



**NORTHEAST OHIO REGIONAL
SEWER DISTRICT
CLEVELAND, OHIO**

CONTRACT DOCUMENTS

VOLUME 1 OF 3

DIVISIONS 00 THROUGH 33

FOR

Doan Brook Stream Enhancement Project



MARCH 2013

NORTHEAST OHIO REGIONAL SEWER DISTRICT

CONTRACT DOCUMENTS

FOR

**DOAN BROOK STREAM ENHANCEMENT PROJECT
NEORS D PROJECT 1131**

MARCH 2013



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State Board of Registration for Professional Engineers and Surveyors

2/25/2013

Brent A Brown
2513 N 90th Street
Wauwatosa WI 53226

Brent A Brown:

In accordance with your application for registration as a Professional Engineer in Ohio by comity (pursuant to Ohio Revised Code 4733.19) and having supplied proof of registration to practice said profession in another state, you are hereby authorized to practice temporarily in the state of Ohio pursuant to R.C. 4733.18(A). This temporary permit is only valid during the time your application for registration by comity is being processed and reviewed by the Ohio Board. This temporary permit is valid for 60 days. Should the Board disapprove your registration by comity, this temporary permit would terminate on the date of denial and you must cease and desist from practicing in Ohio immediately.

This temporary permit is issued to you as an individual and is not a permit for your firm. Pursuant to Ohio Revised Code 4733.16, a firm must obtain a Certificate of Authorization in order to offer or provide engineering or surveying services in Ohio.

Any contracts, drawings or other engineering work product must be signed and sealed with the professional seal of the state where you are currently registered and must include the following:

Under temporary authorization from the Ohio State Board of Registration for Professional Engineers and Surveyors while my application for professional registration in Ohio is pending. This temporary authorization to practice is good for 60 days and expires on April 25, 2013.

STATE BOARD OF REGISTRATION FOR
PROFESSIONAL ENGINEERS AND SURVEYORS

John Greenhalge
Executive Director

NORTHEAST OHIO REGIONAL SEWER DISTRICT
DOAN BROOK STREAM ENHANCEMENT PROJECT

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LEGAL NOTICE

NORTHEAST OHIO REGIONAL SEWER DISTRICT

Doan Brook Stream Enhancement Project

Sealed Bids will be received at the office of the Director of Finance of the Northeast Ohio Regional Sewer District (NEORSD) located at 3900 Euclid Avenue, Cleveland, Ohio 44115 until 2:00 P.M. Official Local Time on **Tuesday, April 9, 2013**, at which time Bids received will be publicly opened and read aloud for the Doan Brook Stream Enhancement Project.

In general, the work shall consist of furnishing all labor, materials, equipment, and incidentals for construction of the following work:

- Stabilization of earthen side slopes
- Repair and construction of sandstone block walls
- In-stream structures
- Sculpture Play and Bioretention Areas
- Stream Bank Terraces
- Temporary public parking lot
- Existing parking lot resurfacing
- Landscaping
- 2-years of monitoring and maintenance

A pre-bid conference has been set for **1:00 PM** local time on **Tuesday, March 19, 2013** at the **Northeast Ohio Regional Sewer District Environmental and Maintenance Services Center (EMSC) located at 4747 East 49th Street, Cuyahoga Heights, Ohio**. This meeting has been set in order to provide all potential Bidders an opportunity to discuss with the Owner all aspects of the Contract Documents for the Doan Brook Stream Enhancement Project. Any changes, additions and/or deletions resulting from this pre-bid conference will be covered in an addendum to the Contract Documents. A project site visit may follow the pre-bid conference.

Drawings, Specifications and Bid Forms and subsequent addenda will be available for download from a project-specific NEORSD Sharefile site. Prospective bidders will be required to register to obtain a Sharefile account to access these documents. The NEORSD will post the link to the Sharefile site on the NEORSD's Bids website (www.neorsd.org/bids). Prospective bidders are strongly encouraged to frequently monitor the Bids website for project updates and addenda. The NEORSD will not be responsible or liable for project addenda that are not received by the bidder due to incorrect or out-of-date contact information.

The NEORSD reserves the right to reject any and all Bids, to waive any informalities or irregularities in the Bids received in accordance with applicable state laws. Bidders shall review the Instructions to Bidders and all other contract documents prior to submitting a bid for this project.

The Contract will be subject to the NEORSD policies and goals regarding the use of minority and women business enterprises (MBE/WBE). This policy is contained in the Bid Booklet. **The MBE/WBE goal for this Contract is 20%.**

The Engineer's Estimate for the Doan Brook Stream Enhancement Project is \$3,900,000.00.

All questions regarding the Contract Documents shall be directed to the Project Manager for the NEORSD, Kimberly Colich at (216) 881-6600 or e-mail ColichK@neorsd.org.

Bid File No: EB-2309

Resolution No. 35-13

Date: March 7, 2013

Advertised :

The Cleveland Plain Dealer:

- March 11, 2013
- March 18, 2013

RESOLUTION

<< PLACEHOLDER >>



INSTRUCTIONS TO BIDDERS

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ARTICLE 1
DEFINITIONS

See Article 1 of the General Terms and Conditions.

ARTICLE 2
ADVERTISEMENT

Information concerning title of Bid, Resolution Number of the Board of Trustees of the Northeast Ohio Regional Sewer District (hereafter designated as the District) and place and dates of advertisement appears in the Legal Notice to Bidders.

ARTICLE 3
BIDS

Sealed Bids endorsed and submitted on the Bid Form(s) will be received at the office of the Director of Finance of the Northeast Ohio Regional Sewer District, 3900 Euclid Avenue, Cleveland, Ohio 44115, until the official time on the date indicated for the "Bid Opening" in the Legal Notice to Bidders. Bids received prior to the advertised hour of opening will be kept securely sealed. The officer whose duty it is to open them will determine when the specified Bid Opening time has arrived, and no Bid received thereafter will be considered. Bids will be opened and publicly read aloud, irrespective of any irregularities therein, at the District's public meeting room, 3900 Euclid Avenue, Cleveland, Ohio 44115. All Bids received in conformity with these Contract Documents shall, as soon as practicable, be tabulated. All materials submitted, whether or not in conformity with the Contract Documents, shall become public records.

ARTICLE 4
FORM OF BID

- A. Every Bid must be submitted on the forms supplied by the District in the Bid Booklet and shall give the price of each and every Item of Work bid on, in figures (digits), and must contain the full name of every person, firm or corporation comprising the Bidder, and the address of the person, firm or the president and secretary of the corporation bidding; and, if a corporation, the Bid must give the name and the state in which it is incorporated.
- B. The Bid Booklet must be submitted un-mutilated in a sealed envelope. The envelope shall clearly state the following information for the project including a large notation of "Bid Booklet" on the front:

Bidder Name: _____
Project Name: _____
Bid File Number: _____
Bid Opening Date: _____
Bid Submission Date and Time: _____

The District shall take no responsibility for mislabeled or unidentified bids which are inadvertently opened early and may have to be excluded from consideration.

- C. The District may consider as informal any Bid on which there is an alteration of or departure from the Bid Form attached hereto and, at its option, may reject the same.
- D. The award of the Contract, will be made to the lowest and best Bidder whose Bid complies with all the requirements prescribed. , Where Alternate Bids are taken, the award will be made on the basis of determining the lowest and best acceptable Bid for the selected Alternate(s). In no case will an award of a Contract be made by the District until all necessary investigations have been completed regarding the qualifications of the Bidder to whom it is proposed to award the Contract and all alternate Bids, if any, have been evaluated. The successful Bidder will be notified that its Bid has been accepted and that it has been awarded the Contract.
- E. The District reserves the right to require the Bidder to present satisfactory evidence beyond that required in Article 13, Bidder's Qualifications, that it has been regularly engaged, as either principal or superintendent, in the business or work similar to that for the Bid herein. The Director may also require the Bidder to present satisfactory evidence that it is fully prepared with the necessary capital, material, machinery, personnel and equipment to conduct the Work to be contracted to the satisfaction of the District, and to begin promptly when so ordered.
- F. The District reserves the right to reject any Bid from any bidder that, within five (5) years prior to the bid opening date, is or has been:
 - 1. in arrears or declared to be in default to the District upon any contract or debt, or has otherwise failed to perform faithfully, fully, and completely any previous contract with the District;
 - 2. in arrears or declared to be in default to another public or private entity upon any contract or debt, or has otherwise failed to perform faithfully, fully, and completely any previous contract with another public or private entity;
 - 3. in default, as surety or otherwise, upon any obligation to the District; or
 - 4. in default, as surety or otherwise, upon any obligation to another public or private entity.

The District further reserves the right to reject any Bid from any bidder that:

1. proposes to utilize any subcontractor, supplier, or vendor that is or has been in arrears or declared to be in default to the District upon any contract or debt, or has otherwise failed to perform faithfully, fully, and completely any previous contract with the District within five (5) years prior to the bid opening date; or
2. proposes to utilize any subcontractor, supplier, or vendor that is or has been in arrears or declared to be in default to another public or private entity upon any contract or debt, or has otherwise failed to perform faithfully, fully, and completely any previous contract with another public or private entity within five (5) years prior to the bid opening date.

This paragraph shall apply to any proposed subcontractor, supplier, or vendor that has common ownership or control, or right of control, of any person, firm, corporation, joint venture, or joint venture partner that committed any of the above.

The District reserves the right to permit any bidder to substitute another subcontractor, supplier, or vendor for any subcontractor, supplier, or vendor who would otherwise cause the Bid to be rejected for the above-referenced reasons at no adjustment in the Bid amount or allocation of the Bid amount.

The term “bidder” as used in this paragraph shall refer to any person, firm, corporation, partnership, joint venture, or individual joint venture partner.

This paragraph shall apply equally to any person, firm, or corporation that has committed any of the above while performing as a prime contractor, a subcontractor, or as a joint venture partner under a joint venture arrangement, even if such person, firm, or corporation is submitting a bid as a partner in a different joint venture arrangement, and regardless of whether the bidder was the managing joint venture partner under the prior joint venture. Further, this paragraph shall apply to any person, firm, corporation, joint venture, or individual joint venture partner submitting a bid that has or previously had within the last five (5) years common ownership or control of any person, firm, corporation, subcontractor, joint venture, or joint venture partner that committed any of the above.

ARTICLE 5

PRICES

- A. For all Items, the unit and/or lump-sum prices must be stated, in ink, separately in figures (digits) in the proper columns of the Bid. The successful Bidder shall be required to provide a breakdown of labor and material prices in a schedule of values within ten (10) days after issuance of Notice to Proceed.

- B. Where "units" are shown, insert the price "per unit." Where "lump sum" is indicated, insert the complete price for performing all Work under the Item.

ARTICLE 6

ALTERNATE BIDS

A proper Bid must be made for every Item shown on the Bid Form or Bid Form pages for each Contract for which a Bid is being submitted. Where Alternate Bid Items are indicated, the Bidder shall bid on one and may bid on all of the Alternates. The District reserves the right to select any one of the Alternates on which a Bid is submitted, without regard to price comparisons between Alternates. If no Bid is indicated for any Item, the District shall assume that the Bidder has submitted no Bid for that Item.

ARTICLE 7

NAME OF BIDDER

Each Bid must be clearly signed with the full name and address of each person, firm or corporation comprising it. In case of a partnership, the firm's name and address and the name and address of each individual party must be given. If the Bidder is a joint venture, each party's name and address must be given.

ARTICLE 8

SIGNATURE OF BIDDER

- A. The firm, corporate or individual name of the Bidder must be signed by the Bidder in the space provided for the signature on the Bid Form. If the Bidder is a corporation, the name of the corporation, the name and title of the officer duly authorized to sign for the corporation, the business address of such officer and the name of the state in which the corporation is chartered must be given. If the Bidder is a partnership, the signature of at least one of the partners must follow the firm's name, using the term "member of firm." If the Bidder is an individual, use the term "doing business as" or "sole owner."
- B. All successful Bidders who are corporate bodies shall furnish at the time of the execution of the Contract a resolution of the Directors of the Corporation evidencing authority of the officer signing the Contract to do so. Agents of Bonding Companies shall furnish Power of Attorney bearing the Seal of the Company evidencing such agents' authority to execute the particular type of Bond returned.
- C. In the event that the Bidder is a joint venture, there shall be submitted with the Bid certifications signed by authorized officers of each of the parties to the joint venture identifying who shall sign all documents for the joint venture, and, should the joint venture be the successful Bidder who shall act in all matters relative to the Contract resulting therefrom for the joint venture.

ARTICLE 9
BIDDER'S AFFIDAVITS

Each Bidder is required to submit with its Bid a non-collusion affidavit on the form contained in the Bid Booklet. If the Bidder is a joint venture, the Bidder must attach a copy of the joint venture agreement to the non-collusion affidavit.

ARTICLE 10
BID GUARANTY

- A. Each Bid submitted to the District shall be accompanied by a Bid Guaranty in the form of either:
1. A Bond in the form contained in the Bid Booklet for the full amount of the Bid stated in dollars and cents. A percentage is not acceptable.

or
 2. A certified check, cashier's check, or irrevocable letter of credit pursuant to Chapter 1305 of the Ohio Revised Code in an amount equal to ten percent (10%) of the full amount of the Bid.
- B. If a Bond is submitted as a Bid Guaranty, it shall be secured by a guarantee of a surety company authorized to do business in the State of Ohio and listed in the latest issue of U.S. Treasury Circular 570. The amount of the Bond shall be within the maximum amount specified for such company in the tables of said Circular 570. Personal sureties are not acceptable. The current Power of Attorney for the person who signs for any surety company shall be attached to the Bond. Said Bond shall be conditioned to:
1. Provide that, if the Bid is accepted, the Bidder will, after the award of the Contract, enter into a proper Contract in accordance with the Contract Documents. If for any reason, other than as provided by law, the Bidder fails to enter into the Contract, and the District awards the Contract to the next lowest Bidder, the Bidder and the Surety on its Bond shall be liable to the District for the difference between its Bid and that of the next lowest bidder, or for a penal sum not to exceed ten percent (10%) of the amount of the Bond, whichever is less. If the District does not award the Contract to the next lowest bidder but resubmits the project for bidding, the Bidder failing to enter into the Contract and the Surety on its Bond shall be liable to the District for a penal sum not to exceed ten percent (10%) of the amount of its full Bid or the costs in connection with the rebidding of the Project, required advertising, and administrative costs, whichever is less.

