asphalt Cement PG: PG 64-28.
    b. Leveling Course:
        1) HMA Mixtures: MDOT 4EML.
        2) Asphalt Cement PG: PG 64-28.
        3) Air voids modified to 3% using regression for light traffic applications.
    c. Top Course:
        1) HMA Mixtures: MDOT 5EML.
        2) Asphalt Cement PG: PG 64-28.
        3) Air voids modified to 3% using regression for light traffic applications.

2.2 EQUIPMENT

A. Pavers:
1. Provide an approved self-powered machine capable of spreading and finishing the bituminous mixture to the cross section and grade as indicated on the Drawings.
    a. Supporting wheels, treads, or other devices that ride on the prepared base.
    b. Screeds the full width of the bituminous mixture being applied using an oscillating or vibrating screed.
    c. Equipped with a hopper and an automatic material-depth control device so that each distributing auger and corresponding feeder responds automatically to provide for a constant level of mix ahead of the screed unit to the full width being paved.
2. Provide paver with approved automatic screed control:
    a. System of sensor-operated devices, which follow reference lines or surfaces on one or both sides of the paver.
    b. Adjust speed of the paver to produce the best results.
3. When approved extensions are added to the main screed, provide with the same vibrating screed or tamper action as the main unit of the paver, except for paving variable width areas.
    a. Equip the extensions with a continuation of the automatically controlled spreading augers to within 18 inches of the outside edge of the extension, or as directed.
    b. Provide the main screed and any extensions with an approved method of heat distribution and retention.
4. For Shoulders and Widening:
    a. A self-propelled mechanical spreader capable of maintaining the proper width, depth, and slope without causing segregation of the material.
    b. For base courses up to 10-1/2 feet in width and for leveling and top courses up to 8 feet in width.

B. Rollers:
1. Provide rollers and maintain rolling patterns to achieve required densities to produce a neat, tightly bonded joint that meets surface tolerances
2. Steel-Wheeled Rollers:
    a. Self-propelled, vibratory or static, tandem rollers; or self-propelled static 3-wheeled rollers.
    b. Vibratory Rollers:
        1) Capable of reversing without backlash and equipped with spray attachment for moistening all rollers and scrapers.
        2) Frequency of at least 2,400 vpm and amplitude setting low.
        3) Equipped with a shutoff to deactivate the vibrators when roller speed is less than 0.5 mph and provision to lock in the manufacturer’s recommended speed.
3. Pneumatic-Tired Rollers:
    a. Self-propelled type with a total weight, including ballast, not less than 8 tons nor greater than 30 tons.

b. Equipped with a minimum of 7 wheels situated on the axles in such a way that the rear group of tires will not follow in the tracks of the forward group, but will be so spaced that a minimum tire path overlap of 1/2-inch is obtained.
c. Smooth tires capable of being inflated to the pressure recommended by the Manufacturer of the roller or as directed.
d. Tire Pressures: Maximum variation 5 psi.

PART 3 - EXECUTION

3.1 PREPARATION

A. Test subgrade, subbase or aggregate base for density.
1. Rework surfaces that have become too wet or dry to provide the required density. Do not pave on wet or saturated aggregates.
2. Required Density: Minimum 95% of Maximum Density ASTM D1557.

B. Proof or Test Rolling:
1. Field test the uniformity and stability of the subgrade and subbase.
2. Loaded dump truck or other approved equipment over entire area in each of 2 perpendicular directions.
3. Areas indicated or as designated by Engineer or field representative.
4. In presence of Engineer or field representative.
5. Repair/undercut unstable or yielding areas as directed.

C. Fine Grading:
1. Immediately prior to placing paving materials, test the subgrade or aggregate base course for conformity to the elevations and cross-section as indicated on the Drawings.
2. Fine grade as necessary to bring base course into conformance with the proper elevation and cross-section.
3. Compact areas which have been re-graded to minimum 95% Maximum Density ASTM D1557.

D. Do not place HMA material until the surface to be paved upon has been inspected and approved by Engineer.

E. Immediately before placing the bituminous material, remove excess loose material remaining on the surface.

3.2 INSTALLATION

A. Weather and Seasonal Limitations:
1. As required by DOT Construction Specifications.
2. Do not schedule paving if local radar shows rain in forecast, unless paving can be completed prior to rain event.

B. Transportation of Mixtures
1. Use trucks that have tight, clean, smooth metal beds from which the entire quantity of the mixture is discharged smoothly into the spreading equipment.
2. Maintain temperature of the mixture discharge from the hauling unit at the target placement temperature or as directed.
a. Acceptance Range for HMA at Point of Discharge:
1) Minimum 250 degrees F to maximum 350 degrees F.
2) HMA mixes less than 250 degrees F or greater than 350 degrees F at point of discharge:
a) Do not place mix unless approved by Engineer.
b) Remove mix from Site and dispose off Site unless approved by Engineer.
c) No additional cost to project.
b. If transporting at prevailing temperature below 50 degrees F or when haul times exceed 30 minutes, insulate truck beds and ensure all covers are fastened.
3. Apply approved release agent to hauling unit to prevent adhesion of the mixture to the bed surface.

C. Placement of the Mixture:
   1. To the fullest extent practicable, spread all mixtures with an asphalt paver.
      a. In areas inaccessible to a paver, mixtures may be spread with a motor grader or mechanical device approved by the Engineer.
      b. Complete placement of each course over the full width of the section under construction on each day's run unless otherwise directed by the Engineer.
   2. Provide a uniformly finished surface at all times, free from tearing or other blemishes that would require hand work.
   3. Spread all mixtures without segregation to the cross sections indicated on the Drawings.
   4. When paving ramps or shoulders, or when the grade of a concrete gutter or other existing installation must be met, use the automatic grade reference and slope control devices as directed.
   5. Whenever a breakdown or malfunction of the automatic controls occurs, operate the equipment manually for the remainder of the normal working day, provided this method of operation will produce results as required.
   6. Coordinate the spreading of the mixture with the required roller coverage, considering the rate of cooling of the mixture as affected by lift thickness and environmental conditions.
   7. Coordinate the work such that at the completion of each day's paving operations, all lanes will have been resurfaced to within 1 load of the same point-of-ending.

D. Placing Bituminous Leveling and Top Course Mixtures:
   1. Place HMA in lifts not to exceed the maximum application rates as recommended by State DOT for the mixture specified.
   2. Place the HMA mixture by an approved self-propelled mechanical paver to such a depth that when compacted, it will have the thickness specified or as directed.
   3. Adjust the paver to that speed which gives the best results for the type of paver being used and which coordinates satisfactorily with the rate of delivery of the mixture to the paver to provide a uniform rate of placing the mixture without intermittent operation of the paver.
   4. When delays result in slowing paving operations such that the temperature of the mat immediately behind the screed falls below 200 degrees F:
      a. Stop paving and place a transverse construction joint.
      b. If the temperature of the mat falls below 190 degrees F prior to any rolling - remove and replace the mat at Contractor's expense.
   5. Place the HMA mixture to the required cross section and as indicated on the Drawings.
   6. Whenever the temperature of the previously placed mat falls below 170 degrees F prior to placement of the adjacent mat:
      a. Tack coat the vertical edges of the initial mat with bituminous bond coat material before the mixture is placed on the adjacent section.
      b. In placing the mixture adjacent to joints, and rake or broom to provide a dense smooth connection.
   7. Connections with existing surfaces at the beginning and ending of resurfacing sections and at intersections.
      a. Construct by feathering out the mix at the rate of approximately 1-inch per 25 feet, unless butt joints are used.
      b. After compaction has been completed, spray the first 3 feet of the joint and 1-foot of area not surfaced with bituminous bond coat, sanded, and rolled.
      c. This work shall be accomplished within the concurrent construction season.
   8. If the lanes are being constructed with 2 or more pavers in echelon, match the loose depth of bituminous mixture from each paver at the longitudinal joints.
   9. Thickness: In place compacted thickness tested in accordance with ASTM D3549.
      a. Thickness must be within 1/4-inch of specified thickness during both leveling and top course paving.
   10. Smoothness requirements: After final rolling, the surface may be tested longitudinally by Engineer using a 10-foot straightedge at selected locations. The variation of the surface from the testing edge for the straightedge between any 2 contacts with the surface shall at no point exceed the following limits:
      a. For HMA Base Course Mixtures:
         1) For Lower Courses: 3/4-inch.
         2) For Top Course: 3/8-inch.
      b. For HMA Leveling and Top Course Mixtures:
         1) Multiple Course Construction: 1/8-inch for top course, 1/4-inch for lower courses.
         2) Single Course Construction: 1/4-inch.
      c. Pavement at castings and valve boxes must be flush or a maximum of 1/4-inch higher than casting. In no case shall casting be higher than pavement.

d. Any bird bath remaining after 24 hours after a rain event is unacceptable and subject to Engineers direction for remediation. Possible repairs might include saw cut and removal or reheating and rolling pavement to eliminate bird bath.

11. Correct variations in excess of the specified tolerance as directed. Remove and replace pavement as directed by Engineer.
12. Weighing Loads: Each load of bituminous mixture accepted by Engineer shall be weighed to the nearest 20 pounds on an approved scale having an automatic print-out system.
13. Weather and Seasonal Limitations:
    a. Do not place HMA or apply tack/bond coat when precipitation is imminent or when surface moisture will prevent satisfactory curing.
    b. Unless otherwise approved by Engineer in writing, temperature requirements for placing HMA mixtures will be in accordance with the table below.
    c. HMA paving will not be allowed below minimum temperatures in table or when there is frost on or in the grade or on the existing surface.

Target Placement Temperatures			
Temperature of the Surface Being Overlaid	Rate of Application of Bituminous Material (lbs/square yard)		
	<120	120 to 200	> 200
35 to 39			330 degrees F
40 to 49		330 degrees F	315 degrees F
50 to 59	330 degrees F	315 degrees F	300 degrees F
60 to 69	315 degrees F	300 degrees F	285 degrees F
70 to 79	300 degrees F	285 degrees F	270 degrees F
80 to 89	285 degrees F	270 degrees F	270 degrees F
90 and over	270 degrees F	270 degrees F	270 degrees F

E. Rolling:
1. Compact each layer of HMA to the required density, free of all roller marks.
2. Begin rolling of the HMA mixture as soon after placing as it will bear the roller without undue displacement, picking up the mat, or cracking.
    a. Roll longitudinally at the extreme sides of the lanes and proceed toward the center of the pavement, overlapping on successive trips by at least half the width of the drive wheel of the roller.
    b. Complete alternate passes of the roller using slightly different lengths.
3. Complete the required roller coverage during the period of time in which the temperature of the mixture is sufficient for the roller coverage to be effective in compaction of the mixture.
4. Use tandem steel-wheeled rollers for the final rolling operation on each layer of HMA.
5. Keep surface of steel rollers completely moist with water when rolling.
6. Operate vibratory rollers in the static mode when used for finish rolling or pinching the joint.
7. In Areas Inaccessible to Rollers:
    a. Thoroughly compact the mixture with hot, hand tampers or with mechanical tampers.
    b. Trench rollers or rollers filled with compression strips may be used in depressed areas.

F. Bond or Tack Coat:
1. Clean contact surfaces of sand, dirt, or other objectionable material before applying bond coat.
2. Apply to existing bituminous material and to the vertical edge of the adjacent pavement or curb and gutter, prior to applying new bituminous when:
    a. Paving over milled surface.
    b. Paving over old pavement.
    c. Paving over new pavement.
    d. Adjacent pavement face that is below 170 degrees F.

3. Distributor Vehicle:
   a. Use identical overlapping nozzle spray pattern.
   b. Maintain temperature and pressure that result in a constant uniform application rate.
   c. Provide means for determination of the volume of tack applied to a surface area.
4. Apply tack coat to vertical surfaces and provide uniform application.
5. Application Rate:
   a. 0.05 to 0.1 gallons per square yard for paved surfaces.
   b. Increase application rate 20 to 30% for milled or very rough surfaces.
   c. Increase application rate 50% for vertical edge of adjacent pavement or structure.
   d. Calculate yield by dividing gallons used by square yards covered.
6. Prevent bond or tack coat from coming into contact with structures near the areas to be paved.
7. Allow emulsified asphalt tack coat to break, as indicated by color change from brown to black before HMA paving is placed.
8. Do not place tack coat if local radar shows rain in forecast, unless paving can be completed prior to rain event.

G. Acceptance Density Range:
   1. Low Volume Roads/Parking Lots:
      a. Acceptable Range: 93 to 97% of the TMD.
      b. Average Daily Density: ≥ 94%.
   2. Medium/Heavy Volume Roads:
      a. Acceptable Range: 92 to 96% of the TMD.
      b. Average Daily Density: ≥ 93%.
   3. For smaller projects, the engineer may elect to accept the project without density testing:
      a. Compact all patching, widening, wedging, base, leveling and surface layers of asphalt paving until no further consolidation is visible under the action of the compacting equipment and roller marks are eliminated.
      b. Use two or more rollers per paver if placing more than approximately 165 tons of mixture per hour.
      c. Basis of Acceptance: Engineer's visual examination.

H. Construction Joints:
   1. Thoroughly compact all joints to produce a neat, tightly bonded joint that meets surface tolerances and density requirements.
   2. Transverse Joints:
      a. Construct when mixture placement operations are suspended.
      b. Thoroughly compact the forward end by rolling before the mixture has cooled.
      c. When work is resumed, vertically cut the end for full depth of the layer unless a formed edge is constructed as approved by the Engineer.
      d. When road must remain open to traffic construct temporary taper before allowing traffic on new surface:
         1) Cut vertical joint and remove excess HMA.
         2) Place burlap, canvas or paper as a bond breaker ahead of and against the vertical face.
         3) Place HMA against the bond breaker and taper from new mat to existing surface.
         4) Extend temporary taper 5 feet for each inch of mat thickness or as directed by Engineer.
         5) Thoroughly compact and cool the temporary taper.
   3. Longitudinal Joints:
      a. Construct parallel to centerline of road.
      b. Multiple Lift Construction: Offset minimum 6 inches from previously placed joint.
      c. Vertical Longitudinal Joint:
         1) Apply uniform tack coat over joint face of existing pavement with a surface temperature less than 170 degrees F.
         2) Place HMA so that it uniformly overlaps the first lane approximately 1 inch.
         3) Roll the longitudinal joint from the hot side, 1/2 foot to 1 foot away from the joint for the first pass.
         4) Subsequent Passes: Overlap the cold side by 1/2-foot to 1 foot.
      d. Tapered Overlapping Longitudinal Joint:
         1) Taper the HMA mat at the slope no greater than 1:12.
         2) Extend tapered portion beyond the lane width.
         3) Place 1/2-inch to 1 inch notch at the top of the taper on all courses of paving.
         4) Compact the formed taper section with a weighted roller as wide as the taper.
         5) Apply uniform tack coat to the surface of the taper before the adjacent lane is placed.

e. Longitudinal Joint Compaction:
   1) Joint Density: Minimum 90% TMD (G_{mm}).
   2) Joint Density with echelon paving; same as adjacent mat.