2. Indemnify the District against all damage suffered by failure to perform the Contract according to its provisions and in accordance with the Contract Documents and to pay all lawful claims of Subcontractors, Materialmen, and Laborers for labor performed or material furnished in carrying forward, performing, or completing the Work; and agree and assent that this undertaking shall be for the benefit of any Subcontractor, Materialman, or Laborer having a just claim, as well as for the District.
- C. If the Bid Guaranty is in the form of a certified check, cashier's check or irrevocable letter of credit, it shall be attached in the space provided on the page entitled "Bid Guaranty," and must be made payable to the order of "Northeast Ohio Regional Sewer District." Cash deposits will not be accepted. If the Bidder submits either a certified check, cashier's check or irrevocable letter of credit as a Bid Guaranty, it must be accompanied by a properly and duly executed Consent of Surety from an approved surety company licensed to do business in the State of Ohio agreeing to furnish the Bond described in Article 21 upon the award of the Contract. Said Consent of Surety shall be on the form included in the Bid Booklet.
 - D. If the Bid Guaranty is in the form of a certified check, cashier's check or irrevocable letter of credit, the Bid Guaranty shall be conditioned to provide that if the Bid is accepted, the Bidder will, after the award of the Contract, enter into a proper Contract in accordance with the Contract Documents. If for any reason, other than as provided by law, the Bidder fails to enter into the Contract, and the District awards the Contract to the next lowest bidder, the Bidder shall be liable to the District for the difference between its Bid and that of the next lowest bidder, or for a penal sum not to exceed ten percent (10%) of the full amount of the Bid, whichever is less. If the District does not award the Contract to the next lowest bidder but resubmits the project for bidding, the Bidder failing to enter into the Contract shall, except as provided by law, be liable to the District for a penal sum not to exceed ten percent (10%) of the full amount of the Bid or the costs in connection with the rebidding of the Project, required advertising, and administrative costs, whichever is less.

ARTICLE 11

DISPOSITION OF BID GUARANTY

- A. In case a Bid is rejected, or in case a Bidder is determined not to be the lowest and best bidder, the Bid Guaranty submitted with the Bid will be released or returned to the unsuccessful Bidder.
- B. If a Bidder submits a certified check, cashier's check or irrevocable letter of credit as the Bid Guaranty, and the Bid is accepted, the Bid Guaranty will be returned after the Contract has been signed and the Bond required by Article 21 has been furnished and approved by the Legal Department of the District.

ARTICLE 12
ADDENDA

If any person contemplating submitting a Bid for the proposed Contract has a question as to the meaning of any part of the Drawings, specifications or other documents pertinent to the Bid, he or she may submit to the District a written request to the contact provided in the Advertisement for Bids for an interpretation thereof. The person submitting the request will be responsible for its prompt delivery. Any interpretation of the Bid Documents will be made only by Addendum duly issued. A copy of such Addendum will be posted through the "Bids and Proposals" section of the District's website at www.neorsd.org and within the project specific ShareFile site that also contains the original contract documents. The District will not be responsible for any explanation or interpretation of the Bid Documents made other than by addenda duly issued, including any oral communications by its employees, agents or others.

ARTICLE 13
BIDDER'S QUALIFICATIONS

The Bidder must furnish on the Bidder's Qualification Questionnaire form included in the Bid Booklet information such as evidence of financial responsibility, a list of available facilities including equipment and personnel, and evidence of ability to perform the Contract based upon projects of a similar nature. The District may require the Bidder to identify contact persons for such projects to facilitate investigation of the Bidder's qualifications.

ARTICLE 14
APPROXIMATE QUANTITIES

Where Bids are based upon estimated quantities, it is understood that the estimates are prepared by the District for the purpose of comparison of Bids, and that the estimated quantities are not guaranteed but are approximate only, and that the District reserves the right to increase, decrease or omit any one or more items, at the unit price bid, as the District may deem desirable.

ARTICLE 15
FAMILIARITY WITH THE WORK

- A. The Bidder, before submitting a Bid, shall carefully examine all Contract Documents and all available information with respect to buildings, surface and subsurface conditions; shall visit the site to make a thorough investigation of conditions that may in any manner affect the performance of the Work; shall familiarize itself with federal, state and local laws, ordinances, rules and regulations affecting performance of the Work; and shall carefully coordinate its observations with the requirements of the Contract Documents. The Bidder's obligations hereunder shall include, but not be limited to, making such additional

surveys and investigations, including subsurface investigations, as the Bidder may deem necessary to determine its bid price(s) for performance of the Work. Permission to make such surveys and subsurface investigations will be granted by the District upon written request of the Bidder. In order to obtain written permission for subsurface investigations, the Bidder must specifically state by station number or location the specific area, which it intends to investigate, and the manner of investigation it proposes to use. Not less than 48 hours prior to entering upon any premises for the purpose of its investigations, written notice of such entry shall be given to the owner of the property, with evidence of each notice furnished to the District Legal and Engineering Departments. The Bidder will bear all responsibility for restoring all areas disturbed by itself as a result of any and all of its subsurface investigations to the condition existing prior to being disturbed, such condition being determined by the District.

In the case of any error, omission, discrepancy or ambiguity in the Drawings, specifications or estimated quantities contained in the Bid Documents, or in case a potential Bidder has a question as to the meaning of any provision of the Drawings, specifications or other Bid Documents, then said potential Bidder shall immediately request in writing a clarification of said provision, or a correction of said error or omission, from the District. Any such clarification or correction shall be by Addendum issued pursuant to Article 12. Failure to request a clarification or correction will cause the Bidder, if awarded the Contract, to be bound by the District's interpretation of the meaning of the provision in question.

- B. The successful Bidder agrees by signing the Contract that it will make no claim for additional payment or for an extension of time for completion of the Work or for any other concession because of any misinterpretation or misunderstanding on its part of the Contract Documents, or because of any failure on its part to fully acquaint itself with all conditions relating to the Work.
- C. The submission of a Bid will constitute a representation by the Bidder that it has complied with every requirement of this Section.

ARTICLE 16

SURFACE, SUBSURFACE DATA AND EXISTING FACILITIES

- A. Where the Drawings indicate that test borings have been made, samples and logs of these test borings shall be available for review by any prospective Bidder.
- B. The making available of this subsurface data to prospective Bidders is not intended to relieve prospective Bidders from their responsibility to familiarize themselves with the conditions in accordance with Article 15 of the Instructions to Bidders, including subsurface conditions.
- C. Reference Drawings showing the existing facilities will be made available to any Bidder by the District upon written request. Any Bidder requesting copies of any

Drawings shall bear the cost of reproduction. Any information shown on the reference Drawings of the existing facilities or given elsewhere is for reference and information only. The District does not warrant the correctness of the Drawings and/or other information. It is the responsibility of the Bidder to verify any and all information shown and/or given, notwithstanding that the Bidder in the normal course of business will rely on the Drawings and specifications of the District.

ARTICLE 17

CONSIDERATION OF BIDS

The District, in making its determinations as to which Bidder is the lowest and best Bidder, may include in its consideration of the Bidder factors which include, but are not limited to, the following: the experience and facilities for complying with the Contract; compliance with the District's Business Opportunity Program requirements, which includes the Minority Business Enterprise (MBE), Women Business Enterprise (WBE) and Small Business Enterprise (SBE) Programs; the previous conduct and financial condition of the Bidder and its reputation in the industry; and other factors which, in the opinion of the District, could affect the performance of the Contract. Bidders are advised that the District will look with disfavor upon a Bid in which prices appear to the District to be unbalanced. The District reserves the right to reject any Bid, which in its opinion appears unbalanced or otherwise to be not in conformance with the Drawings and specifications, notwithstanding the District's absolute right to reject any and all bids for any reason whatsoever.

ARTICLE 18

ACCEPTANCE OR REJECTION OF BIDS

- A. The District reserves the right to accept or reject any or all Bids, and any part or parts of any Bid, and also the right to waive any informalities in the Bids. In the awarding of a Contract, the District reserves the right to consider all elements entering into the question of determining the responsibility of the Bidder. Any Bid which is incomplete, conditional or obscure, or which contains additions not called for, or erasures, is not on forms herein included and bound, or contains irregularities of any kind, may be considered irregular and subject to rejection.
- B. In case the price stated in words and the prices stated in figures do not agree, the prices stated in words shall be used in computing the Bid.

ARTICLE 19

UNBALANCED BIDS

An unbalanced bid is defined as one that, in the opinion of the District, contains Bid prices for Items of Work to be performed which are in excess of or less than the true monetary value of such work and would result in payment estimates disproportionate to

the value of such item. The District at its sole option may reject any such Bid that the District determines to be unbalanced.

ARTICLE 20

TIME OF AWARD

- A. General - The Board of Trustees of the District shall make an award or reject all Bids within sixty (60) days following the opening of Bids.
- B. The Contract shall be signed by the successful Bidder and returned, together with the Bond and other required Contract Documents, within ten (10) working days after the proscribed forms have been presented to the successful Bidder for execution. The District shall not be bound until the execution of the Contract by the District.
- C. If the successful Bidder is a corporation, the officer who signs the Contract shall furnish copies of the resolution of the Directors of the corporation authorizing the officer to sign the Contract. Such resolution must bear the seal of the corporation.
- D. Subject to the applicable provisions of law, the Contract shall be in full force and effect only from and after the date when a fully executed and approved counterpart thereof and a Notice To Proceed signed by the Director have been tendered or delivered, or both, to the Contractor or its duly authorized agent or representative. Deposit of said counterpart in the United States mail in an envelope or wrapper properly addressed and provided with sufficient postage shall constitute compliance with these provisions by the District.

ARTICLE 21

BID, PERFORMANCE, AND PAYMENT BOND

- A. If the Bidder to whom a Contract has been awarded submitted a certified check, cashier's check or irrevocable letter of credit as its Bid Guaranty, said successful Bidder shall, within the time specified in Section Article 10, furnish a Bond in the full amount of the Bid. Such Bond shall be in the same form as that which is included in these Contract Documents. Said Bond shall be secured by a guaranty of a surety company authorized to do business in the State of Ohio and listed in the latest issue of U.S. Treasury Circular 570. The amount of the Bond shall be within the maximum amount specified for such company in the tables of said Circular 570. Personal sureties are not acceptable. The current Power of Attorney for the person who signs for any surety company shall be attached to the Bond. Said Bond shall be conditioned to indemnify the District

against all damage suffered by failure to perform the contract according to its provisions and in accordance with the Contract Documents and to pay all lawful claims of Subcontractors, Materialmen, and Laborers for labor performed or material furnished in carrying forward, performing, or completing the Contract; and agree and assent that this undertaking shall be for the benefit of any Subcontractor, Materialman, or Laborer having a just claim, as well as for the District.

- B. Each Bidder is permitted to include the cost of its Bid, Payment and Performance Bond under the appropriate Bid item. This amount will be paid to the Contractor with the first progress payment estimate.

ARTICLE 22

RELEASE OF BOND

The Contractor's Bond will not be released until all the provisions of the Contract have been fulfilled.

ARTICLE 23

DISQUALIFICATION OF BIDDERS

- A. No person, firm or corporation shall be allowed to make, file or have an interest in more than one Bid for the same Work unless alternate Bids are called for. A person, firm, or corporation who has submitted a subproposal to a Bidder, or who has quoted prices on materials to a Bidder, is not hereby disqualified from submitting a Bid on its own behalf.
- B. Any bidder who provided services during design as professional engineers and/or surveyors, as defined under O.R.C. Chapter 4733, who are thereby bound to the requirements of the Code of Ethics for Engineers and Surveyors as defined in O.R.C. §§ 4733-35 are precluded from bidding on subsequent construction contracts in either a Prime or Subcontractor role. Other contractual services, that are not provided by professionals as defined under O.R.C. Chapter 4733 that are performed in support of the design activities will not preclude an individual or firm from bidding on construction contracts.

ARTICLE 24

WAGES AND SALARIES

- A. Bidders are required to pay not less than the prevailing wage and salary rates specified in the Contract Documents and to observe the conditions of employment with respect to certain categories and classifications of employees.

- B. The rates of pay set forth in the Contract Documents are the minimum to be paid during the life of the Contract. It is, therefore, the responsibility of Bidders to inform themselves as to local labor conditions, such as the length of work day and work week, overtime compensation, health and welfare contributions, labor supply and prospective changes or adjustments of rates or any other such items.



**GENERAL TERMS AND CONDITIONS TO THE
AGREEMENT
BETWEEN OWNER AND CONTRACTOR**

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ARTICLE 1
DEFINITIONS

1.1 The following terms, when used in this Agreement or in the Contract Documents shall have the meanings set out below.

1.1.1 “Actual Costs” shall mean costs for on-site storage of materials and supplies, on-site office and supervision costs, premium wages paid, increased costs for necessary machinery and equipment, and costs of the applicable taxes, insurance, burden on labor wages paid, bond premiums and overhead incurred by the Contractor for the direct benefit of the Project.

1.1.2 “Applicable Laws” means and includes all: (i) applicable professional and industry standards, codes, specifications or manuals recognized by any technical organization, association or society; and (ii) all applicable local, state, and federal laws, rules, orders, regulations, building and zoning codes in the jurisdiction in which the Project is located pertaining to the Work furnished by Contractor pursuant to the Contract Documents.

1.1.3 “Application for Payment” shall mean a written request for a progress payment or final payment submitted in a form approved by Owner and accompanied by the supporting documentation required by the Contract Documents.

1.1.4 “Base Contract Price” shall mean Contractor’s total cost to perform the bid items included in the Contract Documents, excluding Specific Allowances, the General Allowance and Contractor’s Bond premiums and is stated in Article 2 of the Agreement between Owner and Contractor.

1.1.5 “Approved Satisfactory,” “Equal to,” Proper and Similar Terms shall mean the decision is vested in the Owner and such decision shall be binding upon the Contractor and its Subcontractors and suppliers.

1.1.6 “Beneficial Use” shall mean the acceptance of completed equipment and/or operating systems by the Owner prior to Substantial Completion.

1.1.7 “Calendar Day” means any calendar day including Saturdays, Sundays and legal holidays. Calendar Day is the default interpretation if not specified as a Calendar Day or Work Day in the Contract Documents.

1.1.8 “Change Order” is defined in Article 12.

1.1.9 “Claim Documents” is defined in Article 9.

1.1.10 “Complete,” “Completion” or “Final Completion” shall mean when all of the Work of the Contract Documents completely fulfills all of the terms of the Contract Documents without exception. This includes the submission of all final close-out paperwork required rby Article 5.4 of the Contract.

1.1.11 “Construction Change Directive” is defined in Article 12.

1.1.12 “Construction Testing Lab” shall mean the independent construction testing and inspection firm that is provided by the Owner and coordinated by the Contractor during the performance of the Work when required by the Contract Documents.

1.1.13 “Contract Documents” consist of the Agreement Between Owner and Contractor, the General Conditions to the Agreement between Owner and Contractor, Special Conditions, if any, Contractor’s Bid Booklet, including the Bid Form, the Specifications, the Drawings, all Addenda issued prior to execution of this Agreement between Owner and Contractor, the Notice to Proceed, Contractor’s Bid, Performance and Payment Bond, and all Change Orders, Work Orders, Construction Change Directives, and Field Orders issued thereafter by the individuals authorized on behalf of Owner. Geotechnical Baseline Reports (GBR),

if provided, and Geotechnical Data Reports (GDR), if provided, are also considered part of the Contract Documents. Approved Shop Drawings and other Contractor submittals are not part of the Contract Documents.

- .1 In case of any inconsistency, conflict or ambiguity among the Contract Documents, the documents shall govern in the following order of precedence: (i) the Agreement Between Owner and Contractor; (ii) the General Conditions to the Agreement Between Owner and Contractor; (iii) Special Conditions, if any; (iv) the Specifications; (v) Geotechnical Baseline Reports (if provided); (vi) Geotechnical Data Reports (if provided) (vii) the Drawings.
- .2 These documents are bound herein, except for Change Orders, Work Orders and minor changes in the Work which may be issued after the execution of this Agreement. Documents not attached are incorporated by reference. There are no Contract Documents other than those specifically listed in this Agreement as Contract Documents.
- .3 The Contract Documents represents the entire and integrated agreement between the parties to this Agreement and supersedes all prior negotiations, representations, or agreements, either written or oral. The Contract Documents may be amended or modified only by a Change Order, Work Order or minor changes in the Work as defined in the General Conditions to the Agreement between Owner and Contractor.

1.1.14 “Contract Sum” is the amount stated in Article 2 of the Agreement between Owner and Contractor.

1.1.15 Whenever the term **“Contractor”** is used, it shall be used and understood as referring to the person or organization that enters into the Agreement between Owner and Contractor to provide a portion or portions of the Work necessary to complete the construction of the Project.

1.1.16 The words **“Contractor shall”** are implied and shall be so understood wherever a direction is stated in the imperative and wherever the words **“Provide,” “Furnish”** or **“Install”** are used. Minor items and accessories or devices reasonably inferable as necessary to the complete and proper installation and operation of any system, shall be provided by the Contractor for such system whether or not they are specifically called for by the Contract Documents.

1.1.17 “Contractor’s Schedule” is defined in Paragraph 8.9.

1.1.18 “Corrective Action” shall mean action taken to correct Work that does not comply with the requirements of the Contract Documents.

1.1.19 “Deduct Order” is defined in Article 12.

1.1.20 “Dispute Resolution Board (DRB)” is a panel of three experienced, respected, and impartial reviewers, organized before construction begins and meets at the jobsite periodically for the purpose of resolving problems before they escalate into major disputes.

1.1.21 “Drawings” shall mean the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent and character of the Work to be performed by Contractor. Shop drawings and other Contractor submittals are not drawings or Contract Documents.

1.1.22 “Engineer” shall mean the individual or entity named as such in the Agreement Between Owner and Contractor.

1.1.23 “Federal Labor Standards” shall mean the requirements of the Davis-Bacon Act, the Copeland Anti-Kickback Act, the Stark Self-Referral Law, the Contract Work Hours Standard Act, Executive Order No. 11246, Section 601 of the Civil Rights Act and all Federal Labor Standards in effect prior to Award.

1.1.24 “Final Completion Date” shall mean the number of calendar days or date defined by the Owner for the completion of the Work as stated in Article 1 of the Agreement Between Owner and Contractor. This includes the submission of all final close-out paperwork required by Article 5.4 of the Contract.

1.1.25 “Field Order” shall mean a written order issued by the Owner, which requires a minor change in Work, but which does not require approval of a Work Order and does not involve a change in the Contract Sum or a time extension.

1.1.26 “Final Adjusting Change Order” shall mean the final Change Order issued by the owner which shall adjust the final contract amounts of all bid items to account for unused quantities and/or reductions due to approved Deduct Orders.

1.1.27 “Furnish” means **“furnish only.”** Materials or items to be furnished by the Owner shall be consigned to the Contractor and delivered to the site.

1.1.28 “General Allowance” shall mean the funds added to the Base Contract Price for unspecified extra or additional Work that was not foreseeable at time of the bid, but that is necessary to complete the Project as originally contemplated. The General Allowance is the Base Contract Price times a defined percentage, not to exceed ten percent (10%) of the Base Contract Price unless authorized by the Owner’s Executive Director and approved, by Board resolution, by Owner’s Board of Trustees. The use of the General Allowance shall be documented by a Work Order signed by both the Owner’s Director of Engineering and Construction and Owner’s Executive Director. The General Allowance is stated in subparagraph 2.1.2 of the Agreement between Owner and Contractor.

1.1.29 “Hazardous Materials/Regulated Substances” a “Regulated Substance” as referred to in this clause is a generic term used to describe all materials that are regulated by federal or any state or local government or Applicable Laws during transportation, handling and/or off-site disposal. These include, but are not limited to, all materials that are or contain radioactive materials, petroleum, mercury, asbestos-containing materials (ACM), or lead paint, including ACM mastic, sealants, coatings and paintings as well as materials that are regulated as (a) “hazardous material” or “hazardous substance” under the Hazardous Material Transportation Act, as amended, for the Comprehensive Environmental Response Compensation and Liability Act (“CERCLA”), as amended, and the Control of Radioactive Contamination of Environmental Law, as amended (b) “chemical hazards” under the Occupational Safety and Health Administration standards, as amended, (c) “chemical substances and mixtures” under the Toxic Substances Control Act, as amended, (d) “pesticides” under the Federal Insecticide, Fungicide and Rodenticide Act, as amended, and (e) “hazardous waste” as defined or listed under the Resource Conservation and Recovery Act (RCRA), as amended, and the Hazardous Waste Control Law, as amended.

1.1.30 “Indemnitees” are defined in Paragraph 16.1.

1.1.31 “Install” means **“install only”** materials and/or items furnished by others. Such materials or items shall be received at the site, unloaded, stored, protected, and installed in place by the Contractor, and shall include final connections, unless such Work is specifically excluded. Minor items and accessories or devices reasonably inferable as necessary to the complete and proper installation and operation of any system, shall be provided by the Contractor for such system whether or not they are specifically called for by the Contract Documents.

1.1.32 “Markup Fee” is defined in Subparagraph 12.1.8.5.

1.1.33 “Materials Status Report” shall mean the list of delivery dates for materials and equipment required to be furnished and installed by the Contract Documents which shall conform to Contractor’s Submittal Schedule and Contractor’s Schedule.

1.1.34 “Notice to Proceed” shall mean written notice from the Owner to the Contractor to commence its Work in accordance with the Contract Documents. In issuing the Notice to Proceed, stipulations may be included as to time and other requirements that may condition commencement of the Work at the Site.

1.1.35 “Notice of Termination for Convenience” shall mean written notice from Owner to Contractor of its decision to terminate Contractor’s performance of Work for the Project specifying the extent of termination and the effective date.

1.1.36 “Owner” is the public entity identified in the Agreement between Owner and Contractor and for whom the Work is to be performed by Contractor. The Owner may also be referred to as the NEORS or the District.

1.1.37 “Payroll Tax Obligations” shall mean the timely payment of compensation and benefits, including, but not limited to: (a) overtime, medical, and any other benefit, and (b) all matters relating to compliance with all employer obligations to withhold employee taxes, pay employee and employer taxes, and file payroll tax returns and information returns under local, state, and federal income tax laws, unemployment compensation insurance, state disability insurance tax laws, social security and Medicare tax laws, and all other payroll tax laws or similar laws with respect to all the Contractor’s personnel providing Work for the Project.

1.1.38 “Prevailing Wage Coordinator” shall mean the individual identified in Paragraph 8.18.

1.1.39 “Work Order Pre-Authorization” is defined in Article 12.

1.1.40 “Product” includes materials, systems, and equipment.

1.1.41 “Product Data” shall mean illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

1.1.42 Not Used.

1.1.43 The **“Project”** is the design and construction included in the Contract Documents approved by the Owner of which the Work performed by Contractor under the Contract Documents is a part.

1.1.44 “Project Records” shall mean all information, materials and data of every kind and character and form (hard copy, as well as computer readable data), including without limitation, records, books, papers, documents, notes, subscriptions, recordings, agreements, purchase orders, leases, contracts, commitments, arrangements, payrolls, subcontractor files, original estimates, Applications for Payment, Change Orders, job cost reports, project notes, daily diaries, superintendent reports, drawings, receipts, vouchers and memoranda, and any and all other agreements, sources of information and matter that may in Owner’s judgment have any bearing on or pertain to any matters, rights, duties or obligations under or covered by the Contract Documents to the extent necessary to adequately permit evaluation and verification of: (a) Contractor compliance with the Contract Documents; (b) compliance with Owner’s business ethics policies; and (c) compliance with provisions for pricing change orders, invoices or claims submitted by the Contractor or his payees.

1.1.45 “Project Specific Safety Program” is defined in Paragraph 14.1.

1.1.46 The term **“provide”** or **“perform”** shall mean to furnish and install complete, including as applicable all connections to utilities or service, complete anchorage and suspension, fastening or anchor device, controls, trim, supports, operation and other related items or labor, unless specifically specified otherwise in the Contract Documents.

1.1.47 “Samples” shall mean physical examples which illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

1.1.48 “Shop Drawings” shall mean drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-Subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

1.1.49 “Schedule of Values” shall mean a schedule prepared and approved by Owner allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor’s Applications for Payment.

1.1.50 “Site” means the area within the Owner’s property lines or portions of such area which are enclosed within a limit line in the Contract Documents, including any structures or encumbrances within such areas.

1.1.51 “Specialist” means an individual or firm of established reputation (or, if newly organized, whose personnel have previously established a reputation in the same field), which is regularly engaged in, and which maintains a regular force of workers skilled in either (as applicable) manufacturing or fabrication of items required by the Contract Documents. Where the Contract Documents require installation by a Specialist, that term shall also be deemed to mean either the manufacturer of the item, or an individual or firm performing the work for the manufacturer.

1.1.52 “Specific Allowances” include specified items of Work generally known to be required for the Project but whose quantities and/or pricing is unknown until after the items of Work have been performed. Specific Allowances should be used only for work related to the bid items specified by the Allowance. The use of the Specific Allowances shall be documented by a Work Order signed by Owner’s Director of Engineering and Construction. The Specific Allowances are stated in Subparagraph 2.1.3 of the Agreement between Owner and Contractor.

1.1.53 “Specifications” shall mean the Contract Documents consisting of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.

1.1.54 “Standard of Care” means that Contractor shall exercise the degree of care and diligence in the rendition of all Work under this Agreement in accordance with the industry standards expected of contractors with significant experience with projects involving design and construction work which is similar in design, size, function and complexity as the Project.

1.1.55 “Stored Materials” shall mean materials or equipment stored safely off-Site in a secure warehouse or on the premises of a fabricator or some other secure facility reasonably acceptable to the Owner and not yet incorporated into the Work.

1.1.56 “Subcontractor” shall mean a person or organization who has a direct contract with the Contractor to perform any of the Work at the Site, or to furnish materials, equipment or systems specifically fabricated for the Work.

1.1.57 “Sub-Subcontractor” shall mean the Subcontractor’s sub-subcontractors and suppliers at whatever tier.

1.1.58 “Submittal Schedule” shall mean Contractor’s schedule for submitting Shop Drawings, Product Data, Samples, markups, models and other submittals which is coordinated with the Contractor’s Schedule and which allows the Owner reasonable time for review.

1.1.59 “Substantial Completion” shall mean the Work of the Contract (or a specified part of the Work as provided in the Contract Documents or otherwise determined by Owner) has progressed to the point where the Work (or a specific part of the Work) is essentially and satisfactorily complete in accordance with the Contract Documents, as modified by approved Change Orders, Field Orders or a Minor Change in Work, and is ready for full occupancy or use by the Owner in the manner intended without inconvenience or discomfort and includes all local, state and federal approvals, permits and licenses required by all governmental agencies having jurisdiction over the Project; provided, however, that the determination of Substantial Completion of the Work shall not be withheld if the failure to obtain same is due to design errors or other causes not the fault of or responsibility of the Contractor. The determination by the Owner on the status of Substantial Completion shall generally but not specifically mean or include: all materials,

equipment, systems, controls, features, Underground Facilities, accessories and similar elements are installed in the proper manner and in operating condition; spaces and surfaces (except minor areas or spaces) have been painted or otherwise finished throughout; masonry and concrete cleaned with any sealer or other finish applied; casework installed, complete with tops, sinks, fittings and other related items installed and services connected; utilities and systems connected and functioning; site work essentially complete; permanent heating, ventilating, air conditioning and other systems properly operating with proper controls; lighting and electrical systems installed, operable and controlled; and other work to a similar state of essential and satisfactory completion. A minor amount of work, as determined by and at the discretion of the Owner, such as installation of minor accessories or items, a minor amount of painting, seeding, landscaping, minor replacement of defective work, minor adjustment of controls, completion or correction of minor site or exterior work that cannot be completed due to weather conditions, will not delay the determination of Substantial Completion.