3.3 CLEANING

A. Prior to acceptance of the work, clean the pavement and related areas to remove dirt and stones.

END OF SECTION 32 12 16

SECTION 32 13 13 – CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the furnishing and installation of form work, reinforcement, and concrete pavement for exterior work:
   1. Driveways and roadways.
   2. Parking lots.
   3. Curbs and gutters.
   4. Walkways.
   5. Miscellaneous exterior concrete pavement.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. ASTM Publications:
      a. A185 - Steel Welded Wire, Fabric, Plain for Concrete Reinforcement.
      b. A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
      c. A775 - Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
      d. A820 - Steel Fibers for Fiber Reinforced Concrete.
      e. C33 - Specification for Concrete Aggregates.
      f. C39 - Test Method for Compressive Strength of Cylindrical Concrete Specimens.
      g. C94 - Specification for Ready-Mixed Concrete.
      h. C136 - Sieve Analysis of Fine and Coarse Aggregates.
      i. C150 - Specification for Portland Cement.
      j. C260 - Specification for Air-Entraining Admixtures for Concrete.
      k. C309 - Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
      l. C330 - Specification for Lightweight Aggregates for Structural Concrete.
      m. C494 - Specification for Chemical Admixtures for Concrete.
      n. C618 - Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
      o. C989 - Ground Granulated Blast Furnace Slag (GGBFS) For Use in Concrete and Mortars.
      p. C1116 - Standard Specification for Fiber Reinforced Concrete and Shotcrete.
      q. C1260 - Potential Alkali Reactivity of Aggregates (Mortar-bar method).
      r. C1293 - Determination of Length Change of Concrete Due to Alkali-silica Reaction (Concrete prism test).
      s. C1567 - Potential alkali-silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-bar method).
      t. D3963/D and 3963M - Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars.
   2. ACI - American Concrete Institute:
      a. 117 - Standard Tolerances for Concrete Construction and Materials.
      b. 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
      c. 224 3R - Joints in Concrete Construction.
      d. 302.1R - Guide for Concrete Floor and Slab Construction.
      e. 303R - Guide to Cast-In-Place Architectural Concrete Practice.
      f. 304R - Guide for Measuring, Mixing, Transporting and Placing Concrete.
      g. 304.2R - Placing Concrete by Pumping Methods.
      h. 305R - Hot Weather Concreting.
      i. 306R - Cold Weather Concreting.
      j. 309R - Guide for Consolidation of Concrete.
      k. 330 - Guide for Design and Construction of Concrete Parking Lots.

l. 360 - Design of Slabs on Grade.
3. Concrete Reinforcing Steel Institute (CRSI):
   a. Manual of Standard Practice – current edition.
   b. Placing Reinforcing Bars – current edition.
4. Americans with Disabilities Act (ADA).
5. State DOT Standards:
   a. Specifications for Construction - current edition.
   b. Standard Plans.

1.4 SUBMITTALS

A. Action Submittals:
   1. Provide mix design(s) for concrete to be supplied.
      a. Include quantities and sources of all aggregates, cement, cementitious materials, and admixtures to be used.
      b. Submitted from a state DOT certified testing laboratory regularly engaged in designing and testing concrete for exterior paving.
      c. Use test results for mix design from within the past 12 months.
   2. Product Data: Submit Manufacturer's product data with application and installation instructions for admixtures, curing compounds, expansion joint fillers and sealants.
   3. Alkali-Silica Reactivity (ASR):
      a. Submit to Engineer ASTM C1260 Accelerated mortar bar test, and ASTM C1293 Concrete prism expansion for ASR from aggregate supplier.
      b. Documentation may include previous testing (within previous 2 years) of materials and sources intended for use.
      c. Documentation may include previous testing (within previous 2 years) from other projects or records provided by the material suppliers.

1.5 QUALITY ASSURANCE

A. Testing: Testing will be performed in accordance with Division 01 Section "Testing Services for Buried Utilities, Roadways, and Site Projects" and the Contractor's Quality Control Plan.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Concrete Reinforcement:
   1. Welded wire fabric in accordance with ASTM A185, yield stress 65,000 psi.
   2. Reinforcing bars in accordance with ASTM A615, yield stress 60,000 psi.

B. Cement:
   1. Portland Cement: ASTM C150, Type I or I/II, or Type IL in accordance with ASTM C595.
   2. Do not use different Manufacturers of cement, or different degrees of fineness.

C. Cementitious Materials or Cement Substitutes:
   1. Fly Ash: ASTM C618, Class C .
   2. Ground Granulated Blast Furnace Slag (GGBFS):
      a. ASTM C989 Grade 100 minimum.
      b. Use only as a blending material with Type I or Type IA Portland cement.
   3. Silica Fume, Dry-Densified:
      a. ASTM C1240.
      b. Use only as a blending material with Type I or Type IA Portland cement.
   4. Reduce the cement quantity up to a maximum of 25% for fly ash substitution or up to 40% for GGBFS substitution.
   5. Fly ash or GGBFS weight additions must equal the weight of the cement reduction.
   6. For concrete containing Portland cement, fly ash and GGBFS in the same mix design, reduce the cement quantity up to 40%, with the maximum fly ash quantity not exceeding 15%.

D. Aggregates:
   1. Grade aggregates according to procedures of ASTM C136, Class M, Exposure 4.
   2. Coarse Aggregates: ASTM C33, Number 57 (1-inch), crushed limestone.
   3. Fine Aggregate: ASTM C33.
   4. Test all aggregates for alkali-silica reactivity and provide mitigation method, if required.

E. Water: Clean, fresh and potable.

F. Steel Reinforcement:
   1. Deformed bars that conform to ASTM A706 or Grade 60 steel bars ASTM A615.
   2. Bars for Dowels or Lane Ties: Conform to Grade 40 ASTM A615 or A617.
   3. Welded Wire Fabric: Conform to ASTM A185.
   4. Epoxy Coating:
      a. Where required, conform to ASTM D3963/D3963M.
      b. Select coating material from State DOT qualified products list.
      c. Provide certification, if required by Engineer, that material conforms to standards.
      d. Use bar chairs and wire ties that are plastic coated, epoxy coated or plastic.

G. Epoxy Coating Material:
   1. Corrosion Protection Coatings:
      a. One part, heat curable, thermosetting powdered epoxy.
      b. Conforming with ASTM A775.
   2. Epoxy Coating Patching Material:
      a. Compatible with factory applied epoxy coating.
      b. Conforming with ASTM A775.

H. Synthetic Fibers:
   1. Synthetic fibers are fibers manufactured from polymer-based materials such as polypropylene, nylon and polyethylene telephthalate
   2. Monofilament or fibrillated polypropylene designed for use in concrete pavement.

I. Admixtures:
   1. General:
      a. No admixture shall contain more than 0.1% water soluble chloride ions by mass of cementitious material.
      b. No admixture shall contain calcium chloride.
   2. Air-Entraining:
      a. Required in all mixtures.
      b. Comply with ASTM C260.
      c. Daravair series or Darex series, by W.R. Grace & Company; Micro Air, by BASF Admixtures, Inc.; or equal.
   3. Water-Reducing Admixtures:
      a. Provide concrete mixtures with the same strength, air content as the respective concrete without the admixture.
      b. Select water reducing admixtures from the state DOT’s qualified products list.
      c. Admixture dosage rates are based on the total cementitious material (cement plus fly ash or GGBFS).

J. Curing Agents:
   1. Comply with ASTM C309.
   2. Provide approved products by Symons Corporation, W.R. Meadows, L & M Chemical, Master Builders or Dayton-Superior which are compatible with floor coatings or toppings specified.
   3. Compounds for Curing:
      a. 1100 Clear by W.R. Meadows.
      b. Day-Chem Rez Cure (J-11-W) by Dayton Superior.
      c. Resi-Chem Clear Cure by Symons.
      d. Confilm by Master Builders.
      e. L & M Cure by L & M Chemical.

2.2 CONCRETE MIX DESIGN

A. Design mix to project normal-weight concrete consisting of a mixture of Portland cement, blended Portland cement, cement substitutes, fine aggregate, coarse aggregate, water and admixtures when required or permitted producing the following properties:
   1. Compressive Strength: 4,000 psi (min) at 28 days.
   2. Air Content: 5.5% to 8.0%
   3. Slump: 0 to 4 inches or the slump in the approved mix design.
   4. Water Cement Ratio: 0.45 maximum.

B. Alkali-Silica Reactivity (ASR):
   1. The Concrete supplier is required to evaluate the fine aggregates (only) used in the production of the concrete for ASR.
   2. Submit to the Engineer ASTM C1260 Accelerated mortar bar test for ASR from the aggregate supplier.
   3. Submit to the Engineer ASTM C1293 concrete prism expansion for ASR from the aggregate supplier if available, or if necessary.
   4. Documentation may include previous testing of materials so long as material source has not changed, and test is not more than 2 years old.
   5. No ASR mitigation is required if aggregates are non-reactive where ASTM C1260 accelerated mortar bar test expansion is less than 0.10% at 14 days, or if ASTM C1293 Concrete prism expansion is less than 0.04% at 1 year.
   6. If ASTM C1260 mortar bar test results is more than 0.10% expansion at 14 days, ASTM C1293 concrete prism test is required to be performed before aggregates can be used.
   7. ASR mitigation is required if aggregates are found to be moderately reactive where ASTM C1293 Concrete prism expansion is equal to or greater than 0.04%, but less than 0.12% at 1 year.
   8. Aggregates will not be accepted if ASTM C1293 Concrete prism expansion is equal to or greater than 0.12% at 1 year.

C. Mitigation Methods for Moderately Reactive Aggregates:
   1. In accordance with DOT approved Specifications.
   2. Use low Alkali Cements:
      a. Submit mill test report data and calculations for Cement and Fly ash.
      b. Maximum Alkali content of cementitious materials (cement and fly ash) (Na2Oe) (Na2O equivalent) ≤ 3.5 lbs/cyd.
      c. Maximum Alkali content in cement (Na2Oe) (Na2O equivalent) ≤ 0.7%.
      d. Maximum lime CaO in Fly ash ≤ 20%.
      e. Minimum Silica in Fly ash SiO2 ≥ 35%.
      f. Total oxides in Fly ash (SiO2 + Al2O3 + Fe2O3) ≥ 60%.
   3. Demonstrate the effectiveness of the proposed mix combination to resist the potential for excessive expansion caused by ASR using current and historic data:
      a. ASTM C1567 (14 day test) using both coarse and fine aggregate and all cementitious materials.
      b. Mortar bars constructed of cementitious materials and coarse and fine aggregates must produce an expansion of less than 0.10%.

2.3 FORM WORK

A. Provide necessary form work to provide concrete dimensions indicated on the Drawings ±1/2 inch.
   1. Forms to be straight and true, minimum 1 5/8-inch thick wood, full depth of concrete or steel forms.
   2. All curved radius pours to be smooth deflectable steel.

2.4 CONTRACTION JOINTS

A. Provide necessary contraction joints to control random cracking with sawcut or hand-troweled joint.
   1. Depth: 1/4 slab thickness minimum, or as indicated on the Drawings.
   2. Spacing: Maximum of 10 feet for 4-inch slabs, maximum of 12 feet for 5-inch and 6-inch slabs, maximum of 15 feet for 7-inch and greater slabs.
   3. Cut in location as indicated on the Drawings.
   4. Keep panels as square as possible with length not more than 25% greater than width.

2.5 ISOLATION (EXPANSION) JOINTS

A. Joint fiber shall be preformed, composed of either blended, bonded flexible and waterproof fiber meeting the requirements of AASHTO M213 or polyvinyl chloride with fabric strand.

B. Reinforcement: Proflex by Oscoda Plastics; or approved equal.

C. Full depth of concrete.

2.6 SEALANTS

A. Joint sealant to be gray elastomeric silicone or polyurethane sealant conforming to ASTM 920: Sonoborn SL-2; or equal.

PART 3 - EXECUTION

3.1 GRADING

A. Provide smooth base of granular material compacted to 95% of its maximum density in accordance with ASTM D1557.

B. Proof of Test Rolling: Field testing of the uniformity and stability of the subgrade, subbase or base:
1. Loaded dump truck or other approved equipment.
2. Areas shown or as designated by Engineer or field representative.
3. In presence of Engineer or field representative.
4. Repair/undercut failed areas as directed.

3.2 INSTALLATION

A. Weather and Temperature Limitations:
1. Do not place concrete when the temperature of the air is at or expected to drop below 40 degrees F for at least 7 days after placing.
2. Do not place concrete if portions of the base, subbase, or subgrade layer are frozen, or if the grade exhibits poor stability from excessive moisture levels.
3. Do not place concrete when the temperature of the air is above or expected to exceed 85 degrees F for at least 7 days after placing.

B. Cold Weather Concrete Operations:
1. Comply with the recommendations of ACI 306R.
2. Recommended Protective Measures:
    a. Heating materials.
    b. Providing insulating blankets and windbreaks.
    c. Heated enclosures.
    d. Advise Engineer of planned protective measures.
    e. Straw or similar materials are not allowed.
3. Do not use frozen materials or materials containing ice or snow.
4. Do not place concrete on frozen subgrade.