1.1.60 “Substantial Completion Date” shall mean the number of calendar days or the date after the issuance of the Notice to Proceed defined by the Owner for completion of the Work as stated in Article 1 of the Agreement Between Owner and Contractor.

1.1.61 “Tier 1 Decision” shall mean the dispute resolution decision defined in Article 9.

1.1.62 “Underground Facilities” shall mean all underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communication, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

1.1.63 “Unforeseen Conditions” shall mean conditions encountered at the Site which are: (1) subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents and the reports described in Article 3 and were otherwise unknown or not detected by the Contractor prior to performance of the Work; or (2) unknown physical conditions of an unusual nature, which differ materially from those ordinarily found to exist and generally recognized as inherent in the Northeast Ohio area.

1.1.64 “Warranty Period” shall mean a period of one (1) year from the Substantial Completion Date of the entire Work (or a specific part of the Work) or the longer periods of time as may be required by specific warranties contained in the Contract Documents, provided by manufacturers or suppliers, or as otherwise stated in the Certificate of Substantial Completion when Contractor shall remove or correct all Work performed by Contractor under the Contract Documents which the Owner deems to be defective in material or workmanship or not in conformance with the Contract Documents and without an increase to the Contract Sum.

1.1.65 The term **“Work”** includes all labor, materials, tools, equipment, special equipment and supervision necessary to produce and fully complete the construction required or inferred by the Contract Documents as determined by the Owner.

1.1.66 “Work Day” means any calendar day excluding Saturdays, Sundays, and legal holidays.

1.1.67 “Work Order” is defined in Article 12.

1.1.68 Words in the singular shall include the plural whenever applicable.

ARTICLE 2

RELATIONSHIP OF THE PARTIES

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

- 2.2** The Contractor's services shall be provided in conjunction and cooperation with the services of Owner's Engineer and the Owner.
- 2.3** The Contractor shall provide sufficient organization, personnel and management to carry out the requirements of the Agreement in an expeditious and economical manner consistent with the best interests of the Owner. The Contractor shall submit to the Owner upon execution of the Agreement an organizational chart of its principals, employees and consultants performing Work on behalf of the Owner for the Project. The organizational chart shall identify the individuals with authority to make decisions on behalf of Contractor and the lines of communication and authority among the individuals performing Work for the Project. Contractor's organizational chart shall be accompanied by a summary of the responsibilities assigned to each individual. Once approved by the Owner, Contractor's organizational chart shall not be modified without prior written notice, good cause and the written approval of the Owner, which shall not be unreasonably withheld.
- 2.4** The Contractor hereby represents to the Owner the following:
- 2.4.1** That the Contractor is financially solvent, able to pay its debts as they mature and possessed of sufficient working capital to complete the Work and perform the obligations required by the Contract Documents, including, but not limited to its indemnity obligations to the Owner pursuant to Article 16;
- 2.4.2** That the Contractor is able to furnish the plant, tools, materials, supplies, equipment, labor, supervision and management required to complete the Work and perform the obligations required by the Contract Documents and shall employ only employees, principals and consultants with sufficient experience and competence to perform the Work required for Projects similar in design, size, function and complexity;
- 2.4.3** That the Contractor is authorized to do business in the State where the Project is located and properly licensed by all necessary governmental and public and quasi-public authorities having jurisdiction over the Contractor, the Work and the Project;
- 2.4.4** That the Contractor's execution and performance of this Agreement is within Contractor's duly authorized powers;
- 2.4.5** That the Contractor shall perform all Work in strict compliance with the Applicable Laws and the Standard of Care required by the Contract Documents;
- 2.4.6** That the Contractor agrees that if there is any conflict between the Applicable Laws, the Contractor will notify the Owner of the conflict and identify the particular code, standard, rule, order, or regulation which is the more stringent requirement so long as it satisfies the requirements of the Applicable Laws;
- 2.4.7** That the Contractor represents and warrants that no officer, director, employee or agent of the Owner has been or will be employed, retained or paid a fee, or otherwise has received or will receive, any personal compensation or consideration, by or from the Contractor or any of the Contractor's officers, directors, employees or agents in connection with the obtaining, arranging or negotiation of the Agreement between Owner and Contractor or other documents entered into or executed in connection with the Agreement. In the event of Contractor's non-compliance, the Agreement may be cancelled, terminated, or suspended in whole or in part and the Owner may pursue all rights and remedies that the law or the Contract Documents provide; and
- 2.4.8** That the Contractor is engaged in an independent business and will perform all obligations under this Agreement as an independent contractor and not as the agent or employee of the Owner. The Contractor's personnel performing Work shall be considered solely the employees or agents of the Contractor and not employees or agents of the Owner. The Contractor has and retains the right to exercise full control of and supervision over the performance of the Work and full control over the employment, direction, assignment, compensation, and discharge of all personnel performing the Work. The Contractor

is solely responsible for all matters relating to compensation and benefits of all the Contractor's personnel who perform Work. This responsibility includes, but is not limited to compliance with the Payroll Tax Obligations required by the Contract Documents.

2.5 The Contractor agrees that the representations and warranties in Paragraph 2.4 shall survive the execution and delivery of the Agreement.

2.6 During the performance of the Agreement, the Contractor agrees as follows:

2.6.1 The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, 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, 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.

2.6.2 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, or national origin.

2.6.3 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 advising of the Contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

2.6.4 The Contractor will comply with all provisions of Executive Order 11246 dated September 24, 1965, and all of the rules, regulations, and relevant orders governing federal contractors.

2.6.5 The Contractor will furnish all information and reports required by Executive Order 11246 dated September 24, 1965, and by rules, regulations, and orders governing federal contractors, or pursuant thereto, and will permit access to its books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

2.6.6 The Contractor shall comply with the ordinances, laws, regulations and directives of any jurisdiction where Contractor is performing Work relating to length of workday, minimum wage and non-discrimination. Contractor agrees that in the case of differing or contradictory requirements imposed by the various local, state or federal agencies participating in the Project or Work subject to the Contract Documents, the most stringent requirements for the Contractor shall govern.

2.6.7 In the event Contractor desires to operate its workforces beyond a normal work week of five (5) eight (8) hour days, Contractor shall do so only after providing the Owner with at least forty-eight (48) hours advance written notice. In addition, if the overtime Work will violate the ordinances in the jurisdiction where Contractor is performing Work, Contractor shall be solely responsible for obtaining written permission to extend the maximum length of the workday or work week.

2.6.8 If Contractor does not comply with the affirmative action and nondiscrimination clauses of the Contract Documents or with any of the nondiscrimination rules, regulations, or orders, the Agreement may be cancelled, terminated or suspended in whole, or in part. In addition, the Contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 dated September 24, 1965, and the other sanctions that may be imposed and remedies invoked as provided in Executive Order 11246 dated September 24, 1965, or by rule, regulation, or order governing federal contractors, or as otherwise provided by all Applicable Laws.

2.6.9 The Contractor will include Paragraph 2.6 and Subparagraphs 2.6.1 through 2.6.9 in every subcontract or purchase order unless exempted by rules, regulations, or orders governing federal contractors. The Contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct, including sanctions for noncompliance provided, however, that in the event Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency the Contractor may request that the United States enter the litigation to protect the interests of the United States.

ARTICLE 3 **OWNER**

- 3.1** If requested by the Contractor, the Owner shall furnish evidence that financial arrangements have been made to fulfill the Owner's obligations under the Contract Documents.
- 3.2** The Owner shall designate a representative authorized to act on the Owner's behalf with respect to the Project. The Owner or such authorized representative shall render decisions in a reasonable manner pertaining to documents submitted by the Contractor in order to avoid unreasonable delay in the orderly and sequential progress of the Contractor's Work. The Owner may provide signatures of approval electronically and/or by proxy in order to expedite any required approvals on behalf of the Owner.
- 3.3** If available, the Owner shall furnish surveys describing physical characteristics, legal limitations and known utility locations for the site of the Project, and a written legal description of the Site. The surveys and legal information shall include, as applicable, grades and lines of streets, alleys, pavements and adjoining property and structures; adjacent drainage; rights-of-way, restrictions, easements, encroachments, zoning, deed restrictions, boundaries and contours of the Site; locations, dimensions and necessary data pertaining to existing buildings, other improvements and trees; and information concerning available utility services and lines, both public and private, above and below grade, including inverts and depths. All the information on the survey shall be referenced to a Project benchmark.
- 3.4** The Owner shall furnish all legal, accounting and insurance services as may be necessary at any time for the Project, including auditing services the Owner may require to verify the Contractors' Applications for Payment or to ascertain how or for what purposes the Contractor has used the money paid by or on behalf of the Owner.
- 3.5** Prompt written notice shall be given by the Owner to the Contractor if the Owner becomes aware of any fault or defect in the Project or nonconformance with the Contract Documents.

ARTICLE 4 **OWNER'S ENGINEER**

4.1 SERVICES OF ENGINEER

- 4.1.1** Owner may retain an Engineer whose services, duties and responsibilities are described in the separate Agreement Between Owner and Engineer and in this Agreement.
- 4.1.2** Engineer shall not have control or charge of construction means, methods, techniques, sequences or procedures, or safety precautions and programs in connection with the Work performed by Contractor.
- 4.1.3** Engineer shall at all times have access to the Work wherever and whenever it is in preparation or progress. Contractor shall ensure safe facilities are available to the Engineer for access to the Work.
- 4.1.4** The Engineer may issue interpretations and clarifications of the Contract Documents when requested by the Contractor or Owner.
- 4.1.5** In conjunction with Owner, Engineer shall conduct inspections to determine the dates of Substantial Completion and Final Completion.

4.1.6 In conjunction with Owner, Engineer shall review Contractor's original operation of any equipment or systems such as initial start-up, testing, adjusting or balancing.

4.1.7 Engineer shall be consulted by Owner and shall assist Owner in the review and approval of Contractor's Application for Payment and other aspects of the Project.

4.1.8 Engineer may request through Owner to call, schedule, and conduct job meetings to be attended by Contractor, representatives of its Subcontractors, and Owner, to discuss such matters as procedures, progress, problems, coordination, budget and scheduling.

4.1.9 Engineer is not authorized to revoke, alter, change, relax or release any requirements of the Contract Documents, nor is Engineer authorized to approve or accept any portion of the Work not executed in strict accordance with, nor to issue instructions contrary to the Contract Documents. Contractor may not claim that Engineer's approval is a modification or conclusive evidence of satisfactory performance.

ARTICLE 5

PROGRESS PAYMENTS

5.1 PROGRESS PAYMENTS

5.1.1 The Owner shall make progress payments to Contractor based on the Contract Sum as provided below and elsewhere in the Contract Documents.

5.1.2 The period covered by each Application for Payment shall be one thirty (30) day period ending on the twentieth (20th) day of the month. No more than one (1) Application for Payment will be submitted to Owner during any thirty (30) day period.

5.1.3 Provided an Application for Payment is received by Owner not later than the twentieth (20th) day of a month, the Owner shall make payment to the Contractor not later than the twentieth (20th) day of the following month and in the amount of the approved Application for Payment. If an Application for Payment is received by Owner after the application date fixed above, Owner shall use its best efforts to make payment to Contractor not later than thirty (30) days after the Owner receives the Application for Payment.

5.1.4 The Contractor may apply for in the first Application for Payment the Lump Sum bid amount for the Bid, Performance and Payment Bond and Insurance. Prior to submittal of the second Application for Payment, the Contractor shall submit to the Owner for its approval, Contractor's Schedule of Values. The Schedule of Values shall be based on the Contract Sum as supported by Subcontracts, Purchase Orders and the Bid Item Numbers listed in Contractor's Bid Form and that are included in Contractor's Base Contract Price. The Contractor shall also provide the Owner with all supporting data reasonably requested by the Owner to substantiate the accuracy of the Schedule of Values. The Schedule of Values may be amended by mutual agreement of the Owner and the Contractor through a properly executed Change Order to reflect the actual Contract Sum as established through Subcontracts and Purchase Orders issued by the Contractor. Unless otherwise mutually agreed by the Owner and the Contractor, the Insurance, the Bid, Performance, and Payment Bond, the General Allowance, each Specific Allowance, all DRB invoices and each Change Order and Construction Change Directive shall be accounted for as a separate component of the Schedule of Values. Each Application for Payment shall report the status of the General Allowance, each Specific Allowance, each Change Order and each Constructive Change Directive in addition to the original Schedule of Values.

5.1.5 In taking action on the Contractor's Application for Payment, the Owner shall be entitled to rely on the accuracy and completeness of the information furnished by the Contractor and shall not be deemed to represent that the Owner has made a detailed examination, audit or arithmetic verification of the documentation submitted in support of any Application for Payment or that the Owner has made exhaustive or continuous on-site inspections to ascertain how or for what purposes the Contractor has used amounts previously paid on account of the Contract Sum.

5.1.6 Unless specified elsewhere, on or before the 20th day of each month during the performance of the Work or on such other regular monthly schedule as may be agreed, the Contractor shall submit to the Owner Contractor's Application for Payment. Contractor's Application for Payment shall set forth the Contract Sum incurred to the date of such Application for Payment, allocated among the categories set forth in the Schedule of Values approved by Owner. Each Application for Payment shall be accompanied by: 1) a signed Application for Payment form; 2) an explanation for each pay item billed; 3) an updated Schedule of Values showing the status of each sub-bid item billed; 4) spreadsheets showing the status of each Specific and General Allowance item; 5) an MBE/WBE/SBE Utilization Report and Tracking Sheet; 6) certified payroll records and other labor compliance information required under the Contract Documents submitted to the Owner's Prevailing Wage Coordinator; 7) an updated Project Schedule submitted via SharePoint Workflow; and 8) an updated Stored Materials Status Report. Each Application for Payment shall contain an allocation of the percentage of completion of each portion of Work as of the end of the period covered by the Application for Payment.