C. Hot Weather Concrete Operations:
1. Comply with the recommendations of ACI 305R.
2. Recommended Protective Measures:
    a. Cooling materials.
    b. Concrete placement during cooler hours of the day.
    c. Providing shading and windbreaks.
3. Advise Engineer of planned protective measures.

D. Preparation of Base:
   1. Excavate to the required depth and to a width that will permit forming.
   2. Remove unsuitable material below the required depth and replace with sound earth.
   3. Shape and compact the base to conform to the section indicated on the Drawings.

E. Forms:
   1. Use fixed forms.
   2. Apply form releasing agent to prevent concrete from bonding to forms.
   3. Provide straight, full depth forms free of warp and strong enough to resist springing during concrete placement.
   4. Firmly stake fixed forms to prohibit movement.

F. Placing and Finishing Concrete:
   1. Place all concrete in accordance with ACI 304R and ACI 304.2R.
   2. Moisten base before placing concrete.
   3. Place concrete and consolidate, including along the faces of the forms, before finishing.
   4. Place and finish in a continuous operation.
   5. When replacing gutters along with concrete walk ramps, construct the gutter to the same dimensions and profile and use the same reinforcement pattern as the existing gutter.
   6. Float the surface just enough to produce a smooth surface free from irregularities.
   7. Round edges and joints with an approved finishing tool.
   8. Broom finish concrete drawing a fine-hair broom across the concrete surface, perpendicular to the line of traffic. Repeat operation if required to provide a fine line texture acceptable to the Engineer.

G. Joints:
   1. General: Comply with ACI 318-6.3, 6.4, and ACI 301, Section 6.
      a. Construct expansion, weakened-plane (contraction), and construction joints true-to-line with face perpendicular to surface of concrete.
      b. Construct transverse joints at right angles to the centerline, unless otherwise indicated.
   2. Weakened-Plane (Contraction) Joints:
      a. Provide weakened-plane (contraction) joints, sectioning concrete into areas
         1) As indicated on the Drawings.
         2) 24 to 36 times the thickness of the slab if not indicated on the Drawings.
      b. Contraction joints for curbs shall be provided at maximum 10 foot intervals and maximum 15-foot spacing for slabs, unless indicated otherwise.
      c. Construct weakened plane joints for a depth equal to at least 1/4 concrete thickness, as follows:
         1) Tooled Joints: Form weakened-plane joints in fresh concrete by grooving top portion with a recommended cutting tool and finishing edges with a jointer.
         2) Sawed Joints: Form weakened-plane joints using powered saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut joints into hardened concrete as soon as surface will not be torn, abraded, or otherwise damaged by cutting action.
   3. Construction Joints: Place construction joints at end of placements and at locations where placement operations are stopped for a period of more than 1/2 hour, except where such placements terminate at expansion joints.
   4. Expansion Joints:
      a. Provide premolded joint filler for expansion joints abutting concrete curbs, catch basins, manholes, inlets, structures, walks and other fixed objects, unless otherwise indicated.
      b. Locate expansion joints at 100 feet on center along linear lengths of curb and walks, and at points of radii of curbs unless otherwise indicated.
   5. Extend joint fillers full width and depth of joint, and not less than 1/2 inch or more than 1 inch below finished surface for joint sealant.
   6. Furnish joint fillers in one-piece lengths for full width being placed, wherever possible. Where more than 1 length is required, lace or clip joint filler sections together.

H. Reinforcing:
   1. Install reinforcing as indicated on the Drawings.
   2. Install in accordance with CRSI for placing reinforcing bars and Manual of Standard Practice.

I. Epoxy Coating:
   1. Minimum 6 mils thick and uniform.
   2. Coat reinforcement after fabrication.
   3. Repair damage to epoxy coating in accordance with:
      a. ASTM A775.
      b. Epoxy-coating Manufacturer's recommendations.

J. Backfilling:
   1. After the concrete has gained sufficient strength, remove fixed forms and backfill with sound earth.
   2. Compact and level the backfill 1-inch below the surface of the concrete.

3.3 CONCRETE FINISHING

A. After striking-off and consolidating concrete, smooth surface by screening and floating. Use hand method only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.

B. After floating, test surface for trueness with a 10 foot straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous smooth finish.

C. Work edges of slabs, and formed joints with an edging tool, and round to 1/2 inch radius, unless otherwise indicated. Eliminate tool marks on concrete surface.

D. After completion of floating and troweling when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:
   1. Exterior slabs and concrete pavement types shall have a non-slip finish by scoring the surface with a heavy broom, perpendicular to the line of traffic.
   2. Repeat operation if required to provide a line texture acceptable to the Engineer.

E. Do not remove forms for 24 hours after concrete has been placed.
   1. After form removal, clean ends of joints and point-up any minor honeycombed areas.
   2. Remove and replace areas or sections with major defects, as directed by the Engineer.

3.4 CURING

A. General:
   1. As soon as possible, after texturing operations have been completed and after the free water has left the surface, coat the concrete walk surface and sides of slip-formed concrete walks with a uniform layer of membrane curing compound.
   2. Apply 1 coat of curing compound on non-grooved surfaces and 2 coats on grooved surfaces.
   3. Apply not less than 1 gallon per 25 square yards of concrete for each application.
   4. Apply the second coat after the first has dried sufficiently but do not exceed 2 hours between coats.
   5. Keep the compound thoroughly mixed according to the Manufacturer’s recommendations.
   6. Do not thin curing compound.
   7. Reapply curing compound immediately to surfaces damaged by rain, joint sawing, foot traffic or other activities.
   8. If fixed forms are removed during the curing period, coat the entire area of the sides of the concrete walk with curing compound immediately after removal of forms.

B. These requirements are minimum requirements only.

C. Repair or replacement of concrete showing damage due to inadequate curing is required.

D. All costs associated with this corrective work will be borne by the Contractor.

3.5 PROTECTION

A. Protect the concrete from damage until acceptance of the Work.

B. Protect the concrete from freezing until the concrete has attained a compressive strength of at least 1000 psi.

C. Maintain surface as clean by removing surface stains and spillage of materials as they occur.

D. Sweep concrete and wash free of stains, discolorations, dirt and other foreign material just prior to final inspection.

3.6 DEFECTIVE WORK

A. The following list of deficiencies are considered defective work if found within 1 year of installation. Removal or replacement by the Contractor at no cost to the Owner is required:
   1. Difference in elevation between panels of 1/4-inch or greater.
   2. Cracks of any lengths that are 1/8-inch wide or wider.
   3. Surface spalling covering in excess of 20% of the area of any 1 panel.
   4. A hole that is 1/2-inch or greater in depth and 2 inches or greater in diameter.
   5. Residual splatter that is 1/2-inch or higher and attached to a panel.
   6. Elevation difference of 1/2-inch in 10 feet caused by settling, that has not caused an elevation difference between panels.
   7. Multiple hairline cracking.
   8. Footprints, bike tire tracks, animal tracks, or the like, created while concrete was not cured.
   9. ASR cracking or potholing.

3.7 CLEAN-UP

A. For duration of work, Contractor is to maintain work area free of waste material, debris, and the like.

B. Provide onsite containers as necessary for work of this Section.

C. Remove upon completion all excess material, debris, and equipment.

END OF SECTION 32 13 13

SECTION 32 13 14 – CONCRETE WALKS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the furnishing and installation of concrete walks.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. ASTM Publications:
      a. A820 - Steel Fibers for Fiber Reinforced Concrete.
      b. C33 - Specification for Concrete Aggregates.
      c. C39 - Test Method for Compressive Strength of Cylindrical Concrete Specimens.
      d. C94 - Specification for Ready-Mixed Concrete.
      e. C136 - Sieve Analysis of Fine and Coarse Aggregates.
      f. C150 - Specification for Portland Cement.
      g. C260 - Specification for Air-Entraining Admixtures for Concrete.
      h. C309 - Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
      i. C330 - Specification for Lightweight Aggregates for Structural Concrete.
      j. C494 - Specification for Chemical Admixtures for Concrete.
      k. C618 - Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
   2. ACI – American Concrete Institute:
      a. 117 - Standard Tolerances for Concrete Construction and Materials.
      b. 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
      c. 302.1R - Guide for Concrete Floor and Slab Construction.
      d. 303R - Guide to Cast-In-Place Architectural Concrete Practice.
      e. 304R - Guide for Measuring, Mixing, Transporting and Placing Concrete.
      f. 305R - Hot Weather Concreting.
      g. 306R - Cold Weather Concreting.
      h. 309R - Guide for Consolidation of Concrete.
   3. Americans with Disabilities Act (ADA).

1.4 SUBMITTALS

A. Action Submittals:
   1. Provide mix design for concrete to be supplied.
      a. Include quantities and sources of all aggregates, cement, cementitious materials, and admixtures to be used.
      b. Submitted from a state DOT certified testing laboratory regularly engaged in designing and testing concrete for exterior paving.
      c. Use test results for mix design from within the past 12 months.
   2. Product Data: Submit Manufacturer’s product data with application and installation instructions for admixtures, curing compounds, expansion joint fillers and sealants.
   3. Alkali-Silica Reactivity (ASR):
      a. Submit to Engineer ASTM C1260 Accelerated mortar bar test, and ASTM C1293 Concrete prism expansion for ASR from aggregate supplier.
      b. Documentation may include previous testing (within previous 2 years) of materials and sources intended for use.
      c. Documentation may include previous testing (within previous 2 years) from other projects or records provided by the material suppliers.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cement:
1. Portland cement, ASTM C150, Type I or I/II , or Type IL in accordance with ASTM C595.
2. Do not use different types of cement, different manufacturers of cement, or different degrees of fineness.

B. Cementitious Materials or Cement Substitutes:
1. Fly Ash: ASTM C618, Class C or F.
2. Ground Granulated Blast Furnace Slag (GGBFS):
   a. ASTM C989 Grade 100 minimum.
   b. Use only as a blending material with Type I or Type IA Portland cement.
3. Silica Fume, Dry-Densified:
   a. ASTM C1240.
   b. Use only as a blending material with Type I or Type IA Portland cement.
4. Reduce the cement quantity up to a maximum of 25% for fly ash substitution or up to 40% for GGBFS substitution.
5. Fly ash or GGBFS weight additions must equal the weight of the cement reduction.
6. For concrete containing Portland cement, fly ash and GGBFS in the same mix design, reduce the cement quantity up to 40%, with the maximum fly ash quantity not exceeding 15%.

C. Aggregates:
1. Grade aggregates according to procedures of ASTM C136, Class M, Exposure 4.
2. Coarse Aggregates: ASTM C33-5S, Number 57 (1-inch), crushed limestone.
3. Fine Aggregate: ASTM C33.
4. Test all aggregates for alkali-silica reactivity and provide mitigation method, if required.

D. Water: Clean, fresh and potable.

E. Admixtures:
1. General:
   a. No admixture shall contain more than 0.1% water soluble chloride ions by mass of cementitious material.
   b. No admixture shall contain calcium chloride.
2. Air-Entraining:
   a. Comply with ASTM C260.
   b. Daravair series or Darex series, by W.R. Grace & Company; Micro Air, by BASF Admixtures, Inc.; or equal.

F. Curing Agents:
1. Curing agents shall comply with ASTM C309.
2. Provide approved products by Symons Corporation, W.R. Meadows, L & M Chemical, Master Builders or Dayton-Superior which are compatible with floor coatings or toppings specified.
3. Compounds:
   a. Curing:
      1) 1600 White by W.R. Meadows.
      2) Day-Chem Rez Cure (J-11-W) by Dayton Superior.
      3) Resi-Chem Clear Cure by Symons.
      4) Confilm by Master Builders.
      5) L & M Cure by L & M Chemical.

G. Concrete Reinforcement:
1. In accordance with ASTM A185.
2. Welded wire fabric 6-inch x 6-inch x W1.4 x W1.4.

2.2 CONCRETE MIX DESIGN

A. Design mix to project normal-weight concrete consisting of Portland cement aggregate, air-entrained add mixture and water producing the following properties:
   1. Compressive Strength: 3,500 psi (min) at 28 days.
   2. Air Content: 5.5% to 8.0%
   3. Slump: 0 to 3 inches unless mid-range water reducer is used then slump may 6 inches Water Cement Ratio: 0.5 maximum.

B. Alkali-Silica Reactivity (ASR):
   1. The Concrete supplier is required to evaluate the fine aggregates (only) used in the production of the concrete for ASR.
   2. Submit to the Engineer ASTM C1260 Accelerated mortar bar test for ASR from the aggregate supplier.
   3. Submit to the Engineer ASTM C1293 concrete prism expansion for ASR from the aggregate supplier if available, or if necessary.
   4. Documentation may include previous testing of materials so long as material source has not changed, and test is not more than 2 years old.
   5. No ASR mitigation is required if aggregates are non-reactive where ASTM C1260 accelerated mortar bar test expansion is less than 0.10% at 14 days, or if ASTM C1293 Concrete prism expansion is less than 0.04% at 1 year.
   6. If ASTM C1260 mortar bar test results is more than 0.10% expansion at 14 days, ASTM C1293 concrete prism test is required to be performed before aggregates can be used.
   7. ASR mitigation is required if aggregates are found to be moderately reactive where ASTM C1293 Concrete prism expansion is equal to or greater than 0.04%, but less than 0.12% at 1 year.
   8. Aggregates will not be accepted if ASTM C1293 Concrete prism expansion is equal to or greater than 0.12% at 1 year.

C. Mitigation Methods for Moderately Reactive Aggregates:
   1. In accordance with DOT approved Specifications.
   2. Use low Alkali Cements:
      a. Submit mill test report data and calculations for Cement and Fly ash.
      b. Maximum Alkali content of cementitious materials (cement and fly ash) (Na2Oe) (Na2O equivalent) ≤ 3.5 lbs/cyd.
      c. Maximum Alkali content in cement (Na2Oe) (Na2O equivalent) ≤ 0.7%.
      d. Maximum lime CaO in Fly ash ≤ 20%.
      e. Minimum Silica in Fly ash SiO_2 ≥ 35%.
      f. Total oxides in Fly ash (SiO_2 + Al_2O_3 + Fe_2O_3) ≥ 60%.
   3. Demonstrate the effectiveness of the proposed mix combination to resist the potential for excessive expansion caused by ASR using current and historic data:
      a. ASTM C1567 (14 day test) using both coarse and fine aggregate and all cementitious materials.
      b. Mortar bars constructed of cementitious materials and coarse and fine aggregates must produce an expansion of less than 0.10%.