5.2 RETAINAGE AND SECURITY

5.2.1 Estimates and Security: The Owner shall evaluate Applications for Payment, which shall contain full, accurate and detailed estimates of the various kinds of labor performed and material furnished under the Contract, stating the amount for each kind of labor and material as well as the materials and amount due in the aggregate, which estimates shall be based upon actual measurement of such labor and materials, and shall give the amounts of the preceding estimate, and the amount of labor performed and materials furnished since the last estimate. The Owner shall, at its sole discretion, delete from such estimate any items which are in dispute with respect to either performance or amount due and shall pay the balance not in dispute. From the date the Contract is fifty percent (50%) complete, as evidenced by payments in the amount of at least fifty percent (50%) of the Contract, all funds retained for the faithful performance of work shall be deposited in escrow pursuant to Section 153.63 of the Ohio Revised Code. After the Contract is fifty percent (50%) complete, no further funds shall be retained. When a major portion of the Project is, in the opinion of the Owner, substantially completed and occupied, or in use, or otherwise accepted, and the Owner sees no other reason to withhold retainage, the retainage percentages held in connection with such portion shall be released from escrow and paid to the contractor, withholding only that amount which, in the sole opinion of the Owner, is necessary to assure completion. Funds in the escrow account not heretofore paid, with accumulated interest, shall be paid thirty (30) days from the Date of Final Completion.

5.2.2 Payment for Labor: For the first fifty percent (50%) of the Contract, partial payment to the Contractor for labor performed under either a unit or lump-sum price shall be made at the rate of ninety-two percent (92%) of the estimates prepared by the Contractor and approved by the Engineer. All labor performed after the job is fifty percent (50%) completed shall be paid for at the rate of one hundred percent (100%) of the estimates submitted by the Contractor and approved by the Engineer.

5.2.3 Payment for Materials: In addition to all other payments on account of Work performed, there shall be allowed a sum at the rate of ninety-two percent (92%) of the invoice costs, not to exceed 92% of the item cost delineated in the Schedule of Values, for material delivered on the site of the Work, or other point in the vicinity of the Work or other previously approved storage site, provided such materials have been inspected and found to meet the Specifications. The balance of such invoiced value shall be paid when such material is incorporated into and becomes a part of such building, construction, addition, improvement, alteration, or installation.

5.2.4 Progress Payments for Specifically Manufactured Items: 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. At the option of the Owner, progress payments during the fabrication of items specialty manufactured for incorporation into this Project, which cannot practicably be diverted to another project, and which have a lengthy fabrication period, may be made by the Owner. Items for this Project which the Owner considers to be eligible for progress payments are listed in the contract documents. In addition, the Contractor may request progress payments for other items prior to commencing fabrication, which request may be approved or disapproved by the Owner at its option. Submission of request for progress payments must be accompanied by a notarized statement furnished by the

manufacturer of the item that the amount of progress payment claimed constitutes not more than the requested percentage of the manufacturer's invoice and setting forth all previous payments that have been made by the Contractor to the manufacturer.

5.2.5 Security for Payments for Stored Materials: Payments for Stored Materials will not be made unless:

- .1** The Owner has either (i) received executed conditional bills of sale (subject only to receipt of payment) or other reasonably satisfactory proof of the Owner's otherwise unencumbered title in and to the Stored Materials or (ii) been granted a first priority security interest and has been provided with an executed, recordable UCC-1 financing statement, in the Stored Materials prior to or simultaneous with the Owner's payment;
- .2** The Stored Materials are fully insured in an amount and with an insurance company reasonably satisfactory to the Owner, under a policy containing a standard mortgagee endorsement or the equivalent, and the Owner is provided a certificate of insurance evidencing the required insurance has been purchased by Contractor; and
- .3** The Stored Materials have been clearly marked with, among other things, the Owner's name and the job number so as to segregate and distinguish the Stored Materials from the property of others, and the Owner has the opportunity to inspect the Stored Materials and approve the identity, quality and quantity of the Stored Materials.

5.2.6 Except with the Owner's prior approval, Contractor's payments to Subcontractors shall be subject to retention of not more than eight (8%) on labor only for the first fifty percent (50%) of the Contract Sum. The Owner and the Contractor shall agree upon a mutually acceptable procedure for review and approval of payments and retention for subcontracts.

5.2.7 When Contractor's Application for Payment includes material delivered to the Site, under the possession and control of the Contractor but not yet incorporated into the Work, the delivered materials shall become property of the Owner. If the delivered material is stolen, destroyed or damaged by casualty before being used, Contractor shall replace the delivered material at its own cost and expense.

5.3 PAYMENTS WITHHELD

5.3.1 The Owner may decline to approve an Application for Payment in whole or in part, to the extent reasonably necessary to protect the Owner's interests or if the representations by the Contractor cannot be reasonably accepted and will notify Contractor of Owner's determination. If agreement cannot be reached on a revised amount, the Owner will process the Application for Payment for such amount as it reasonably deems appropriate. The Owner may elect to withhold payment in full or in part on an Application for Payment when Owner subsequently discovers evidence or subsequent inspections of the Work covered under a previous Application for Payment reveal, in the Owner's reasonable opinion, that it may be necessary to protect the Owner from loss because of:

- .1** Defective work not remedied;
- .2** Third party claims filed;
- .3** Failure of Contractor to make undisputed payments properly to Subcontractors for labor, materials or equipment;
- .4** Reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5** Damage to the Owner or another Contractor working at the Project;

- .6 Failure to submit affidavits and waivers of liens with Contractor's Application for Payment;
- .7 Failure to submit the monthly Schedule updates;
- .8 Persistent failure to carry out the Work in accordance with the Contract Documents; or
- .9 The existence of a material breach by Contractor of any material provision of the Contract Documents and/or Applicable Laws.

5.4 FINAL PAYMENT

5.4.1 Final payment shall be made by the Owner to the Contractor when: (1) the Work required by the Contract Documents has been fully performed by the Contractor, except for Contractor's obligations during the Warranty Period; (2) a final Application for Payment and a final accounting for the Contract Sum have been submitted by the Contractor and reviewed by the Owner; (3) a Certificate of Completion and Final Acceptance has then been approved by Owner; (4) Contractor has submitted a final affidavit attesting that Contractor has fully completed all Work required by the Contract Documents and setting forth the name, address and amounts owed to any unpaid Subcontractors or material/equipment suppliers ("Affidavit of Contractor"); (5) Contractor has submitted a notarized Final Affidavit of Compliance with Ohio Prevailing Wages; (6) Contractor has submitted notarized lien waivers executed by its Subcontractors and its or their material and equipment suppliers; (7) Contractor has submitted notarized Affidavit of Contractor forms executed by its Subcontractors; and (8) Contractor has executed and submitted a release of all claims against the Owner arising under or by virtue of this Contract, except claims which are specifically excepted by the Contractor as are set forth therein.

5.4.2 The amount of the final payment shall be calculated as follows:

- .1 Take the Contract Sum substantiated by the Contractor's final accounting for all Work Orders, Change Orders, and Actual Costs.
- .2 Subtract amounts, if any, for which the Owner withholds, in whole or in part, from the final Application for Payment as provided by the provisions of the Contract Documents and other amounts properly withheld by the Owner under the Contract Documents.
- .3 Subtract the aggregate of previous payments made by the Owner.

If the aggregate of previous payments made by the Owner exceeds the amount due the Contractor, the Contractor shall reimburse the difference to the Owner.

5.4.3 The Owner's accountants will review and report in writing on the Contractor's final accounting within 30 Calendar Days after delivery of the final accounting to Owner. Provided the conditions precedent to final payment required by Article 5 have been performed by Contractor, the Owner will, within twenty (20) Work Days after receipt of the written report of the Owner's accountants, either pay Contractor the amount determined to be due by Owner's accountants or identify, in writing, the reasons why the Owner disputes the written report of Owner's accountants.

5.4.4 If the Owner's audit of the Contractor's final accounting is determined to be less than claimed by the Contractor, the Contractor shall proceed in accordance with Article 9. Unless agreed to otherwise, a demand for review by the DRB of the disputed amount shall be made by the Contractor within 30 Calendar Days after the Contractor's receipt of Owner's payment or written notification pursuant to Article 5. Failure to make such demand within the 30 Calendar Day period shall result in either the final accounting reported by the Owner's accountants or Owner's determination becoming binding on the Contractor. Pending a final resolution of the disputed amount, the Owner shall pay the Contractor the amount determined by Owner's accountants or the amount the Owner has identified as undisputed.

5.4.5 If, subsequent to final payment and at the Owner's request, the Contractor incurs costs described in Article 8 and not excluded by Article 8: (1) to correct Work not conforming to the Contract Documents; or (2) arising from the resolution of disputes, the Owner shall reimburse the Contractor such costs, if any, on the same basis as if such costs had been incurred prior to final payment, but not in excess of the Contract Sum.

5.4.6 Neither Owner's acceptance of the Work, nor payments for Work or any part of the Work, nor any possession of the Project taken by Owner shall operate as a waiver of rights or obligations under any portion of the Contract Documents or Applicable Laws. Nor shall Owner's waiver of any breach of the Contract Documents by Contractor constitute a waiver of any other or any subsequent breach of contract.

ARTICLE 6

DISCOUNTS, REBATES AND REFUNDS

- 6.1** Cash discounts obtained on payments made by the Contractor shall accrue to the Owner if the Owner has deposited funds with the Contractor with which to make payments; otherwise, cash discounts shall accrue to the Contractor.
- 6.2** Amounts which accrue to the Owner in accordance with the provisions of Paragraph 6.1 shall be credited to the Owner as a deduction from the Contract Sum.

ARTICLE 7

ACCOUNTING RECORDS

- 7.1** The Contractor shall keep full and detailed Project Records and exercise such controls as may be necessary for proper business and financial management under the Agreement. The Owner, Owner's accountants or any local, state or federal governmental authority, or their duly authorized representatives shall be afforded access to Contractor's Project Records and Contractor shall preserve the Projects Records and shall make them available for inspection or copying for a period of three years after Substantial Completion, or for such longer period as may be required by Applicable Laws. All Project Records related to financial matters will be maintained in accordance with generally accepted accounting principles and audit standards, consistently applied. There will be an "open book" policy in effect at all times with regard to all Project Records maintained by the Contractor, or anyone on its behalf and the Owner, Owner's accountants or any local, state or federal governmental authority, or their duly authorized representatives will be afforded full and complete access to the Project Records at all reasonable times. The Owner, Owner's accountants or any local, state or federal governmental authority, or their duly authorized representatives will have the right to audit the Project Records of Contractor, Subcontractors and Sub-Subcontractors. If the audit results in a finding that an overcharge or error of any nature has occurred, Owner will adjust Contractor's Application(s) for Payment accordingly.
- 7.2** If the Contractor carries out any of the duties of this Agreement through a Subcontract with a value of \$25,000.00 or more over a 12-month period, the subcontract will also contain a clause compelling the Subcontractor to abide by the provisions of Article 7.
- 7.3** Owner's authorized representative or designee shall have reasonable access to the Contractor's facilities to inspect and copy Project Records, shall be allowed to interview all current or former employees to discuss matters pertinent to the performance of the Agreement and shall be provided adequate and appropriate work space, in order to conduct audits in compliance with Article 7.
- 7.4** Any adjustments and/or payments which must be made as a result of any such audit or inspection of the Contractor's Project Records shall be made within a reasonable amount of time (not to exceed 30 Calendar Days) from the presentation of Owner's undisputed findings to the Contractor.

ARTICLE 8
ADMINISTRATION OF THE CONSTRUCTION CONTRACT

The Contractor shall provide administration of its own work forces and of all Subcontractors and Sub-Subcontractors in cooperation with the Owner as set forth below.

8.1 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

8.1.1 Since the Contract Documents are complementary, before starting each portion of the Work, the Contractor shall carefully study and compare the various Drawings and other Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Paragraph 3.3, if such information is available, shall take field measurements of any existing conditions related to that portion of the Work and shall observe any conditions at the Site affecting it. These obligations are for the purpose of facilitating construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, any errors, inconsistencies or omissions discovered by the Contractor shall be reported promptly to Owner as a request for information and in the format required by Owner.

8.1.2 Contractor shall promptly report in writing to Owner and Engineer any and all conflicts, errors, omissions, ambiguities or discrepancies which Contractor discovers, or has actual knowledge of, and shall obtain a written response to request for information from Engineer before proceeding with the Work affected thereby. The Contractor is not required to ascertain that the Contract Documents are in accordance with Applicable Laws, statutes, ordinances, building codes, and rules and regulations, but any nonconformity discovered by or made known to the Contractor shall be reported promptly to Owner.

8.1.3 If the Contractor believes that additional cost or time is involved because of clarifications or instructions issued by Owner in response to the Contractor's notices or requests for information pursuant to Subparagraphs 8.1.1 and 8.1.2, the Contractor shall provide the notice in the time frame required by Paragraph 13.2. If the Contractor fails to provide the required notice, the Contractor shall have no right to additional compensation or a time extension. Fulfillment of the notice requirements of Paragraph 13.2 is an express condition precedent to Contract entitlement to an increase to the Contract Sum or a time extension. The Contractor shall not be liable to the Owner for damages resulting from errors, inconsistencies or omissions in the Contract Documents or for differences between field measurements or conditions and the Contract Documents unless the Contractor did or should have recognized such error, inconsistency, omission or difference and failed to report it to Owner.

8.1.4 As an ongoing obligation, the Contractor shall carefully study and compare the Contract Documents with each other and with information furnished by the Owner and shall at once report to the Owner, any and all errors, inconsistencies, or omissions discovered or reasonably apparent. If the Contractor performs any construction activity which involves a recognized or reasonably apparent error, inconsistency or omission in the Contract Documents which is due to an asserted error or omission in the Contract Documents without such notice to the Owner, the Contractor waives any right to an increase to the Contract Sum or a time extension. After reporting any error, inconsistency, or omission discovered in the Contract Documents, the Contractor shall not proceed with any Work so affected without the written clarification or determination of the Owner.

8.1.5 The Contractor shall take field measurements and verify field conditions and shall carefully compare the field measurements and conditions and other information known to the Contractor with the Contract Documents before commencing Work activities. Errors, inconsistencies or omissions discovered by the Contractor shall be immediately reported to the Owner, including, without limitation, utility locations, the exactness of grades, elevations, dimensions or locations given on any Contract Document issued by the Engineer or the work installed by the Owner's separate contractors. The Contractor shall provide field measurements of existing conditions upon the request of the Owner. The Contractor shall satisfy itself as to the accuracy of all utility locations, grades, elevations, dimensions and locations contained in the Contract Documents prior to performing any affected Work. In all cases of interconnecting Work, the Contractor shall verify at the Project Site all dimensions relating to the existing

or other Work. Any deficient Work caused by the Contractor's failure to verify all existing utility locations, grades, elevations, dimensions, or locations contained in the Contract Documents shall be promptly rectified by the Contractor as part of the Contract Sum.

8.1.6 Unforeseen Conditions

- .1** If Unforeseen Conditions are encountered at the Site, Contractor shall Provide Owner prompt notice before conditions are disturbed and in no event later than seven (7) Calendar Days after first observance of the conditions. Owner will promptly conduct a review and, if they constitute Unforeseen Conditions as defined in the Contract Documents and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or a time extension, or both. If the Owner determines that the conditions at the Site do not constitute Unforeseen Conditions as defined in the Contract Documents and that no change in the terms of the Contract is justified, the Owner shall so notify the Contractor in writing, stating the reasons. Claims by the Contractor in opposition to Owner's determination must be made within fourteen (14) Calendar Days after the Owner has given Contractor notice of the Owner's decision. Any timely opposition to the Owner's decision shall be subject to further proceedings pursuant to Article 9.
- .2** The Contractor shall identify the information supplied by the Owner which describes the subsurface or otherwise concealed physical conditions that Contractor claims constitutes Unforeseen Conditions as defined in the Contract Documents. When the actual conditions at the Site are reasonably consistent with the information supplied by the Owner, then the conditions shall not be deemed to be Unforeseen Conditions as defined in the Contract Documents.

8.1.7 The Contractor will assist the Owner to communicate with and address local and government officials with jurisdiction over the Project. Due to the sensitive nature of these communications, the Contractor agrees and acknowledges that all communications will be at the direction and discretion of the Owner.

8.2 SUPERVISION AND CONSTRUCTION PROCEDURES

8.2.1 The Contractor shall supervise, inspect and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures.

8.2.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for or on behalf of the Contractor or any of its Subcontractors.

8.2.3 The Contractor shall not be relieved of its obligations to perform the Work strictly in accordance with the Contract Documents by the performance or non-performance of the services or determinations of the Engineer, or by tests, inspections or approvals required or performed by persons other than the Contractor or its Subcontractors.

8.2.4 The Contractor shall be responsible to inspect portions of the Work performed under this Agreement or any other Contract to determine that such portions are in proper condition to receive subsequent Work pursuant to this Agreement. The Contractor assumes the full responsibility for the cost

and expense to correct any deficient Work caused by its failure to properly inspect the Work for suitability prior to performing Contractor's Work.

8.2.5 The Contractor shall provide proper facilities, take all necessary precautions and assume the entire cost for protecting the Work against adverse weather conditions and for handling all storm and flood water, sewage, seepage, ice or snow that may be encountered up to the date of Final Completion of the Work subject to the Contract Documents.

8.3 LABOR AND MATERIALS

8.3.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

8.4 SUBSTITUTIONS

8.4.1 Wherever materials, products, articles, equipment, systems or similar items are identified by reference to proprietary terms or similar reference, it is intended to establish the minimum standard or measure of quality that has been determined as requisite or intended for the Work. Competition is encouraged from subcontractors, suppliers, manufacturers and producers whose products, systems, reputations, performance and service warrant acceptance for the conditions, intent of design, requirements and other considerations of the Work under the conditions specified in the Instruction to Bidders.

8.4.2 The determination of products for use may be based on the construction, design, function, type, size, capacity, performance, strength, durability, efficiency, sound level, finish, aesthetic quality, service, matching existing work, the Owner's standards for repair, replacement and maintenance or other characteristics and criteria. Acceptance or rejection of proposed alternate or similar products, equipment or system that are equal to those specified in the Contract Documents may be based on any of the foregoing factors and criteria. The final decision on acceptance or rejection of proposed alternate or similar products, equipment or system that are equal to those specified in the Contract Documents shall be vested in the Owner and its determination may or may not express the reason for the decision, at Owner's option.

8.4.3 The product, equipment, system, or manufacturer used as the basis for the design or specification shall generally set the criteria. It shall be expressly understood that any product, equipment, system or manufacturer listed in the Contract Documents as acceptable shall meet and be in full compliance with the requirements and criteria, including those established by the product, equipment, system or manufacturer used as the basis for the specification. The Owner shall have the right to reject any proposed deviations from specified criteria or characteristics, or deviations from the criteria and characteristics of the product, system or manufacturer used as the basis of the Contract Documents.

8.4.4 Following the Notice to Proceed, only specified items will be used for the Project. If, however, an alternate or substitution is to be used during construction, it will only be approved by Owner under the following circumstances:

- .1** The required product, material or method cannot be provided in a timely fashion, but not as a result of Contractor's failure to pursue the work promptly or coordinate various activities; or
- .2** The required product, material or method cannot be provided in a manner which is compatible with other materials of the Work, or cannot be properly coordinated with the Work; or
- .3** The required product, material or method has not received required approval by a governing authority, and the requested substitution can be approved; or

- .4** Contractor establishes the substitution will provide substantial advantage to the Owner, in terms of cost, time or other valuable considerations, and after Contractor deducts offsetting responsibilities the Owner may incur, including additional compensation to the Engineer for redesign and evaluation services, increased cost of other work by the Owner or separate Contractors, and similar considerations.

8.4.5 If the substitution is approved, Contractor shall certify to Owner that the proposed substitution is Equal To or better than the required product, material or method, that the proposed substitution is suitable for the intended purpose at the intended location and that Contractor warrants the substituted design.

8.4.6 Any modifications necessary as a result of Owner approving a substitution shall be paid by Contractor.

8.4.7 If the substitution is not approved by Owner, the Contractor shall use the material, article, or piece of equipment specified in the Contract Documents.

8.5 WARRANTY

8.5.1 The Contractor warrants to the Owner that all materials and equipment furnished under the Contract Documents shall be new and unused, unless otherwise specified, and that upon Substantial Completion of each portion of the Work such portion will be free from faults and defects in materials, and workmanship and in conformance with the Contract Documents and Applicable Laws in effect on the date of this Agreement and as thereafter modified through the Final Completion of Contractor's Work. Contractor agrees without adjustment in the Contract Sum to remove or correct all Work performed by it under the Contract Documents which the Owner deems to be defective in material or workmanship or not in conformance with the Contract Documents and Applicable Laws during the Warranty Period. Contractor also agrees during the Warranty Period to remove or correct any portions of the Work that may be damaged or destroyed by such defective Work or by the removal or correction of such defective Work. Owner shall approve the Work performed during the Warranty Period and, if the Work is unacceptable, the Warranty Period shall be extended until the Work is acceptable to Owner. Upon request by Owner, the Contractor and Owner shall jointly inspect the Work during the eleventh month following the Date of Substantial Completion to identify and investigate any defective or non-conforming Work covered during the Warranty Period. Contractor's warranty excludes remedy for normal wear and tear and normal usage.

8.5.2 If Owner does not require defective Work to be removed or corrected by Contractor, an equitable reduction in the Contract Sum shall be made as reasonably determined by Owner. All reductions in the Contract Sum shall be evidenced by a written Change Order signed by Owner.

8.5.3 If Contractor does not fully perform its obligations under Subparagraph 8.5.1 within a reasonable time following written notice by the Owner to Contractor then, in addition to, and not in lieu of any other right or remedy available to the Owner pursuant to this Agreement, at law or in equity, the Owner may perform or cause such obligations to be performed at the sole cost and expense of Contractor. The amount of such cost and expense shall be deducted from the Contract Sum or, at the Owner's option, shall be due and payable by the Contractor to the Owner on demand.

8.5.4 Nothing contained in Paragraph 8.5 shall be construed to establish a period of limitation with respect to any other obligation which the Contractor might have under the Contract Documents. The Warranty Period relates only to the obligation of the Contractor to correct the Work following Substantial Completion of the Project.

8.5.5 Contractor will collect all written guaranties, warranties and equipment manuals and deliver them to Owner prior to Substantial Completion of the Project.

8.5.6 Contractor, with the assistance of Owner's maintenance personnel, will direct the checkout of those utilities and operations of systems and equipment supplied and/or installed by Contractor, for readiness, and will perform the initial training, start-up and testing.

8.5.7 The Owner may elect to take Beneficial Use of completed equipment and/or operating systems prior to Substantial Completion. After Contractor's submission of all written guaranties, warranties, and equipment manuals, and the performance of the initial training, start-up, and readiness testing, a Certificate of Beneficial Use shall be executed by the Owner and Contractor with a mutually agreed date of acceptance that will start the warranty period for the particular equipment and/or operating system. Any outstanding punchlist items shall be noted on the Certificate of Beneficial Use and remain the responsibility of the Contractor to complete within the specified time limit.

8.5.8 Contractor shall undertake all punch list work expeditiously upon Substantial Completion of the Project in the manner and fashion set forth in the Contract Documents, Certificate of Substantial Completion and as directed by Owner.

8.6 TAXES

8.6.1 The Owner shall provide the Contractor a certificate of tax exemption which the Contractor shall use when purchasing exempt materials or services that will be incorporated into the Work. Contractor shall remain responsible for payment of any sales, consumer, use and similar taxes for the Work that are not entitled to exemption, as determined by the State of Ohio Tax Commissioner and which are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

8.7 PERMITS, FEES AND NOTICES

8.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit and other permits and governmental fees, licenses and inspections necessary for proper execution and completion of the Work which are customarily secured after execution of the Agreement between Owner and Contractor and which are legally required when bids are received or negotiations concluded.

8.7.2 The Contractor shall comply with and give notices required by Applicable Laws during the performance of the Work.

8.8 SUPERINTENDENT

8.8.1 The Contractor shall employ competent superintendents who shall be identified in Contractor's organizational chart pursuant to Paragraph 2.3. The Superintendent shall be the representative of Contractor and all communications given to the Superintendent shall be as binding as if given to Contractor. Unless specifically approved by the Owner, the Contractor's superintendent shall be present during all working hours from the Date of Commencement to Substantial Completion of the Work, including those times when only Contractor's Subcontractors are performing work at the Site or minor activity is in progress. The Superintendent shall provide a daily report for each working day of the contract from Notice to Proceed until the Contract is physically complete. The report shall be delivered to the Construction Supervisor no later than the next working day. The report shall describe the work that was completed, the labor, equipment and materials utilized and any other issues or problems encountered.

8.9 CONTRACTOR'S SCHEDULE AND THE PROJECT CONSTRUCTION SCHEDULE

8.9.1 Contractor shall comply with the scheduling requirements contained in the Contract Documents, including submitting with each Application for Payment a schedule of revisions to the Contractor's Schedule along with a narrative report describing work accomplished during the current month as well as work projected to be accomplished during the following month.

8.10 DOCUMENTS AND SAMPLES AT THE SITE

8.10.1 The Contractor shall maintain at the Site or at such other locations as it may be approved by Owner from time to time, for its use and the use and inspection of the Engineer, Contractor, Owner, and all

governmental authorities with jurisdiction over the Project one copy of all Drawings, Specifications, Addenda, reviewed Shop Drawings, Change Orders and other Modifications, in good order and marked on a monthly basis to record all changes made during construction. Reviewed Shop Drawings, Product Data, Samples, Drawings and any other Contract Documents marked to record changes between as built conditions and design conditions shall be delivered to the Owner on a monthly basis through the Final Completion of the Work.

8.10.2 Prior to Final Completion of the Work and before the final Application for Payment is approved, Contractor shall turn over to Owner, all sets of Drawings, in Contractor's possession, which were stamped and approved by the Building Department, and all permits or certificates issued for the Work. Upon Final Completion of the Project and prior to negotiating the final payment from Owner, Contractor shall prepare and deliver promptly to Owner a set of "red-lined" as-built Drawings, in accordance with the Contract Documents.

8.11 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

8.11.1 The Contractor shall review and submit to Owner with reasonable promptness and in such sequence required by the Contractor's Schedule, all Shop Drawings, Product Data, Samples and Contractor's other submittals required by the Contract Documents.

8.11.2 By reviewing and submitting Shop Drawings, Product Data, Samples, and Contractor's other submittals required by the Contract Documents, Contractor represents that it has determined and verified all materials, field measurements, and field construction criteria related to the Work, or will do so, and that it has checked and coordinated the information contained within the Shop Drawings, Product Data, Samples and Contractor's other submittals with the requirements of the Work and of the Contract Documents.

8.11.3 The Contractor shall make any corrections reasonably required by the Owner and shall resubmit the required number of corrected copies of Shop Drawings, Product Data, Samples or Contractor's other submittals required by the Contract Documents. Resubmittal of Shop Drawings, Product Data, Samples and Contractor's other submittals necessitated by required corrections shall not be a cause for extension of time. Contractor shall direct specific attention in writing or on resubmitted Shop Drawings, Product Data, Samples or Contractor's other submittals, to revisions other than the corrections requested on previous submittals.