2.3 DETECTABLE/TACTILE WARNING SURFACES

A. Furnish and install tactile surface plate into uncured concrete cement.
   1. In accordance with most current Americans With Disabilities Act (ADA).
   2. Materials:
      a. Vitrified Polymer Composite (VPC), cast-in-place surface tile.
      b. Cast iron warning plate.
   3. Manufacturers:
      a. VFC: Armor Tile, ADA Solutions.
      b. East Jordan Iron Works, Neenah Foundry Company.
   4. Color: Unfinished cast iron.
   5. Plates must be radial to match curb radius when indicated on the Drawings.

2.4 FORM WORK

A. Provide necessary form work to provide concrete dimensions indicated on the Drawings ±1/2 inch.
   1. Forms to be straight and true, minimum 1 5/8-inch thick wood, full depth of concrete or steel forms.
   2. All curved radius pours to be smooth deflectable steel.

2.5 EXPANSION JOINTS

A. Joint fiber shall be pre formed, composed of either blended, bonded flexible and waterproof fiber meeting the requirements of AASHTO M213 or polyvinyl chloride with fabric strand.

B. Reinforcement: Proflex by Oscoda Plastics; or approved equal.

C. Full depth of concrete.

2.6 SEALANTS

A. Joint sealant to be gray elastomeric silicone or polyurethane sealant conforming to ASTM 920: Sonoborn SL-2; or equal.

PART 3 - EXECUTION

3.1 GRADING

A. Provide smooth base of granular material compacted to 95% of its maximum density in accordance with ASTM D1557.

3.2 INSTALLATION

A. Weather and Temperature Limitations:
   1. Do not place concrete when the temperature of the air is at or expected to drop below 40 degrees F for at least 7 days after placing.
   2. Do not place concrete if portions of the base, subbase, or subgrade layer are frozen, or if the grade exhibits poor stability from excessive moisture levels.
   3. Do not place concrete when the temperature of the air is above or expected to exceed 85 degrees F for at least 7 days after placing.

B. Cold Weather Concrete Operations:
   1. Comply with the recommendations of ACI 306R.
   2. Recommended Protective Measures:
      a. Heating materials.
      b. Providing insulating blankets and windbreaks.
      c. Heated enclosures.
   3. Advise Engineer of planned protective measures.
   4. Straw or similar materials shall not be allowed.
   5. Do not use frozen materials or materials containing ice or snow.
   6. Do not place concrete on frozen subgrade.

C. Hot Weather Concrete Operations:
   1. Comply with the recommendations of ACI 305R.
   2. Recommended Protective Measures:
      a. Cooling materials.
      b. Concrete placement during cooler hours of the day.
      c. Providing shading and windbreaks.
   3. Advise Engineer of planned protective measures.

D. Slope:
   1. All walks should have a cross slope of a minimum 1% and maximum 2% sloped toward a curb or lower elevation.
   2. No walks should exceed 5% longitudinal slope.

E. Preparation of Base:
   1. Excavate to the required depth and to a width that will permit forming.
   2. Remove unsuitable material below the required depth and replace with sound earth.
   3. Shape and compact the base to conform to the section indicated on the Drawings.

F. Forms:
   1. Use fixed forms.
   2. Apply form releasing agent to prevent concrete from bonding to forms.
   3. Provide straight, full depth forms free of warp and strong enough to resist springing during concrete placement.
   4. Firmly stake fixed forms to prohibit movement.

G. Reinforcing: Reinforce all concrete walks with welded wire fabric pulled up 2 inches into concrete.

H. Placing and Finishing Concrete:
   1. Place all concrete in accordance with ACI 304R and ACI 304.2R.
   2. Moisten base before placing concrete.
   3. Place concrete and consolidate, including along the faces of the forms, before finishing.
   4. Place and finish in a continuous operation.
   5. When replacing gutters along with concrete walk ramps, construct the gutter to the same dimensions and profile and use the same reinforcement pattern as the existing gutter.
   6. Float the surface just enough to produce a smooth surface free from irregularities.
   7. Round edges and joints with an approved finishing tool.
   8. Broom finish concrete walks and ramps by drawing a fine-hair broom across the concrete surface, perpendicular to the line of traffic. Repeat operation if required to provide a fine line texture acceptable to the Engineer.

I. Joints:
   1. General: Comply with ACI 318-6.3, 6.4, and ACI 301, Section 6. Construct expansion, weakened-plane (contraction), and construction joints true-to-line with face perpendicular to surface of concrete. Construct transverse joints at right angles to the centerline, unless otherwise indicated.
   2. Weakened-Plane (Contraction) Joints: Provide weakened-plane (contraction) joints, sectioning concrete into areas as indicated on the Drawings. Contraction joints for curbs shall be provided at 10 foot intervals and 20 foot spacing for slabs, unless shown otherwise. Construct weakened plane joints for a depth equal to at least 1/4 concrete thickness, as follows:
      a. Tooled Joints: Form weakened-plane joints in fresh concrete by grooving top portion with a recommended cutting tool and finishing edges with a jointer.
      b. Sawed Joints: Form weakened-plane joints using powered saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut joints into hardened concrete as soon as surface will not be torn, abraded, or otherwise damaged by cutting action.
   3. Construction Joints: Place construction joints at end of placements and at locations where placement operations are stopped for a period of more than 1/2 hour, except where such placements terminate at expansion joints.
   4. Expansion Joints: Provide premolded joint filler for expansion joints abutting concrete curbs, catch basins, manholes, inlets, structures, walks and other fixed objects, unless otherwise indicated. Locate expansion joints at 100 feet on center along linear lengths of curb and walks, and at points of radii of curbs unless otherwise indicated.
   5. Extend joint fillers full width and depth of joint, and not less than 1/2 inch or more than 1 inch below finished surface for joint sealant.
   6. Furnish joint fillers in one-piece lengths for full width being placed, wherever possible. Where more than 1 length is required, lace or clip joint filler sections together.

J. Thickness: Except as otherwise specified or indicated on the Drawings, provide a minimum thickness of 4 inches.

K. Where walkways cross driveways, provide a minimum thickness of 6 inches.

L. Ramps:
1. As indicated on the Drawings.
2. No ramp shall exceed 1:12 slope.
3. Place detectable warning domed plates in fresh concrete in accordance with Manufacturer's instructions on ramp surface.
4. ADA domes to be 24 inches wide, full width of ramp.

M. Backfilling:
1. After the concrete has gained sufficient strength, remove fixed forms and backfill with sound earth.
2. Compact and level the backfill 1-inch below the surface of the concrete.

3.3 CONCRETE FINISHING

A. After striking-off and consolidating concrete, smooth surface by screening and floating. Use hand method only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.

B. After floating, test surface for trueness with a 10 foot straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous smooth finish.

C. Work edges of slabs, and formed joints with an edging tool, and round to 1/2 inch radius, unless otherwise indicated. Eliminate tool marks on concrete surface.

D. After completion of floating and troweling when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:
1. Exterior slabs, sidewalks, flow channels, flumes, curbs, and other similar concrete pavement types shall have a non-slip finish by scoring the surface with a fine-hair broom, perpendicular to the line of traffic. Repeat operation if required to provide a fine line texture acceptable to the Engineer.
2. Retaining walls, wing walls, light pole bases, and other surfaces exposed to view upon completion of work shall be given a rubbed finish as specified below:
    a. Immediately upon removal of the forms, the surfaces to be rubbed shall be pointed up, thoroughly wetted and then rubbed with a No. 20 carborundum brick and water so as to produce a true, even, and smooth surface. When necessary to fill pinholes, and upon areas which have been reconstructed, rubbing shall be done by carborundum brick and a thin cement grout composed of 1 part of cement and 2 parts of fine washed silicone sand, all of which shall pass a No. 20 sieve. The surfaces finished with grout shall be carefully scraped with a steel edge so as to remove all surplus grout, after which it shall be given a final rub with a wood float until all skin and form marks shall be removed. No "wash" composed of cement and water, or cement, sand and water shall be used in this process.

E. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Engineer.

3.4 CURING

A. General:
1. After texturing operations have been completed and after the free water has left the surface, coat the concrete walk surface and sides of slip-formed concrete walks with a uniform layer of membrane curing compound.
2. Apply 1 coat of curing compound on non-grooved (broomed) surfaces and 2 coats on grooved (raked) surfaces.
3. Apply not less than 1 gallon per 25 square yards of concrete for each application.
4. Apply the second coat after the first has dried sufficiently but do not exceed 2 hours between coats.
5. Keep the compound thoroughly mixed according to the Manufacturer's recommendations.
6. Do not thin curing compound.

7. Reapply curing compound immediately to surfaces damaged by rain, joint sawing, foot traffic or other activities.
8. If fixed forms are removed during the curing period, coat the entire area of the sides of the concrete walk with curing compound immediately after removal of forms.

B. These requirements are minimum requirements only. Repair or replacement of concrete showing damage due to inadequate curing is required. All costs associated with this corrective work will be borne by the Contractor.

3.5 ADA TRUNCATED DOMES

A. Prior to installation, review mix design with concrete supplier and installer to ensure concrete has proper slump and will not set too rapidly to allow for proper installation.

B. Install system in accordance with Manufacturer's specifications and recommendations. Dome panels to be perpendicular and parallel with curb with no gaps between panels. Panels must be level and flush with adjacent concrete walk. Installation must be acceptable to Engineer or removed and replaced at Contractor's expense.

C. Install top of domes flush with top of adjacent concrete along top and sides of plates. Install bottom of domes flush with concrete at lower end of plates.

3.6 PROTECTION

A. Protect the walks from damage until acceptance of the Work.

B. Protect the concrete from freezing until the concrete has attained a compressive strength of at least 1000 psi.

C. Maintain walks as clean as practical by removing surface stains and spillage of materials as they occur.

D. Sweep concrete walks and wash free of stains, discolorations, dirt and other foreign material just prior to final inspection.

3.7 DEFECTIVE WORK

A. The following list of deficiencies shall be considered defective work and shall be replaced by the Contractor at no cost to the Owner:
1. Difference in elevation between panels of 1/2-inch or greater.
2. Cracks of any length that are 1/8-inch wide or wider.
3. Surface spalling covering in excess of 20% of the area of any 1 panel.
4. A hole that is 1/2-inch or greater in depth and 2 inches or greater in diameter.
5. Residual splatter that is 1/2-inch or higher and attached to a panel.
6. Elevation difference of 3/4-inch in 10 feet caused by settling, that has not caused an elevation difference between panels.
7. Multiple hairline cracking.
8. Footprints, bike tire tracks, animal tracks, or the like, created while concrete was not cured.
9. Improperly install tactile warning surface.
10. ASR cracking or potholing.

3.8 CLEAN-UP

A. For duration of work, Contractor is to maintain work area free of waste material, debris, and the like.
1. Contractor shall provide on-site containers as necessary for work of this Section. Locate as directed by Engineer.

B. Upon completion and when directed by Engineer, Contractor shall remove all excess material, debris, and equipment occasioned by the work.

END OF SECTION 32 13 14

SECTION 32 16 13 – CONCRETE CURBS AND GUTTERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the furnishing and installation of concrete curbs and gutters.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. ASTM Publications:
      a. A820 - Steel Fibers for Fiber Reinforced Concrete.
      b. C33 - Specification for Concrete Aggregates.
      c. C39 - Test Method for Compressive Strength of Cylindrical Concrete Specimens.
      d. C94 - Specification for Ready-Mixed Concrete.
      e. C136 - Sieve Analysis of Fine and Coarse Aggregates.
      f. C150 - Specification for Portland Cement.
      g. C260 - Specification for Air-Entraining Admixtures for Concrete.
      h. C309 - Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
      i. C330 - Specification for Lightweight Aggregates for Structural Concrete.
      j. C494 - Specification for Chemical Admixtures for Concrete.
      k. C618 - Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
   2. ACI – American Concrete Institute:
      a. 117 - Standard Tolerances for Concrete Construction and Materials.
      b. 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
      c. 302.1R - Guide for Concrete Floor and Slab Construction.
      d. 303R - Guide to Cast-In-Place Architectural Concrete Practice.
      e. 304R - Guide for Measuring, Mixing, Transporting and Placing Concrete.
      f. 305R - Hot Weather Concreting.
      g. 306R - Cold Weather Concreting.
      h. 309R - Guide for Consolidation of Concrete.

1.4 SUBMITTALS

A. Action Submittals: Provide mix design for concrete to be supplied.

1.5 QUALITY ASSURANCE

A. Testing: Testing will be performed in accordance with Division 01 Section "Testing Services for Buried Utilities, Roadways, and Site Projects" and the Contractor’s Quality Control Plan.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cement:
   1. Portland cement, ASTM C150, Type I or I/II , or Type IL in accordance with ASTM C595.
   2. Do not use different types of cement, different manufacturers of cement, or different degrees of fineness.

B. Fly Ash: ASTM C618, Class C.

C. Aggregates:
   1. Grade aggregates according to procedures of ASTM C136, Class M, Exposure 4.
   2. Coarse Aggregates: ASTM C33-5S, Number 57 (1-inch), crushed limestone.
   3. Fine Aggregate: ASTM C33.

D. Water: Clean, fresh and potable.

E. Admixtures:
   1. General:
      a. No admixture shall contain more than 0.1% water soluble chloride ions by mass of cementitious material.
      b. No admixture shall contain calcium chloride.
   2. Air-Entraining:
      a. Comply with ASTM C260.
      b. Daravair series or Darex series, by W.R. Grace & Company; Micro Air, by BASF Admixtures, Inc.; or equal.

F. Curing Agents:
   1. Curing agents shall comply with ASTM C309, Type 2 white.
   2. Provide approved products by Symons Corporation, W.R. Meadows, L & M Chemical, Master Builders or Dayton-Superior:
      a. 1600 White by W.R. Meadows.
      b. Day-Chem Rez Cure (J-11-W) by Dayton Superior.
      c. Resi-Chem Clear Cure by Symons.
      d. Confilm by Master Builders.
      e. L & M Cure by L & M Chemical.