8.11.4 The Contractor shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents by Owner's review or approval of Shop Drawings, Product Data, Samples or Contractor's other submittals required by the Contract Documents, unless Contractor has specifically informed the Owner in writing of such deviation at the time of submission and the Owner has given written approval to the specific deviation. All Shop Drawings, Product Data, Samples or Contractor's other submittals required by the Contract Documents which do not strictly conform with the requirements of the Contract Documents do not alter the terms and conditions of this Agreement regardless of Owner's review or approval of same. Contractor shall not be relieved from responsibility for errors or omissions in the preparation of Shop Drawings, Product Data, Samples or Contractor's other submittals required by the Contract Documents, including, without limitation, the failure to comply with Applicable Laws or by the Owner's review or Owner's approval.

8.11.5 Shop Drawings, Product Data, Samples and Contractor's other submittals required by the Contract Documents shall be dated and bear: Name of Project; description or names of equipment, materials and items, and complete identification of locations at which materials or equipment are to be installed.

8.11.6 Submission of Shop Drawings, Product Data, Samples and Contractor's other submittals required by the Contract Documents shall be accompanied by transmittal letter in duplicate, containing Project name, Contractor's name, number of Drawings, Product Data, Samples, and Contractor's other submittals, titles and other pertinent data. Each and every submission shall be included on Contractor's Submittal Schedule.

8.11.7 When professional certification of performance criteria of materials, systems or equipment is required by the Contract Documents, Owner shall be entitled to rely upon the accuracy and completeness of such calculations and certifications.

8.12 TESTING AND INSPECTION OF CONSTRUCTION

8.12.1 As required by the Contract Documents, the Contractor is solely responsible for the quality of the constructed Work. The Contractor shall inspect the Work on a continuous basis, and the Contractor shall prepare daily reports that summarize the Contractor's observations as outlined in the Contract Documents.

8.12.2 If required by the Contract Documents, the Contractor shall coordinate the services of a construction testing laboratory provided by the Owner. The construction testing laboratory shall maintain an appropriate testing system throughout the performance of the Work to ensure the Contractor's strict compliance with the Contract Documents. The Contractor shall require that the construction testing laboratory perform all of the construction testing required by the Contract Documents. This includes, but is not limited to: the type of test; the percentage of units to be tested and/or the number of samples required; the time of the test and/or whether tests are required to be periodic or continuous. The construction testing laboratory shall provide Owner with copies of each and every testing report or summary simultaneously with the issuance to the Contractor.

8.12.3 The Contractor shall maintain in good order Contractor's testing and daily reports. All testing and daily reports shall remain at the Project Site with the Contractor and shall be made available to the Owner upon request for review. Copies of Contractor's testing and daily reports will be provided to the Owner on a weekly basis.

8.12.4 Owner, in its sole discretion, may, but is not required to, perform its own tests and inspections and the Contractor agrees to assist Owner in uncovering Work required for Owner to perform any such additional tests and inspections. Contractor's costs for uncovering the Work shall be governed by Paragraph 8.17. Owner's tests and inspections are for the sole benefit of Owner, and such additional tests and inspections shall not be deemed a substitute for the Contractor's testing and inspection obligations pursuant to the Contract Documents. The Contractor shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents by the Owner's performance of any testing and inspection.

8.12.5 The Contractor shall bring the Work that does not comply with the requirements of the Contract Documents immediately to the attention of the Owner and make a written report of the recommended Corrective Action. All Corrective Action shall be subject to Owner's prior review and shall be performed by Contractor in the time frame directed by the Owner. All Corrective Action performed by Contractor shall be subject to the Owner's subsequent inspection and approval.

8.13 USE OF SITE

8.13.1 The Owner has included in the Contract Documents, the identity and location of the existing underground utility facilities located in the construction area as disclosed by the owner of the underground utility facility, as well as the name, address and telephone number of each owner of any underground utility facilities in the construction area that does not subscribe to a Registered Underground Utility Protection Service. Owner shall provide written notice of Contractor's name and address by certified mail, return receipt requested to the owners of underground utility facilities known to be located in the construction area of the Project. In the event that the Work will require temporary or permanent relocation of any underground utility facility located in the construction area, the Contractor shall cooperate with the Registered Underground Utility Protection Services and the owners of underground utility facilities that are not members of a Registered Underground Utility Protection Service in order to coordinate Contractor's Work with such relocation and in strict compliance with the written notice, mailing and time requirements of Ohio Revised Code § 153.64. Contractor shall be responsible for direct and indirect losses, costs and expenses caused when: (i) Contractor fails to comply with Paragraph 8.14; (ii) Contractor fails to comply with the notice and time of notice requirements of Ohio Revised Code § 153.64; (iii) the underground

utility facility was located as marked by the owner of the underground utility facility in connection with Contractor's construction operations; or (iv) Contractor had actual knowledge of the location of the underground utility facility in connection with Contractor's construction operations. Contractor and its Subcontractors shall immediately alert the occupants of nearby premises as to any emergency that the Contractor or its Subcontractor may create or discover at or near such underground utility locations in connection with Contractor's construction operations. The Contractor and its Subcontractors shall immediately report to the owner or operator of the underground utility facility any break or leak on its lines or any dent, gouge, groove or other damage to such lines or to their coating or cathartic protection made or discovered in the course of any excavation or tunneling related to the Project.

8.13.2 Contractor shall provide support and protection for all existing work as reasonably required, including all Underground Facilities. The owners of all utility fixtures shall be notified in writing by Contractor before any Underground Facilities are removed, relocated or disturbed. If it becomes necessary to change the position of or temporarily remove any Underground Facilities, the Contractor shall immediately notify the Owner of the location, circumstances and duration and shall suspend Work in the construction area if necessary until satisfactory arrangements have been made by the owners of the Underground Facilities. Contractor shall not be entitled to an increase in the Contract Sum or extension of time when the Underground Facilities are shown in the Contract Documents.

8.13.3 If applicable to the Work specified in the Contract Documents, Contractor's Work shall minimize erosion and sediment run-off and Contractor shall assume the entire cost of handling any sewage, seepage, storm, surface and flood flows which may be encountered at any time during the construction Work. Contractor shall be responsible for obtaining any required permits as per Applicable Law and shall be liable for any fines and penalties assessed by any authority with jurisdiction over the Project due to noncompliance or violation of such requirements. Contractor shall limit both area and duration of bare soil exposure, employ appropriate erosion control through staged clearing, grading and excavating procedures, soil-pile protection, mulching and temporary vegetation. Groundwater, storm water and sediment bearing drainage from dewatering operations shall be filtered or impounded to allow removal of silt, sediment, debris, and other pollutants in an acceptable, stabilized location prior to disposal.

8.13.4 The Contractor shall establish all required base lines and elevation bench lines necessary for the performance of the Work. Contractor shall protect and preserve established benchmarks and monuments and shall make no changes in locations without the written approval of the Owner. Established reference points which may be lost, covered, destroyed or disturbed in the course of performance of the Work or which require shifting because of necessary changes in grades or locations shall, subject to prior approval of the Owner, be replaced and accurately located or relocated (as appropriate) at Contractor's expense, by an Ohio Licensed Engineer or Land Surveyor. If the original base lines or benchmark are lost, covered, destroyed or distributed, Contractor shall re-establish these reference points at no increase in the Contract Sum.

8.13.5 The Contractor shall confine operations and storage of materials, equipment, tools and debris at the Site to areas designated by the Owner, permitted by Applicable Laws or the Contract Documents and shall not unreasonably encumber the Site with any materials, equipment, tools or debris. All excavated materials, construction equipment and materials and equipment to be incorporated into the Work shall be placed so as not to injure any part of the Work or existing facilities and to provide free access to all parts of the Work and to all public utility installations in the vicinity of the Work.

8.13.6 The location of all temporary roadways and similar facilities shall be subject to Owner's review. The Contractor shall keep temporary Work from blocking access to completed Work or from interfering with other work being performed by Owner, other contractors or other public entities. If, however, conflict with normal traffic access occurs, Contractor shall provide temporary bypass routing until such temporary Work is completed. Contractor shall remove all temporary Work from the Project Site after it is no longer needed, and before completion of the Work.

8.13.7 Owner shall have the authority to limit the number of Contractor and Subcontractor employee vehicles present at the Project site. Contractor shall enforce all such limitations. In cases of a dispute

between Owner and Contractor regarding vehicle limitations at the Project Site, the Owner's determination shall govern and be binding on Contractor.

8.14 CLEANING UP AND BACKCHARGES

8.14.1 The Contractor shall keep the premises, the surrounding area and surrounding streets, lawns, and sidewalks free from accumulation of waste materials, rubbish, dirt, mud, vegetation and construction debris caused by operations under the Contract Documents. Before Final Completion, the Work, including stream channels and banks at drainage structures and all borrow and waste areas, storage sites, temporary plant sites, haul roads and other grounds occupied by Contractor in connection with the Work shall be cleaned of all waste materials, rubbish, temporary structures, the Contractor's tools, construction equipment, machinery and surplus materials. These areas shall have suitable vegetative cover established by seeding and mulching or by other approved methods and all parts of the Work shall be left in an acceptable condition as determined by the Owner. When sewers are built in paved or unpaved streets, Contractor shall remove dirt, mud, vegetation and construction debris accumulating from its operations upon all streets, intersecting streets, lawns or sidewalks as often as ordered by Owner.

8.14.2 If the Contractor fails to clean up as provided in the Contract Documents, use the streets, lawns and sidewalks at and adjacent to the Project site as provided in the Contract Documents, creates a nuisance, causes or contributes to water or air pollution, creates a health hazard or violates Applicable Laws, the Owner may implement the Corrective Action it deems appropriate and the reasonable cost of performing the Corrective Action shall be charged to the Contractor and the Contract Sum adjusted accordingly or at Owner's option, paid by Contractor to Owner. Owner shall have the right to allocate the reasonable cost of the Corrective Action among any or all entities performing Work on Site on a pro rata basis. If the unpaid balance of the Contract Sum is insufficient to pay the full cost of the Corrective Action performed by Owner on behalf of Contractor, then Contractor shall pay the difference to Owner upon written demand.

8.15 ACCESS TO WORK

8.15.1 The Contractor shall provide the Owner and Engineer and all authorities with jurisdiction over the Project with safe and reasonable access to the Work in preparation and progress wherever located.

8.16 ROYALTIES, PATENTS AND COPYRIGHTS

8.16.1 The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner, Engineer, and Engineer's consultants for the Project harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents or where the copyright violations are contained in the Contract Documents prepared by the Owner or Engineer. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Owner.

8.16.2 The Owner retains all Work product ownership and intellectual property rights in all Project Records used by Contractor.

8.17 UNCOVERING WORK

8.17.1 Contractor shall provide Owner with three (3) Business Days notice of Contractor's intent to cover a portion of the Work requiring observation, testing or inspection by the Contract Documents. If a portion of the Work is covered contrary to the Owner's, or any authority having jurisdiction over the Project's request, or to requirements specifically expressed in the Contract Documents, the Work must be uncovered, if required in writing by the Owner or any authority having jurisdiction over the Project, at Contractor's expense for the Owner's or any authority having jurisdiction over the Project's observation, testing or inspection and be replaced at Contractor's expense without change in the Contract Sum or extension of time.

8.17.2 If a portion of the Work has been covered which the Owner, or any authority having jurisdiction over the Project has not specifically requested to observe, test or inspect prior to its being covered, the Owner, or any authority having jurisdiction over the Project may request to see such Work and it shall be uncovered by Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be charged to the Owner. If such Work is not in accordance with the Contract Documents, Contractor shall pay such costs without adjustment in the Contract Sum.

8.18 PREVAILING WAGE RATES

8.18.1 The prevailing wage scale in the Cuyahoga County, Ohio area shall be paid by the Contractor to all laborers, workers and mechanics in the performance of the Work, in accordance with the schedule of wages determined by the State of Ohio's Director of Commerce. Contractors performing Work on federally-assisted Projects must comply with the Federal Labor Standards Act.

8.18.2 It shall be the responsibility of the Contractor to comply with all of the provisions of Ohio Revised Code Section 4115.05, as amended effective September 26, 1974, or if applicable, the Federal Labor Standards, including but not limited to, the payment of the prevailing rate of wages to all laborers, workers or mechanics included in the Contract Documents.

8.18.3 The Owner will appoint a Prevailing Wage Coordinator during the performance or term of this Agreement in accordance with Ohio Revised Code Section 4115.07, or if applicable, the Federal Labor Standards. The Contractor and its Subcontractors shall be responsible for complying with all prevailing wage requirements in the Contract Documents, including, but not limited to, supplying the Prevailing Wage Coordinator the following reports and information and Contractor shall continuously update itself and its Subcontractors on all modifications and changes to the following information:

- .1** Employee's full name, address and social security number.
- .2** Employee's Work classification.
- .3** Specify whether the employee is a laborer or operator.
- .4** Specify level/year for all apprentices and provide a copy of the apprenticeship agreement for each apprentice.
- .5** Specify total hours worked each week on the Project.
- .6** Specify hourly rate of pay.
- .7** Specify actual hourly rate paid each employee for the time worked. Overtime hourly rate of not less than time and one-half the basic or regular rate paid is required for all hours worked in excess of forty (40) hours per week. In addition to paying not less than the predetermined rate for the classification in which the employee works, the amount predetermined as fringe benefits in the wage determination issued for the Project, shall also be paid. Fringe payments must be entered in appropriate blocks on payroll forms when such fringes are paid to approved plans, funds, etc.
- .8** For each employee, list all fringe benefits (if any) and amount per hour for each employee. Hourly amount is to be based on 2080 hours per year.
- .9** For each employee, list the total deductions and the net pay for the pay period.

8.18.4 Contractor shall send a final affidavit to the Prevailing Wage Coordinator and to the Construction Supervisor when Contractor submits its final Application for Payment certifying compliance with all prevailing wage requirements in the Contract Documents. A final affidavit certifying compliance with all prevailing wage requirements is also included as part of the project close-out paperwork further described in the Contract Documents.

8.18.5 Except in cases of extraordinary emergencies, eight hours shall constitute a day's work and forty (40) hours a week's work, for any employee and for any worker engaged in any public work carried on whether done by contract or otherwise.