G. Concrete Reinforcement:
   1. Deformed reinforcing bars.
   2. ASTM A615, Fy = 60,000 psi.
   3. Required only when indicated on the Drawings.

2.2 CONCRETE MIX DESIGN

A. Design mix to project normal-weight concrete consisting of Portland cement aggregate, air-entrained add mixture and water producing the following properties:
   1. Compressive Strength: 3,500 psi (min) at 28 days.
   2. Air Content: 5.5% to 8,0%.
   3. Slump: 0 to 3 inches unless mid-range water reducer is used then slump may 6 inches.
   4. Water Cement Ratio: 0.5 maximum.

2.3 FORMWORK

A. Provide necessary formwork to provide concrete dimensions indicated on the Drawings ±1/2 inch.
   1. Forms to be straight and true, minimum 1 5/8-inch thick wood, full depth of concrete or steel forms.
   2. All curved radius pours to be smooth deflectable steel.

2.4 EXPANSION JOINTS

A. Joint fiber shall be preformed, composed of either blended, bonded flexible and waterproof fiber meeting the requirements of AASHTO M213 or polyvinyl chloride with fabric strand or ASTM D1751 fiber joint filler.

PART 3 - EXECUTION

3.1 GRADING

A. Provide smooth base of granular material compacted to 95% of its maximum density in accordance with ASTM D1557.

3.2 INSTALLATION

A. Weather and Temperature Limitations:
   1. Do not place concrete when the temperature of the air is at or expected to drop below 40 degrees F for at least 7 days after placing.
   2. Do not place concrete if portions of the base, subbase, or subgrade layer are frozen, or if the grade exhibits poor stability from excessive moisture levels.
   3. Do not place concrete when the temperature of the air is above or expected to exceed 85 degrees F for at least 7 days after placing.

B. Cold Weather Concrete Operations:
   1. Comply with the recommendations of ACI 306R.
   2. Recommended Protective Measures:
      a. Heating materials.
      b. Providing insulating blankets and windbreaks.
      c. Heated enclosures.
   3. Advise Engineer of planned protective measures.
   4. Straw or similar materials shall not be allowed.
   5. Do not use frozen materials or materials containing ice or snow.
   6. Do not place concrete on frozen subgrade.

C. Hot Weather Concrete Operations:
   1. Comply with the recommendations of ACI 305R.
   2. Recommended Protective Measures:
      a. Cooling materials.
      b. Concrete placement during cooler hours of the day.
      c. Providing shading and windbreaks.
   3. Advise Engineer of planned protective measures.

D. Preparation of Base:
   1. Excavate to the required depth and to a width that will permit forming.
   2. Remove unsuitable material below the required depth and replace with sound earth.
   3. Shape and compact the base to conform to the section indicated on the Drawings.

E. Forms:
   1. Use fixed forms.
   2. Apply form releasing agent to prevent concrete from bonding to forms.
   3. Provide straight, full depth forms free of warp and strong enough to resist springing during concrete placement.
   4. Firmly stake fixed forms to prohibit movement.

F. Reinforcing:
   1. Place reinforcement in accordance with CRSI placing reinforcement bars and Manual of Standard Practice.
   2. Tolerances indicated in ACI 117.
   3. 3-inch minimum cover.

G. Placing and Finishing Concrete:
   1. Place all concrete in accordance with ACI 304R and ACI 304.2R.
   2. Moisten base before placing concrete.
   3. Place concrete and consolidate, including along the faces of the forms, before finishing.
   4. Place and finish in a continuous operation.
   5. When replacing gutters along with concrete walk ramps, construct the gutter to the same dimensions and profile and use the same reinforcement pattern as the existing gutter.
   6. Float the surface just enough to produce a smooth surface free from irregularities.
   7. Round edges and joints with an approved finishing tool.

H. Joints:
   1. General: Comply with ACI 318-6.3, 6.4, and ACI 301, Section 6. Construct expansion, weakened-plane (contraction), and construction joints true-to-line with face perpendicular to the centerline, unless otherwise indicated on the Drawings.
   2. Weakened-Plane (Contraction) Joints: Provide weakened-plane (contraction) joints, sectioning concrete into areas as indicated on the Drawings. Contraction joints for curbs shall be 1-1/2 inch deep provided at 10 foot intervals unless indicated otherwise on the Drawings.
   3. Construction Joints: Place construction joints at end of placements and at locations where placement operations are stopped for a period of more than 1/2 hour, except where such placements terminate at expansion joints.
   4. Install expansion joints at the spring point of curves of all radius curbs. For curbed islands install 2 expansion joints at opposite ends of island at spring points.
   5. Install expansion joints 10 feet either side of catch basins, and every 300 feet longitudinally.

I. Backfilling:
   1. After the concrete has gained sufficient strength, remove fixed forms and backfill with sound earth.
   2. Compact and level the backfill 1-inch below the surface of the concrete.

3.3 CONCRETE FINISHING

A. After striking-off and consolidating concrete, smooth surface by screening and floating. Use hand method only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.

B. After floating, test surface for trueness with a 10 foot straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous smooth finish.

C. After completion of floating and troweling when excess moisture or surface sheen has disappeared, complete surface finishing to create a non-slip finish by scoring the surface with a fine-hair broom, perpendicular to the line of traffic. Repeat operation if required to provide a fine line texture acceptable to the Engineer. Finish edges with 1/2-inch radius.

D. Do not remove forms for 24-hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by the Engineer.

3.4 CURING

A. General: After texturing operations have been completed and after the free water has left the surface, coat the concrete with 1 coat of a uniform layer of membrane curing compound.

3.5 PROTECTION

A. Protect from damage until acceptance of the Work.

B. Protect the concrete from freezing until the concrete has attained a compressive strength of at least 1000 psi.

C. Maintain as clean as practical by removing surface stains and spillage of materials as they occur.

3.6 FIELD QUALITY CONTROL

A. The following list of deficiencies shall be considered defective work if found within 1 year of installation, and shall be replaced by the Contractor at no cost to the Owner:
   1. Gutters that pond more than 1/4-inch of water.
   2. Cracks of any length that are 1/8-inch wide or wider.
   3. A hole that is 1/2-inch or greater in depth and 2 inches or greater in diameter.
   4. Residual splatter that is 1/2-inch or higher than adjacent concrete.

5. Elevation difference of 1/4-inch in 10 feet caused by settling or improper forming.
6. Footprints, bike tire tracks, animal tracks, or the like, created while concrete was not cured.

3.7 CLEANING

A. Maintain work area free of waste, material and debris.

END OF SECTION 32 16 13

SECTION 32 17 23 – PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes parking lot and roadway striping consisting of providing and applying retroreflective permanent pavement markings in accordance with the Manual on Uniform Traffic Control Devices. Provide markings, shapes, spacing, and dimensions that conform to the State DOT Pavement Marking Standard Plans.

1.3 REFERENCES

A. Comply with standards in effect as of the date of the Contract Documents except for those having different revision dates as referenced in the codes or as indicated on the Drawings.

B. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. TT-P-1952D, Federal Specification: Paint, Traffic and Airfield Marking, Waterborne.
   2. United States Department of Transportation - Federal Highway Administration:
      a. Manual on Uniform Traffic Control Devices (MUTCD).
   3. State DOT Current Standards:
      a. Manual on Uniform Traffic Control Devices.

1.4 SUBMITTALS

A. Product Data:
   1. Provide a detailed schedule for construction.
   2. Provide manufacturer data sheet on each material to be used.

1.5 QUALITY ASSURANCE

A. Installation Personnel Qualifications:
   1. Trained and experienced in the fabrication and installation of the materials and equipment.
   2. Knowledgeable of the design.

1.6 DELIVERY, STORAGE AND HANDLING

A. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation.

B. Reject damaged, deteriorated or contaminated material and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

PART 2 - PRODUCTS

2.1 PAVEMENT MARKINGS

A. Marking paint shall meet Federal Specification GSA-FSSTT-P-115E Type 1.

B. Size and Color: 4-inch width, white, yellow, blue or other color depending on intended use.
   1. As indicated on the Drawings.
   2. In accordance with guidelines, State MUTCD and FHWA – MUTCD.

C. Materials to be Used:
   1. Parking Lot Parking Stalls: Waterborne.
   2. Parking Lot Lane Striping: Waterborne.
   3. Parking Lot Stop Bars: Waterborne.
   4. Road Striping: Waterborne.
   5. Road Stop Bars: Waterborne.

D. Traffic paint shall be spray type for stripe marking. Contractor may use one of the following, or equal:
   1. Repcolite:
      a. 47610 Traffic Marking Paint; White.
      b. 47660 Traffic Marking Paint; Yellow.
      c. 47630 Traffic Marking Paint (Barrier Free Blue).
   2. Sherwin Williams:
      a. Setfast Low VOC Acrylic Traffic Marking Paint; TM 5626 (White), TM 5627 (Yellow).
      b. Smart Mark Premium Alkyd Thermoplastic.
      c. Smart Mark Premium Hydro Thermoplastic.
   3. Epoplex: LS90 Polyurea liquid pavement marking system.

E. Thickness (mil) For Single Application:
   1. Waterborne: 15 mil (110 sq. ft./gallon).
   2. Thermoplastic: 90 mil.
   3. Polyurea: 20 mil.

F. If the Contract requires a second application of permanent pavement markings, complete 2 applications regardless of initial pavement marking conditions. Complete the second application from 14 days to 60 days after initial application in the same calendar year.

G. Apply the second application before the required 14 days if previously approved by the Engineer.

Minimum Material Placement Temperature and Seasonal Restrictions

Material	Minimum Air Temperature (F) During Application	Minimum Dry Pavement Temperature (F)	Start Date	End Date
Waterborne	50	50	May 1	Oct. 15
Low Temperature Waterborne	35	35	Oct. 1	May 1
Regular Dry	25	25	Oct. 1	May 1
Cold Plastic Tape With Contact Cement	60	60	May 1	Oct. 15
Cold Plastic Tape Primerless - without Surface preparation Adhesive	60	60	Jun. 1	Sept. 1
Cold Plastic Tape Primerless - with Surface preparation Adhesive	40	40	Apr. 15	Nov. 15
Thermoplastic	50	50	May 1	Oct. 15
Sprayable Thermoplastic	50	50	Apr. 15	Nov. 15
Polyurea	40	10	Apr. 15	Nov. 15

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare as indicated on the Drawings for layout of pavement markings, symbols, and all associated dimensions, details and requirements.

B. Measure pavement and mark pavement marking locations with chalk lines on parking lots or grease pencil to be sure all dimensions comply with the Drawings.

C. Before applying pavement markings, ensure the pavement surface is clean, dry and in sound condition. Remove any dust, oil, grease, dirt, loose rust and other foreign material. Air blast to remove material that prevents pavement markings from adhering to the pavement surface.

D. Apply longitudinal lines with certified self-propelled pavement marking equipment. Contact the Engineer for approval of using other equipment for special markings or areas inaccessible to self-propelled pavement marking equipment.

E. Provide self-propelled equipment certified with the Equipment Certification Guidelines for Pavement Markings. Certification is effective for 2 years. Operate marking equipment at no greater than the certified speed.

F. Use equipment capable of uniformly applying material to the required length and width. Provide equipment for placing centerlines, capable of applying a minimum of three 4-inch lines on a two-lane road in one pass. If applying multiple centerlines, use 3 spray guns positioned 6 inches on center. For two lane freeways, apply the lane line from the left lane.

G. Use equipment for placing hot-applied thermoplastic and sprayable thermoplastic material that can maintain the temperature recommended by the material manufacturer.

H. Prepare new and existing hot mix asphalt (HMA) surfaces open to traffic for 10 days or less with no oil drips, residue, debris, or temporary or permanent markings, by cleaning the marking area with compressed air.

I. Prepare new and existing Portland Cement Concrete (PCC) surfaces free of oil drips, residue, and debris, temporary, or permanent markings, by removing the curing compound from the area required for pavement markings.

J. Prepare existing HMA or PCC surfaces that do not have existing markings, but may have oil drip areas, or both, by scarifying the marking area using non-milling grinding teeth or shot blasting. Use of water blasting to scarify the marking area on PCC surfaces is allowed.

3.2 PAVEMENT MARKING

A. Apply pavement marking in accordance with state DOT and FHWA requirements.

B. For solid lines, apply 4 inch and 6 inch lines, no greater than 1/4 inch wider than the required width. Apply solid lines with no gaps or spaces. Apply a double line as either 2 solid lines or 1 solid line and 1 broken line.

C. Mix liquid materials during application. Do not thin materials. Uniformly apply pavement marking material at the rates indicated by the manufacturer.

D. Operate striping equipment to prevent traffic from crossing the uncured markings. Prevent vehicles from being sprayed.

E. Apply sharp, well-defined markings, free of uneven edges, overspray, or other visible defects, as determined by the Engineer. Ensure pavement marking lines are straight, or of uniform curvature. Pavement markings are subject to inspection by the Engineer. Remove pavement markings outside the required tolerances and re apply in the correct locations. Also re apply unprotected pavement markings damaged by traffic and remove tracked lines at no additional cost to the Owner.

F. Ensure the material application rates, the temperature and seasonal application restrictions listed in the Table after Paragraph 2.1 G. Also ensure the additional requirements indicated in this Article for specific materials are met when applying any material, unless directed by the Engineer.

G. Protect pavement marking from traffic crossing over uncured paint.

H. Re apply lines washed away or otherwise damaged by rain at no additional cost to the Owner.

I. Regular Dry Paint: Wait at least 14 days after placing the pavement surface before applying regular dry pavement markings to new HMA wearing surface. The Engineer may consider waiving the 14 day waiting period if conditions dictate.

J. Cold Plastic:
   1. Prepare the pavement surface and apply the cold plastic tape in accordance with the manufacturer's specifications.
   2. Remove curing compound from new concrete surfaces before applying cold plastic tape.
   3. Install cold plastic tape legends, crosswalks, and stop bars, as shown on the standard plan requirements, unless otherwise required in the Drawings.

K. Primerless – Without Surface Preparation Adhesive:
   1. Ensure dry weather for at least 24 hours, and dry pavement surface before applying the primerless cold plastic tape marking. Clean the pavement surface using an air compressor with at least 185 cfm air flow and 120 psi.
   2. Immediately after placement, roll transverse and special markings at least 6 times with a roller weighing at least 200 pounds.

L. Thermoplastic:
   1. It is the Contractor's responsibility to ensure the pavement is free of excess surface and subsurface moisture that may affect bonding.
   2. Heat and apply the thermoplastic material within the temperature range recommended by the manufacturer.
   3. Heat and apply the sprayable thermoplastic material within the temperature range recommended by the manufacturer.

M. Polyurea:
   1. Ensure the pavement is free of excess surface and subsurface moisture that may affect bonding.
   2. Surface preparation requirements for special, and longitudinal polyuria pavement markings depend on surface conditions.

3.3 CLEANING

A. Prior to acceptance of the work, clean the pavement and related areas to remove dirt and stones.

END OF SECTION 32 17 23

SECTION 32 92 00 – TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the furnishing and installation of the major items listed below:
   1. Seed.
   2. Fertilizer.
   3. Mulch.
   4. Sod.
   5. Dune grass.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. State DOT Current Standards:
      a. Specifications for Construction.
      b. Standard Plans.

1.4 DEFINITIONS

A. Follow-up Maintenance: Maintenance required when seeding, sodding, or other vegetative practices do not achieve the desired degree of stabilization.

B. Periodic Maintenance: Maintenance performed after the vegetation has been established.

1.5 LOCATION

A. Sodded Areas: As indicated on the Drawings.

B. Seeded Areas: All disturbed areas within the project limits not covered by other surface improvements or features.

C. Mulch Blankets: As indicated on the Drawings.

1.6 SUBMITTALS

A. Action Submittals: Product Data for mulch blanket.

B. Informational Submittals:
   1. Samples: For netting and mulch blanket.
   2. Supplier's certified analysis for each seed and fertilizer mixture required.

1.7 QUALITY ASSURANCE

A. Fabrication and Installation Personnel Qualifications:
   1. Trained and experienced in the fabrication and installation of the materials and equipment.
   2. Knowledgeable of the design and the reviewed Submittals.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in a manner which will prevent deterioration, damage, contamination with foreign matter, and damage by weather or elements, and according to Manufacturer's directions.

C. Reject damaged, deteriorated or contaminated material and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil: In accordance with Division 31 Section “Grading.”

B. Fertilizer:
1. Comply with MDOT 917.10, Class A except as herein specified.
2. Liquid Fertilizer for Hydroseed: 16-32-4 containing no chlorine.

C. Seed:
1. Mixture composed of certified seed of the following purity, germination, and proportions by Weight:
   a. Lawns: Coordinate seed mixture with Owner prior to restoration.
2. Furnish seed in durable bags, each marked by the supplier of the blended mix with a tag giving name, lot number, net weight of contents, purity, and germination.

D. Mulch:
1. Small Grain:
   a. Straw.
   b. Hay.
2. Anchoring Material for Small Grain Mulch:
   a. Netting:
      1) Biodegradable.
      2) Openings not to exceed 1-1/2 inches x 2 inches.
      3) Minimum Roll Width: 35 inches.
      4) Anchoring Staples or Pins: Wood pegs. Steel wire not permitted.
3. Hydromulch:
   a. Slurry: Minimum 60% wood fiber mulch with remaining being recycled cellulose fibers.
   b. Tackifier:
      1) Manufacturers: Finn Fiber Plus; Finn Fiber Gum; or equal.
      2) Synthetic fiber or gum.
4. Mulch Blankets:
   a. Biodegradable:
      1) Straw: North American Green S-150; or equal.
      2) Coconut: North American Green C-125; or equal.
      3) Straw and Coconut: North American Green SCC-225; or equal.
   b. Non Degradable Polyester: North American Green P-300; or equal.
   c. Anchoring Staples or Pins:
      1) Hardwood stakes at least 6 inches long.
      2) North American Green Bio-Stake blanket pins at least 6 inches long.

E. Sod: Comply with MDOT Section 917.13 except as herein specified.

PART 3 - EXECUTION

3.1 TOPSOIL

A. In accordance with Division 31 Section “Grading.”

3.2 SEEDBED PREPARATION

A. General:
   1. After the areas to be seeded have been brought to the required grade and properly trimmed, bring soil to a friable condition by disking, harrowing, or otherwise loosening and mixing to a depth of 3 inches to 4 inches. Thoroughly break all lumps and clods.
   2. If the prepared seedbed is not fertilized, satisfactorily seeded, and mulched before the friable condition is lost through compaction or crusting, repeat the seedbed preparation prior to seeding or reseeding.

B. Raking: Rake prepared seedbed before seeding.

3.3 FERTILIZING

A. Dry Fertilizer:
   1. Broadcast on surface as first step in seeding process.
   2. Apply with seeding if drilled.
   3. Work fertilizer into the soil to a depth of 1-inch to 2 inches.
   4. Apply uniformly.
   5. Application Rate: Equivalent to 240 pounds per acre of 12-12-12.

B. Hydroseeding:
   1. Apply fertilizer with seed.
   2. Application Rate: Equivalent to 6.25 pounds per 1,000 square feet of 16-32-4.

3.4 SEEDING

A. Scheduling:
   1. Within 30 days from the time the area was first disturbed.
   2. Channel Banks: Within 24 hours from the time the area was first disturbed.
   3. Seasonal Limitations:
      a. April 20 through October 1.
      b. Dormant seeding after October 1.

B. Sowing:
   1. Sow the seed following or in conjunction with the fertilizer and while the seed bed is in a friable condition.
   2. Do not sow seeds through mulch.
   3. Application Rate:
      a. Lawn Areas: Sow seed at a minimum rate of 5 pounds per 1,000 square feet.

C. Finishing: Float and lightly compact areas sown by hydro-seeder or the broadcast method to incorporate the seed into the uppermost 1/2-inch of the soil.

D. Method:
   1. Broadcast: Do not seed when wind velocity exceeds 5 miles per hour.
   2. Mechanical drills.
   3. Hydroseeder:
      a. Use only equipment specifically designed for hydraulic seeding application.
      b. Mix seed, fertilizer and pulverized mulch in water until uniformly blended into homogeneous slurry.
      c. Continue mixing during application.

E. Inspection: Areas which are sown by hydro-seeder or the broadcast method shall be visually inspected for uniformity of application; areas in which visual inspection fails to reveal an average of 2 seeds per square inch shall be resown at no additional cost to Owner.

F. Seed on Slopes: Protect seeded slopes against erosion with mulch blanket, netting, asphalt emulsion adhesive or other methods acceptable to Engineer.

3.5 MULCHING

A. Small Grain Mulch:
   1. Application:
      a. Immediately after seeding.
      b. Uniform distribution.
      c. Allow sunlight to penetrate mulch.
   2. Application Rate: Two tons per acre (2-1/2 bales per 1000 square feet).
   3. Anchoring:
      a. Mulch anchoring tool.
      b. Netting.
      c. Asphalt Emulsion Adhesive:
         1) Hold mulch in place with asphalt emulsion or other materials approved by Engineer.
         2) Apply emulsion uniformly at a rate of 200 gallons per acre.
         3) Spray emulsion simultaneously with the mulch or immediately following mulching.
         4) Protect signs, structures, and other objects from being marked or disfigured by adhesive materials.
         5) Do not apply during freezing weather.
      d. Latex-based adhesive.

B. Hydromulch:
   1. Apply with hydroseed or following seeding by other method.
   2. Application Rate: 1,250 pounds per acre.
   3. Do not apply if rain is anticipated within 24 hours. Reapplication is required after rain damage at Contractor's expense.

C. Mulch Blankets:
   1. Netting on top.
   2. Fibers in direct contact with soil.
   3. Staple in accordance with Manufacturer's guidelines for slope conditions.
   4. Direction of Installation:
      a. Direction of flow of water in intermittent and ephemeral drains.
      b. Perpendicular to sideslopes above normal water level in perennial drains.

3.6 SOD BED PREPARATION

A. Make Area to be Sodded:
   1. Smooth and uniform.
   2. Parallel to the finished grade and cross sections indicated on the Drawings.

3.7 MAINTENANCE

A. General:
   1. Contractor: Responsible for follow-up maintenance.
   2. Contractor is responsible for periodic maintenance for 60 days after completion of areas of seeding or sodding.

B. Follow-up Maintenance:
   1. Inspect materials planted in the spring during the summer or early fall, and take corrective action during the fall planting season.
   2. Inspect materials planted in the fall during the spring and take corrective action during this spring planting season.
   3. Reseed, sod, plant, fertilize, mulch, topsoil, grade and roll as necessary to achieve a uniform lawn free from weeds, erosion and/or bare areas.
   4. Water sodded and seeded areas as required to maintain the viability of the Product.

C. Periodic Maintenance:
   1. Mow grass at 2-1/2-inch to 3-inch height and subsequent mowings as required to maintain 2-1/2-inch to 3-inch height.
   2. Spot seed areas damaged by traffic or other means.

END OF SECTION 32 92 00

SECTION 33 05 30 – UTILITY HORIZONTAL DIRECTIONAL DRILLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the design, furnishing and installation of a pipe crossing under a street, without disturbing the surface, except at entry and exit points.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. ASTM Standard Specifications:
      a. D2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and other Gravity-Flow Applications.
      b. D2774 - Underground Installation of Thermoplastic Pressure Pipe.
      c. D3261 - Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
      d. D3350 - Polyethylene Plastics Pipe and Fittings Materials.
      e. F1962 - Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit Under Obstacles, Including River Crossings.
   2. AWWA C906 - Standard for Polyethylene (PE) Pressure Pipe and Fittings, 4 In. (100 mm) Through 63 In. (1,575 mm), for Water Distribution and Transmission
   3. State DOT Current Standards:
      a. Specifications for Construction.
      b. Standard Plans.
      c. Special Provisions for Horizontal Directional Drilling.

1.4 DESIGN AND PERFORMANCE REQUIREMENTS

A. Minimum Requirements:
   1. The requirements herein and indicated on the Drawings are minimum requirements.
   2. Product pipe shall be minimum internal diameter of 4 inches.
   3. Select equipment necessary to provide the indicated finished product in the conditions present at the Site.
   4. If, in the opinion of the Contractor, additional geotechnical investigation is required for the design to define the soil conditions, the Contractor shall obtain additional geotechnical information at no cost to the Owner.
   5. No claim for unforeseen condition will be permitted.
   6. Design shall be performed by an engineer licensed in the state that the work occurs.
   7. Review of submittals by Engineer does not relieve Contractor from responsibilities under this specification.

1.5 SUBMITTALS

A. Delegated Design Action Submittals:
   1. Calculations and drawings to support and identify the pipe class, installation, thrust and tensile forces, and proposed pipe.
   2. Calculations and methods for buoyancy modifications during pull back.
   3. Transition fittings at changes in pipe material.
   4. Horizontal and vertical alignment drawing of the pilot hole at the same scale as the Drawings.
   5. Equipment and materials staging plan, including traffic control.
   6. Method for directional drill.

7. Pullback and torque capacity of drill rig(s).
8. Equipment and method for monitoring the location of the drill head.
9. Project workplan and schedule.

B. Informational Submittals:
1. Evidence of current licensure of design engineer in the state in which the work will occur,
2. Provide a log of the following information:
   a. Drill head location.
   b. Axial and torsional loads.
   c. Drilling fluid discharge rate and pressure.
3. Pipe Manufacturer material certifications.
4. Information on drilling fluids to be used.
5. For HDPE pipe, submit pipe Manufacturer's sworn and notarized statements that Contractor has been trained and certified in the handling and joining of the pipe Manufacturer’s materials.

C. Close-Out Submittals:
1. After completion of the directional drilling operation, provide an as-built drawing.
2. Drawing to Include:
   a. Scale: Same as Drawings.
   b. Tabulation of pipeline depth at 25-foot intervals referenced to a stationed alignment located above the pipe.
   c. Tabulation of horizontal alignment points at 25-foot intervals with points being either witnessed to two permanent landmarks or based upon a surveyed and documented coordinate system.

1.6 QUALITY ASSURANCE

A. Installation Personnel Qualifications:
1. Trained and experienced in the use of directional drilling equipment and installation of the materials, for the specific application of Project.
2. Knowledgeable of the design and in down hole drilling, impact of drilling in various geological formations, sensing and recording instrumentation and interpreting computer printout data.
3. Experienced in a minimum of 5 installations of similar or greater complexity and under similar conditions in the last 5 years.
4. The designated Project superintendent shall be present at the Site during work at the Site. Contractor shall not change Project superintendent without written notice to Owner a minimum of 5 working days in advance of the change. Written notice of change shall include detailed information and rationale for staffing change.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Product Pipe:
1. Allowable Pipe Materials:
   a. HDPE.
2. HDPE Pipe:
   a. Material Minimums:
      1) High density polyethylene pipe compound molecular weight of 0.941.
      2) Material Designation: PE 4710.
      3) Material Classification: Type III, Class C, Category 5, Grade P34; ASTM D1248.
      4) Cell Classification: ASTM D3350 445574C/E, PE 4710.
      5) Manufacturing Standard: ASTM D3350.
      6) Pipe shall contain no recycled compounds except that generated in the Manufacturer’s own plant from resin of the same specification from the same raw material.
   b. Manufacturers: Poly Pipe, Inc., Performance Pipe, ISCO Industries; or equal.]
   c. Butt fused joints using equipment and methods in strict accordance with the pipe Manufacturer’s recommendations and ASTM D3261 and ASTM D2657.
   d. HDPE Fittings:
      1) ASTM D3261.

2) Molded or fabricated from polyethylene compound having a cell classification equal to or exceeding the cell classification of the pipe.
3) Molded Fittings: Pressure rated to match the pipe SDR pressure rating to which they are connected.
4) Fabricated Fittings:
a) Made from pipe with a pressure rating at least 25% greater than the pipe to which they are connected.
b) Angle of bends to have tolerance of ± 1% of required angle.

e. Pipe Joining:
1) Pipe to Fitting Joining: Butt fused using equipment and methods in strict accordance with the pipe Manufacturer's recommendations.
2) Joining Segments of Fabricated Fittings: Butt fused using equipment and methods in strict accordance with the pipe Manufacturer's recommendations.

f. Transitions from HDPE Pipe to Other Materials:
1) AWWA C906.
2) Mechanical joint adapter.
3) Obtain Engineer's review.
4) Manufacturers: Phillips Driscopipe, Inc.; Chevron Chemical Company; Plexco; or equal.

3. Product Pipeline Design: Based on Site conditions, performance criteria, and Contractor's means and methods.
4. Entire pipe line shall meet the same design requirements. Pipe segments with different design criteria will not be allowed without written approval of the Engineer and Owner.

B. Drilling Fluids:
1. Organically inert.
2. Fluid composition shall comply with applicable environmental regulations.
3. Select drilling fluid appropriate for conditions encountered at the Site.

C. Casings:
1. At no additional cost to Owner, install casings as needed for the completion of the work or for protection of existing facilities, utilities, properties, and structures.

D. Detection Wire:
1. Copper wire, solid or braided, with coating to prevent oxidation and deterioration.
2. Minimum Gage: 12 AWG.
3. Secure 2 separate wires to outside of product pipeline.

E. Staging Area Fencing:
1. Orange, plastic safety fence supported by steel fence posts.
2. Minimum Height: 4 feet.
3. Maximum Fence Post Spacing: 8 feet.
4. No vertical sags greater than 6 inches between posts.

F. Water: Owner shall be responsible for supplying water required for the work.

PART 3 - EXECUTION:

3.1 LINE AND GRADE

A. Pilot Hole Alignment:
1. Submit pilot hole alignment data for review prior to reaming and pipe installation.
a. Alignment data is required to ensure compliance with alignment tolerance performance criteria.
b. Alignment data submittal review does not relieve the Contractor of responsibility for determining adequate cover for drill fluid containment or other design considerations.
2. Follow the grade as submitted by Contractor and reviewed by Engineer.
a. Minimum Cover: As indicated on the Drawings.
b. Alignment shall be uniform and not include high points greater than 25% of the pipe's inside diameter.
3. Provide Engineer with a tabulation and plot of the pilot hole coordinate data at 25-foot intervals referenced to a datum line located above the entrance and exit elevations of the drill.

B. Final Product Pipeline:
   1. Unless otherwise constrained by right-of-way or easement limitations, allowable alignment deviation shall be as follows:
      a. At Locations More Than 100 Feet From Each End:
         1) Horizontal: 5 feet.
         2) Vertical: 5 feet.
      b. At Locations Within 100 Feet From Each End:
         1) Horizontal: 2 feet.
         2) Vertical: 0.5 feet

3.2 STAGING AREAS

A. Drill Staging Area:
   1. Disturb as little area as possible while providing adequate area for workers and equipment.
   2. Keep area neat and orderly.
   3. Install and maintain staging area fencing around perimeter.

B. Pipe Staging Area:
   1. Disturb as little area as possible while providing adequate area for workers and equipment and to string, assemble, and inspect pipe.
   2. Keep area neat and orderly.
   3. Install and maintain staging area fencing around perimeter.
   4. Provide protection of exposed ends of pipe to prevent entry by children and animals.

C. Establish and maintain within right-of-way and easement boundaries identified by Owner.

D. Restore to original grade and condition after completion of work.

3.3 INSTALLATION

A. General:
   1. Install pilot hole and pipe in conformance with the reviewed submittals.
   2. Minimize subsurface disruption during drilling and pullback operations, including the setting of casings if necessary due to Site conditions or Contractor's operations.
   3. During pilot hole installation, notify Engineer immediately if partial or full blockage is encountered.
   4. Complete operation as expeditiously as possible.
   5. Disposal:
      a. Locate an acceptable site for disposal of drilling fluids and excess soils resulting from drilling operation.
      b. Be responsible for transport of materials to and from the Site to the disposal area as well as disposal costs.
      c. Disposal shall comply with applicable environmental and right-of-way regulations.
   6. Install and maintain measures to protect existing utilities and physical features from damage during the Project, including but not limited to damage caused by equipment, settlement, or vibration.

B. Vibration and Noise:
   1. Limit vibration to a maximum of 0.08 inches/second on each nearby structure. Provide continual vibration monitoring, maximum of 1 minute data point intervals, on or adjacent to structures affected during activities which may exceed this limit. Provide Engineer with copy of data log.
   2. Limit sound levels to a maximum of 67 dB(A) during non-working hours as measured at nearby occupied structures. Sound levels during working hours shall conform to local regulations, or industry standards if no local regulations exist.

C. Heaving and Settlement:
   1. Actively monitor for signs of heaving and settlement during drilling operations.
   2. Include settling control points on the surfaces or structures as specified below and survey their elevation on a daily basis:
      a. Structures adjacent to the work.
      b. Control point at the intersection of Terminal Drive and Gateway Drive.

c. Other points as determined in the field by Engineer.
d. Other points as required by Contractor.

3. Readings shall be taken with an optical or laser level with an accuracy of ±0.01-foot.

D. Drilling Fluids:
1. Source:
a. Supply materials required for drilling fluids.
2. Inadvertent Returns:
a. Minimize drilling fluid returns at locations other than drilling entry and exit points.
b. Immediately clean up inadvertent returns.
c. Be responsible for paying for costs and obtaining permits required for cleanup efforts.
d. Be responsible to repair damage caused by inadvertent returns.
3. Containment:
a. Ensure that equipment is in working order to prevent leakage.
b. Provide protective measures on the Site to prevent migration of drilling fluids out of the staging areas.
c. Immediately remove and clean-up drilling fluids outside of the containment areas.
d. Protect adjacent waterways and storm water facilities from drill fluid contamination.

E. Drill Head Locating:
1. Establish method for determining the location of the advancing drill head.
2. Calculate and plot true vertical depth, horizontal distance and right and left bearing drift.
3. Verify drill head location at least every 25 feet.

F. Prereaming:
1. Determine if prereaming is required.
2. If prereaming is performed:
a. Determine required diameter to minimize subsurface disruption and allow unhindered pullback of the product pipeline.
b. Ensure that annular space around product pipeline is stabilized to prevent settlement.
3. During the operation, monitor the movement of the reaming head to ensure the hole is free of obstructions along the walls which could reduce the cross section of the installed pipe or which may hinder the pullback of the product pipeline.

G. Placement of Pipe:
1. Pull Back:
a. Use appropriate connection equipment between product pipeline and pullback pipe to eliminate transfer of rotational forces to product pipeline.
b. Support pipe as required to ensure a smooth, freely moving pull back.
c. Control and limit tensile load on the pipe by devices such as hydraulic pressure regulators or load sensors.
d. The maximum tensile load on the pipe shall not exceed the maximum allowable load recommended by the pipe Manufacturer.
2. Detection Wire:
a. Secure the detection wire to the outside of the pipe to prevent the wire from being dislodged, broken, or stretched during pullback.
b. Pull detection wire along with the pipe.

3.4 CLEANING

A. Prior to testing, clean pipe using appropriately sized cleaning swabs. Provide containment, filtering, and disposal required for discharge water. Repeat cleaning swab passes as necessary to remove residual soil and drilling fluid contaminants from the pipeline. Multiple swabs may be run in series at the Contractor’s option.

END OF SECTION 33 05 30

SECTION 33 40 00 – STORM DRAINAGE UTILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the furnishing and installation of a storm sewer system.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. ASTM Standards:
      a. A48 - Gray Iron Castings.
      b. A536 - Ductile Iron Castings.
      c. C14 - Concrete Sewer, Storm Drain and Culvert Pipe.
      d. C55 - Concrete Building Brick.
      e. C62 - Building Brick (Solid Masonry Units Made from Clay or Shale).
      f. C76 - Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.
      g. C139 - Concrete Masonry Units for Construction of Catch Basins and Manholes.
      h. C270 - Mortar for Unit Masonry.
      i. C443 - Joints for Circular Concrete Sewer and Culvert Pipe Using Rubber Gaskets.
      j. C478 - Precast Concrete Manhole Sections.
      k. C497 - Method of Testing Concrete Pipe, Sections or Tile.
      l. C822 - Definitions of Terms Relating to Concrete Pipe and Related Products.
      m. C923 - Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes.
      n. C924 – Standard Practice for Testing Concrete Sewer Lines by Low-Pressure Air Test Method.
      o. C1103 – Standard Practice for Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Line.
      p. D449 - Asphalt Used in Dampproofing and Waterproofing.
      q. D520 - Zinc Dust Pigment for Paints.
      r. D2412 -Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
      s. D3212 - Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
      t. D3350 - Standard Specifications for Polyethylene Plastic Pipes and Fitting Materials.
      u. F405 - Corrugated Polyethylene (PE) Tubing and Fittings.
      v. F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
      w. F449 - Subsurface Installation of Corrugated Thermoplastic Tubing for Agricultural Drainage or Water Table Control.
      x. F667 - Large Diameter Corrugated Polyethylene Tubing and Fittings.
      y. F1417 - Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air.
      z. F2736 - Standard Specification for 6 to 30 in. Polypropylene (PP) Corrugated Single Wall Pipe and Double Wall Pipe.
      aa. F2764 - Standard Specification for 30 to 60 in. Polypropylene (PP) Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications.
   2. AASHTO Standard Specifications:
      a. M36 - Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains.
      b. M167 - Standard Plate for Pipe, Pipe Arches, and Arches.
      c. M190 - Bituminous Coated Corrugated Metal Culvert Pipe and Pipe Arches.
      d. M218 - Steel Sheet, Zinc-Coated (Galvanized) for Corrugated Steel Pipe.
      e. M274 - Steel Sheet, Aluminum-Coated (Type 2) for Corrugated Steel Pipe.
      f. M252 - Corrugated Polyethylene Drainage Piping.
      g. M294 - Corrugated Polyethylene Pipe, 12 to 60-inch diameter.

h. M288 - Geotextiles Used for Subsurface Drainage Purposes as modified in MDOT Section 8.09.02.

3. State DOT Current Standards:
   a. Specifications for Construction.
   b. Standard Plans.

1.4 DEFINITIONS

A. Abbreviations:
   1. RCP - Reinforced concrete pipe.
   2. PE - Polyethylene pipe.
   3. PVC - Polyvinyl chloride.
   4. DIP - Ductile iron pipe.
   5. HDPE - High density polyethylene pipe.
   6. EJ - East Jordan Iron Works.

1.5 SUBMITTALS

A. Action Submittals: For Product Data:
   1. Pipe.
   2. Manholes.
   3. Mandrel.

B. Informational Submittals:
   1. Test Reports: MDOT single and triple spot coating test results for CSP.
   2. Certificates: Manufacturers' certification and sworn statement.

1.6 QUALITY ASSURANCE

A. Fabrication and Installation Personnel Qualifications:
   1. Trained and experienced in the fabrication and installation of the materials and equipment.
   2. Knowledgeable of the design and the reviewed Shop Drawings.

B. Testing of Material Installation:
   1. Light or reflected light test for alignment.
   2. Visual inspection for leakage and workmanship.
   3. Deflection Testing for PVC, PE, HDPE Installation:
      a. Electronic deflectometer.
      b. Rigid "Go-No Go" device.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in a manner which will prevent deterioration, damage, contamination with foreign matter, damage by weather or elements, and in accordance with Manufacturer's directions.

C. Reject damaged, deteriorated, or contaminated material and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. RCP: Premarc Corporation; Northern Concrete Pipe; or equal.

B. PE: Advanced Drainage Systems, Inc.; Hancor, Inc.; or equal.

C. PVC: Contec; JM Eagle; or equal.

D. HDPE: Phillips Driscopipe; ADS; or equal.

2.2 PIPE MATERIALS

A. RCP:
1. General: Type and class as indicated on the Drawings.
2. Types:
   a. Concrete: ASTM C 14.
   b. Reinforced Concrete (RCP): ASTM C76.
3. Joints:
   a. Premium: Rubber gasket joints on grooved or stepped pipe ends. Lubricants by pipe Supplier.
   b. Geotextile Fabric:
      1) Nonwoven.
      2) Width: 3 feet.
      3) Physical Requirements:
         a) Schedule:

	Geotextile Blanket	Geotextile Blanket with MDOT Class II Backfill
Grab Tensile Strength (Minimum), Lbs.	90	
Trapezoid Tear Strength (Minimum), Lbs.	45	
Puncture Strength (Minimum), Lbs.	45	
Mullen Burst Strength (Minimum), PSI	140	100
Permittivity Per Second, Sec^{-1}	0.5	
Apparent Opening Size (Maximum), MM	0.21	0.30 (Pavement and Foundation Underdrains) 0.60 (Other Areas)

         b) For pipe wrap where backfill around the pipe meets MDOT granular material Class II requirements; geotextiles, including knitted polyester sock, which meet the following minimum requirements in the applied condition area permitted:
            (1) Mass/Unit Area: 3.0 oz/sq. yd.
            (2) Mullen Burst Strength: 100 psi.
            (3) Maximum Apparent Opening Size: 0.30 mm for pavement and foundation underdrains; and 0.60 mm in all other areas.
      4) Manufacturers:
         a) Hoechst Celanese Corporation: Trivira 011/250.
         b) Amoco Fabric Company: Propex 4553.
         c) Mirafi, Inc.: Mirafi 180N.
         d) Or equal.

B. PE Pipe:
1. General:
   a. ASTM D3350.
   b. Agricultural Drainage and Ground Water Capture System:
      1) 3-inch to 6-inch Diameter: ASTM F405.
      2) 8-inch to 24-inch Diameter: ASTM F667.
   c. Highway Culverts and Underdrains:
      1) 3-inch to 10-inch Diameter: AASHTO M252.
      2) 12-inch to 60-inch Diameter: AASHTO M294.
2. Types:
   a. Type as indicated on the Drawings.
   b. Double walled.
      1) 3-inch to 10-inch Diameter: AASHTO M252.
      2) 12-inch to 60-inch Diameter: AASHTO M294.
   c. Manufacturer: Hancor Sure-Lok; ADS N-12; or equal.

3. Filter Socks:
   a. Knitted polyester.
   b. AASHTO M288.
4. End Sections:
   a. As indicated on the Drawings.
   b. Type: Flared End Section.
   c. Material and Coating: Match pipe.
5. Joints:
   a. Gasketed Snap Coupler:
      1) Integral bell.
      2) Minimum Pull Apart Strength: 400 pounds.
      3) AASHTO M294.
      4) Manufacturers: Hancor HI-Q Sure-Lok; ADS Prolink 5.0.; Hancor Sure-Lok 10.8; or equal.
   b. Split Coupler:
      1) In conjunction with a plastic strap which can be tightened around the coupling.
      2) Used for pipe diameter for which gasketed snap covers are not available.
6. Fittings: AASHTO M294.

C. PVC Pipe:
1. General: Type and schedule as indicated on the Drawings.
2. Types:
   a. Smooth Walled:
      1) 4-inch to 15-inch ASTM D3034.
      2) 18-inch to 48-inch ASTM F679.
   b. Ribbed ASTM F794.
   c. Perforated: 1/4-inch diameter holes at 6 inches on center at 90 degrees from previous perforation.
3. Section Properties:
   a. SDR 35.
   b. Schedule 40.
4. Joints:
   a. Push-on Type Joint.
   b. ASTM D3212.
5. Fittings: Manufactured and furnished by the pipe Supplier.

D. Corrugated High Density Polyethylene (HDPE) Pipe:
1. ADS N-12, ST, MEGA GREEN ST; or equal.
2. Material for pipe production shall be an engineered compound of virgin and recycled high-density polyethylene conforming with the minimum requirements of cell classification 424420C (ESCR Test Condition B) for 4-inch through 10-inch diameters, and 435420C (ESCR Test Condition B) for 12-inch through 60-inch diameters, as defined and described in the latest version of ASTM D3350, except that carbon black content should not exceed 4%.
3. Soil Tight Joints:
   a. 4-inch through10-inch pipe shall meet AASHTO M252, Type S or SP.
   b. 12-inch through 60-inch shall meet AASHTO M294, Type S or SP or ASTM F2306.
   c. Pipe shall be joined using a bell and spigot joint meeting AASHTO M252, AASHTO M294 or ASTM F2306.
   d. Soil Tight Joints shall meet the requirements of ASTM F477.
   e. Soil Tight Fittings shall conform to AASHTO M252, AASHTO M294, or ASTM F2306.

2.3 MANHOLES, CATCH BASINS AND INLETS

A. Type of Units:
1. As indicated on the Drawings:
2. Precast Reinforced Concrete:
   a. Base Section: ASTM C478, base riser section with integral floor.
   b. Riser and Cone Sections: ASTM C478.
   c. Joints: Premium: ASTM C443, rubber gasket.

B. Hardware:
1. Steps:
a. General:
1) 10 inches deep x 10 inches wide.
2) Tread:
a) Depth: 5 inches.
b) Rail Height: 2 inches.
b. Steel rod, 1/2-inch, encapsulated in co-polymer polypropylene.
2. Castings:
a. Manholes: EJIW 1040A; or equal.
b. Catch Basins: EJIW 6508; or equal.
c. Curb Catch Basins: EJIW 7045; or equal.
d. As indicated on the Drawings.
3. Mortar: ASTM C270, Type M.
4. Brick:
a. Concrete: ASTM C55, Type I, Grade N.
5. Grade Rings: ASTM C478. EJIW: Intra-riser.
6. Concrete: MDOT S3.
7. Waterproofing:
a. Bituminous: ASTM D449.

2.4 TRENCH DRAIN

A. General:
1. Precast, presloped polymer concrete.
2. Premanufactured in 4-foot minimum lengths.
3. Ductile iron slotted grates.

B. Manufacturer: Quazite Polycast, Series 700.

PART 3 - EXECUTION

3.1 PREPARATION

A. Alignment and Grade:
1. If there is a grade discrepancy or an obstruction which is not indicated on the Drawings, notify Engineer and obtain instructions prior to proceeding.
2. Where Storm Sewer Crosses Water Main:
a. Expose water main prior to laying storm sewer to verify existing depth.
b. Maintain minimum clearance of 18 inches unless otherwise indicated on the Drawings or approved by Engineer.
c. Space joints equidistant from crossing.
3. Control:
a. Level and Grade Rod: Check line and grade at each structure or cleanout, and 25 foot intervals thereafter.
b. Laser Beam:
1) Check Line and Grade At: Set-up point, 25 feet, 50 feet, 100 feet and 100-foot intervals thereafter.
2) Reset projector at each manhole with a 600 feet maximum.
c. Allowable Deflection:
1) Horizontal: 0.20 feet.
2) Vertical: 0.10 feet.

3.2 INSTALLATION

A. General:
1. Install pipe, fittings and appurtenances in accordance with Manufacturer's recommendations except as herein specified or indicated on the Drawings.
2. Prevent entrance of foreign material.
3. 12-inch and Larger P.E. Pipe: Excavate trench with a hydraulic excavator or backhoe. Trenching machines (wheel, bucket, etc.) will not be allowed.

B. Pipe Laying:
1. Bearing: Support entire length of pipe barrel evenly with extra excavation at joints.
2. Direction: Commence at outlet and proceed up grade with spigot ends pointing in direction of flow.
3. Method:
   a. Wipe clean the socket of pipe last laid.
   b. Center spigot end of pipe to be laid and push home against base of socket.
   c. Center pipe to form a sewer with a uniform invert.

C. Jointing:
1. Mastic:
   a. Surfaces of Joint: Clean and dry before mastic is applied.
   b. Apply mastic to a depth of 1/2-inch or more before placing the pipe.
   c. Take care in laying that the pipe does not shift and that it remains in a home position after assembly.
   d. Remove mastic from inside the pipe for diameters 36 inches and larger.
2. Lubricants: As required for gaskets.
3. Gaskets:
   a. Surfaces of Joint: Clean and dry before lubricant is applied.
   b. Take care in laying that the pipe does not shift and that it remains in a home position after assembly.
4. Band Connector for CSP:
   a. Bar, Bolt and Strap: Tighten bolts to a torque of 100 to 300 foot pounds.
5. External Sealing Band:
   a. In accordance with Manufacturer's recommendations.
   b. Ensure stretch of band along bottom of pipe and prevent pulling the sealing band into the joint by keeping the weight of the pipe off the bedding until band is fully installed.
6. Geotextile Wrap: Wrap around joint surfaces.
7. Allowable Joint Tolerance:
   a. Maximum: 1/2-inch at newest surfaces of the joint.
   b. Allowable joint tolerance shall not affect the lines and grades and their permissible to tolerances.

D. Manholes:
1. Base Section Placement: Full and even bearing.
2. Precast Units: Mortar joints, lift holes, and around pipes.
3. Block Units:
   a. Block: Set in full bed of mortar with key slots filled.
   b. Joints: Maximum 1/2-inch wide at inside face and wiped.
4. Top of Casting Elevation:
   a. Gravel Areas: 6 inches below surface.
   b. Bituminous Base Course: At base course grade.
   c. Final Wearing Surface:
      1) At finished grade.
      2) Adjustment of castings from base course grade to finished grade is incidental.
      3) Ditches: 6 inches below ditch bottom or protruding not more than 6 inches above slope; as applicable.
      4) Other Areas: As directed by Engineer or indicated on the Drawings.
5. Waterproofing: Prevent visible leakage.
6. Refer to standard detail on the Drawings.

E. Catch Basins:
   1. Base Section Placement: Full and even bearing.
   2. Precast Units: Mortar joints, lift holes and around pipes.
   3. Block Units:
      a. Block: Set in full bed of mortar with key slots filled.
      b. Joints: Maximum 1/2-inch below gutter grade.
      c. Sump: 1/2-inch mortar coat inside and outside.
   4. Casting Elevation:
      a. Gutter Area: 1/2-inch below gutter grade.
      b. Other Areas: As indicated on the Drawings or directed by Engineer.
   5. Waterproofing: Prevent visible leakage.
   6. Refer to standard detail on the Drawings.

F. Connections:
   1. To Existing Structures: Relay and repoint loose blocks and bricks as required.
   2. For Future Use:
      a. Bulkhead: With 8-inch thick brick and mortar and 1/2-inch plaster outside.

3.3 REPAIR

A. Treatment of Field Welds and Damaged Galvanized Steel Surfaces:
   1. Clean with wire brush.
   2. Two coats of zinc rich paint conforming to ASTM D520.

3.4 CLEANING

A. Debris: Remove all dirt and debris, including cemented or wedged material from the inside of all sewers, manholes, and catch basins.

B. Final Acceptance: Clean all sewers, manholes, and catch basins before requesting final acceptance.

3.5 TESTING AND INSPECTION

A. Observation: By Engineer.

B. Notification: Arrange for testing with Engineer following backfill, cleaning, and pretesting.

C. Equipment and Manpower: Provide everything required for testing.

D. Alignment and Grade Tests:
   1. Visual:
      a. Each manhole to manhole section.
      b. Mirrors or Lights: Adequate to illuminate the section.
   2. Laser Beam:
      a. Set Laser Beam and Target:
         1) At respective manholes.
         2) Sequentially at 3/4-inch Offset From:
            a) Invert.
            b) Crown.
            c) Left 1/4 point.
            d) Right 1/4 point.
      b. One or More Laser Beam Discontinuous:
         1) Remove and replace section.
         2) Undamaged pipe may be reused.

E. Deflection Test for Plastic Pipe:
   1. Go-No Go Gage:
      a. Standard Details in the Drawings.
      b. Gage O.D.: Not less than 95% of maximum inside pipe diameter.

2. Allowable Maximum Deflection: 5 % of diameter.
3. Pull Go-No-Go Gage Through Each Section:
   a. At least 30 days after completion of backfill.
   b. Pulled by one person with no mechanical advantage.
4. Go-No Go Gage Will Not Pass:
   a. Remove and replace section. Undamaged pipe may be reused.
   b. Vibratory Rerounding Device: Use not permitted.

END OF SECTION 33 40 00

SECTION 33 41 16 – SUBDRAINAGE PIPING (UNDERDRAINS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the furnishing and installation of an underdrain system.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. ASTM Standards:
      a. D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
      b. D4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
      c. D7001 - Standard Specification for Geocomposites for Pavement Edge Drains and Other High-Flow Applications.
      d. D4491 -Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
      e. D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
   2. AASHTO:
      a. M 252 Corrugated Polyethylene Drainage Tubing.
      b. M 288 Geotextiles Used for Subsurface Drainage Purposes.

1.4 SYSTEM DESCRIPTION

A. Underdrain System:
   1. Perforated pipe wrapped with a geotextile sock, or
   2. Perforated pipe bed in stone with geotextile wrap.
   3. Perforated pipe bed with stone or granular material.

1.5 SUBMITTALS

A. Action Submittals:
   1. Pipe materials.
   2. Geotextile fabric.
   3. Aggregate: ASTM Designation, or sieve analysis.

1.6 QUALITY ASSURANCE

A. Fabrication and Installation Qualifications:
   1. Trained and experienced in the fabrication and installation of the materials and equipment.
   2. Knowledgeable of the design and the reviewed Shop Drawings.

PART 2 - PRODUCTS

2.1 UNDERDRAIN PIPE

A. Single Wall High Density Corrugated Polyethylene (HDPE):
   1. Manufacturer: Advanced Drainage Systems, Inc.; or equal.
      a. Pipe:
         1) Perforated Round Single Wall: ADS Single Wall Highway Pipe; or equal.
         2) Perforated Edge Drain: ADS AdvanEDGE; or equal.
         3) Size as indicated on the Drawings.

4) Round Pipe: AASHTO M252, Type C or CP.
5) Edge Drain: ASTM D7001.
6) Material Properties: Virgin polyethylene compounds that comply with cell classification 424420C as defined in ASTM D3350.

b. Joints:
1) AASHTO M252 or AASHTO M294.
2) Soil tight split or snap couplings.

c. Fittings: AASHTO M252 or 294.

d. Cleanouts:
1) Solid wall, no perforations.
2) Same diameter as buried pipe.

2.2 GEOTEXTILES

A. Non Woven, Spun Bound.

B. Water Flow Rate: 150 gallons per minute per square foot, in accordance with ASTM D4491.

C. Tensile Strength: 60 pounds in accordance with ASTM D4632.

2.3 AGGREGATES

A. Clean washed open graded stone.

B. AASHTO M 43, No. 8 Aggregate (3/8-inch), or MDOT 43R.

PART 3 - EXECUTION

3.1 PREPARATION

A. Alignment and Grade:
1. If there is an obstruction which is not indicated on the Drawings, deflect underdrain under obstruction.
2. Slope: Maintain minimum 0.5% slope unless Drawings indicate otherwise.
3. Control:
a. Level and Grade Rod: Check line and grade at cleanout and 50-foot intervals thereafter.

3.2 INSTALLATION

A. Install in conformance with ASTM D2321 and the Manufacturer's recommendations.

B. General:
1. Line and Grade: Provide for outlet to storm sewer, ditch, sump pump, or storm water pumping station.
2. Prevent soil and debris from entering system.

C. Geotextile Fabric:
1. Placement.
2. Wrap outside of stone to prevent soil from entering stone, if stone bedding is used.

D. Pipe Laying:
1. Bedding: Inside a bedding of drainage stone or granular material as indicated on the Drawings.
2. Bearing: Support entire length of pipe evenly.
3. Direction: Commence at outlet and proceed up grade.

E. Jointing for Couplings: Furnished by pipe Manufacturer.

F. Cleanouts:
   1. Use solid wall PVC pipe.
   2. Prefabricated wye and elbow or double elbow furnished by pipe Manufacturer.
   3. Location as indicated on the Drawings.
   4. Refer to standard detail on the Drawings.

3.3 CLEANING

A. Remove all dirt and debris from the inside of all pipes.

B. Final Acceptance: Visible inspection by Engineer prior to backfilling.

END OF SECTION 33 41 16