8.18.6 Failure of Contractor or any Subcontractor to strictly comply with the requirements of Paragraph 8.18 shall entitle Owner to withhold payment to Contractor pursuant to Paragraph 5.2 or terminate this Agreement for cause pursuant to Article 15.

8.18.7 Contractor and every lower-tier subcontractor will be required to submit certified payrolls and labor compliance documentation electronically at the discretion of and in the manner specified by the District. Electronic submittal will be a web-based system, accessed on the World Wide Web by a web browser.

ARTICLE 9

DISPUTE RESOLUTION

9.1 TIER 1 DISPUTE RESOLUTION

9.1.1 Contractor and Owner covenant and agree in the event of any claim, dispute or other matter in question arising out of or relating to the Contract Documents or breach thereof, Contractor shall continue with all Work, including the Work which is in dispute, and Owner will continue to pay for Work and that either party may seek such relief as may be permitted in accordance with the following dispute resolution procedures:

9.1.2 Owner shall meet with Contractor within three (3) Business Days of receipt of written notice from the party requesting relief of a dispute. Owner will issue a written Tier 1 Decision within fourteen (14) Calendar Days of the meeting. Owner and Contractor shall use best efforts to resolve the dispute; however, if the parties are unable to resolve the dispute within fourteen (14) Calendar Days of the Tier 1 Decision then Contractor must either abandon the dispute or timely proceed with the next dispute resolution procedure.

9.1.3 The use of a Dispute Resolution Board (DRB) as set forth in Article 9.2 is not included in the scope of this Agreement unless specifically included in Section SC-1 of this Agreement. Within seven (7) Calendar Days of receipt of the Tier 1 Decision, the party requesting relief shall submit a written request for review of the Tier 1 Decision by the DRB if a DRB is part of the Agreement. In the event that the DRB provisions as set forth in Article 9.2 are not included within the scope of this Agreement pursuant to Section SC-1, and after compliance with Articles 9.1.1 and 9.1.2 above, any claim, dispute or other matter in question arising out of or relating to the Contract Documents or breach thereof will be resolved by litigation in any state court located in Cleveland, Ohio having jurisdiction over the Parties, utilizing Ohio law.

9.2 DISPUTE RESOLUTION BOARD (DRB) PROCESS

9.2.1 The decisions and recommendations of the DRB are advisory and not binding, unless as a result of the DRB process, Owner and Contractor enter into a written settlement agreement identifying the claims and disputes resolved. The DRB process shall be conducted pursuant to the DRB Three-Party Agreement attached as Exhibit "A" and the following terms and conditions.

9.2.2 Owner and Contractor will establish one DRB for the Project consisting of three (3) members. All DRB members shall meet the following criteria:

- .1** Members of the DRB shall not have a financial interest in the Project, except for payment of services on the DRB;

- .2 Members of the DRB shall not be nor have been employed directly or indirectly by either the Owner, Engineer or Contractor for at least three (3) years prior to notice of the Contract award;
- .3 The Members of the DRB shall have substantial experience of not less than ten (10) years in the type of excavation, demolition, design or construction required for the Project; and
- .4 The DRB Members shall discharge their responsibilities impartially and independently considering the facts and conditions related to the matters under consideration and the provisions of the Contract Documents.

9.2.3 The DRB shall consist of the Owner selecting a member for approval by Contractor and the Contractor selecting a member for approval by Owner, with the two (2) approved members selecting the third DRB member. The three (3) DRB members shall commence their services by selecting one (1) member as the chair with the approval of Owner and Contractor. The Owner and Contractor shall select their members and obtain approval from the other party within ninety (90) Calendar Days of the award of the contract by the District's Board of Trustees. The two (2) DRB members shall select the third DRB member and appoint the DRB chair within fifteen (15) Calendar Days of their approval and appointment by Owner and Contractor. Service of a DRB member may be terminated at any time with not less than thirty (30) Calendar Days notice as follows:

- .1 The Owner may terminate the service of the Owner appointed member;
- .2 The Contractor may terminate the service of the Contractor appointed member;
- .3 The third DRB member's service may be terminated by agreement of the other two (2) DRB members or by agreement of the Owner and Contractor;
- .4 A DRB member's resignation.

9.2.4 After selection and approval of the DRB members and chair, all Project related communication between the DRB members and Owner and Contractor shall be with the DRB chair, except during meetings with the parties and distribution of progress documents. All written correspondence between one party and the DRB chair shall be copied to the other party and sent directly to the other two (2) DRB members. The DRB shall meet with the Owner and Contractor on a quarterly basis at the Project Site or other mutually agreeable location based on the circumstances to discuss the Work and related issues identified in the meeting agenda developed by the DRB chair with input from the Owner, Contractor and DRB members. DRB meeting minutes shall be prepared by the Owner, for information only, to document future action items and discussions held, but shall not be used by either Owner or Contractor in DRB hearings or other dispute resolution proceedings. Between each quarterly DRB meeting, Owner shall provide the DRB members with copies of Project Records that provide periodic progress reporting updates or report on the status of any Work or related unresolved issues discussed at any previous DRB meeting. In the event that the project is not experiencing issues requiring DRB involvement, with the agreement of the Owner, Contractor and DRB members, quarterly DRB meetings can be suspended.

9.2.5 Either the Owner or Contractor may refer a Tier 1 Decision to the DRB for a DRB hearing. In addition, either party may refer a dispute for a DRB hearing if the other party fails to comply with the deadlines set forth in Subparagraphs 9.1.1 and 9.1.2. Within ten (10) Calendar Days following referral, the party requesting relief shall submit Claim Documents to the DRB chair with service on the DRB members and opposing party that clearly and in detail gives the following information for each item of additional compensation and time extension requested:

- .1 A narrative of the disputed Work or Project circumstances at issue with enough description and information to enable understanding by a third person who is not familiar with the Project;

- .2 References to the applicable provisions of the Drawings, specifications and other Contract Documents related to the dispute with copies of the applicable Contract Documents included with the Claim Documents;
- .3 The dollar amount of additional compensation for any request for an increase to the Base Contract Price, Specific Allowance(s), General Allowance or Contract Sum with the cost and supporting documents that serve as the basis for the requested compensation;
- .4 The number of Calendar Days of a requested time extension, including a schedule analysis in compliance with Paragraph 13.2 of this Agreement; and
- .5 Copies of all relevant correspondence, schedules, photographs and other Project Records.

9.2.6 The opposing party shall submit, within ten (10) Calendar Days of receipt, a rebuttal to the Claim Documents to the DRB chair with a copy to the opposing party and the DRB members. The DRB members may expand any time-frame if either side requests more time to prepare and submit their Claim Documents or rebuttal.

9.2.7 Within ten (10) Calendar Days of receipt of the Claim Documents and rebuttal, the DRB members shall schedule a DRB hearing with the Owner and Contractor to hear oral presentations from both sides. Once a DRB hearing date has been established, both Owner and Contractor shall submit to the DRB chair, with copies to the other party and DRB members, a list of names and their affiliation who may present at the DRB hearing. The Owner's and Contractor's respective positions shall be presented by individuals thoroughly knowledgeable of the dispute. Each party may have other representatives and technical advisors assist in the presentation. Unless mutually agreed by both parties, outside legal counsel shall not be permitted to attend the oral presentation to the DRB members. The DRB shall arrange and conduct all meetings, hearings and Project visits the DRB members determine necessary to decide all disputes presented to the DRB.

9.2.8 The DRB members shall consider the submitted documents and testimony and render a DRB written recommendations within thirty (30) Calendar Days of the close of the DRB hearing. The decision of the DRB Members shall be by majority vote. The DRB members shall rule on each issue of the claim and determine both entitlement and damages or the lack thereof. The dissenting findings and recommendations will be included in the DRB written majority recommendations. Within thirty (30) Calendar Days of the date of the DRB written recommendations, Owner and Contractor shall accept or reject the DRB written recommendations in whole or in part. All matters agreed to in the DRB written recommendations shall be documented in a written settlement agreement between Owner and Contractor.

9.2.9 Evidence presented to the DRB may be used as evidence in subsequent litigation or arbitration proceedings; additionally, the DRB written recommendations shall be admissible as evidence by either Owner or Contractor in such subsequent proceedings. Any DRB written recommendations introduced into evidence in any subsequent proceeding shall be prefaced with the following paragraph:

These DRB written recommendations may be taken under consideration with the understanding that:

- 1) The DRB written recommendations were based upon presentations by the parties.
- 2) No fact or expert witnesses presented sworn testimony or were subject to cross-examination.
- 3) The parties to the DRB proceedings were not provided with the right to any discovery, such as the production of documents or depositions.
- 4) There is no record of the DRB hearing other than the DRB written recommendations.

9.2.10 The fees and expenses of the DRB members will be paid in total by the Contractor based on mutually agreeable hourly rate(s) and items of reimbursable expense through a specific allowance

contained on the Bid Form. The Contractor shall not include any mark-up to the DRB expenses and shall supply the DRB invoice(s) in Contractor's pay applications.

- 9.3** Should Contractor and Owner be unable to resolve the dispute through the DRB process, any and all disputes shall, at the sole discretion of Owner, be decided by binding arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association then pertaining. The organization, selected by the Owner, to provide arbitration services and any arbitrator(s) appointed thereby shall have no jurisdiction, power or authority to decide or award punitive damages. The award(s) rendered by the arbitrators in accordance with this provision shall be final and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof. All arbitration proceedings or hearings shall be conducted in a location identified by Owner, utilizing Ohio law.
- 9.4** Owner and/or Contractor may join any other party in the arbitration proceeding that Owner and/or Contractor determines is necessary to reach a complete adjudication of any disputes arising under the terms of this Agreement, and/or disputes arising under the terms of any other agreement or contract entered into between Owner and any other party performing Work on the Project.
- 9.5** After the Parties' compliance with Paragraphs 9.1 and 9.2, should the Owner elect not to resolve a dispute by binding arbitration pursuant to the terms of Article 9, such dispute will be resolved by litigation in any state court located in Cleveland, Ohio having jurisdiction over the Parties, utilizing Ohio law.
- 9.6** The failure of either Contractor or Owner to comply with the provisions of the foregoing shall be in contravention of the parties' express intention to implement this alternative means of dispute resolution, shall constitute a breach of these provisions, and Contractor and Owner expressly stipulate that any court having jurisdiction over the parties shall be empowered to immediately enjoin any proceeding commenced in contravention of this Article and the party failing to comply with these provisions shall reimburse the other parties for all costs and expenses (including attorneys' fees) incurred in enforcing these provisions.
- 9.7** Unless otherwise agreed in writing, the Contractor shall continue to provide services and shall maintain progress during the good faith negotiations required by this Agreement, any DRB hearing, arbitration or litigation proceedings, and the Owner shall continue to make payments to the Contractor in accordance with this Agreement, however the Owner shall be under no obligation to make payments on or against any claim or amounts in dispute during the good faith negotiations required by this Agreement or the pendency of any DRB hearing, arbitration or litigation proceeding to resolve those claims or amount in dispute.

ARTICLE 10

SUBCONTRACTS

- 10.1** The Contractor and Subcontractor hereby expressly agree that the Owner is not a third-party beneficiary to the Contractor-Subcontractor Agreement. The Owner, Contractor and Subcontractor hereby expressly agree that the Subcontractor is not a third-party beneficiary to this Owner-Contractor Agreement.
- 10.2 SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK**
- 10.2.1** The Contractor understands and agrees that no contractual agreement exists for any part of the Work under this Agreement between the Owner and any of the Subcontractors nor Sub-Subcontractors. Further, the Contractor understands and agrees that it alone is responsible to the Owner for all of the Work under this Agreement and that any review of Subcontractors or Sub-Subcontractors by the Owner will not in any way make the Owner responsible to nor for the actions or failures of any Subcontractor or Sub-Subcontractor.
- 10.2.2** Contractor-proposed Subcontractors or Sub-subcontractors shall have a record of successful and satisfactory past performance with the type of work and/or items proposed to be provided or furnished by them.

10.2.3 Except whereby the submission of the bid by the Contractor under the conditions of the Contract Documents indicates or implies it has accepted the use of a particular specified Subcontractor, the Contractor will not be required to contract with any Subcontractor or person or organization against whom it has a reasonable objection.

10.2.4 Contractor must provide an official list of subcontractors and sub-subcontractors on forms provided in the Contract Documents and must obtain the written approval of the Owner prior to substituting any subcontractors or sub-subcontractors.

10.2.5 The written Contract between the Contractor and Subcontractors shall: (1) require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by the terms of the Contract Documents and all Applicable Laws and to assume toward the Contractor all the obligations and responsibilities which the Contractor, by the Contract Documents and this Agreement, assumes toward the Owner; (2) require each Subcontractor to maintain the required insurance policies; (3) require the Subcontractor to procure any surety bonds required by the Contractor; and (4) allow to the Subcontractor the benefit of all rights, remedies and redress afforded to the Contractor by the Contract Documents and this Agreement.

10.3 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

10.3.1 Each subcontract agreement for a portion of the Work is contingently assigned by the Contractor to the Owner provided that:

- .1** Assignment is effective only after termination of the Contract by the Owner for cause or convenience pursuant to Article 15 and only for those subcontract agreements which the Owner accepts by notifying the Subcontractor and Contractor in writing; and
- .2** Assignment is subject to the prior rights of the surety obligated under bond relating to the Contract.

10.3.2 Upon such assignment, if the Work has been suspended for more than 90 days, the Subcontractor's compensation shall be equitably adjusted for increases in Actual Costs proximately resulting from the suspension.

ARTICLE 11 **CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS**

- 11.1** The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the Site under conditions of the contract identical or substantially similar to these, including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such claims as provided in Articles 12 and 13 and elsewhere in the Contract Documents.
- 11.2** The Contractor shall afford the Owner and separate Contractors reasonable opportunity for the introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.
- 11.3** Costs caused by delays, improperly timed activities or defective construction shall be borne by the party responsible therefore.

ARTICLE 12

WORK ORDERS, CHANGE ORDERS AND CONSTRUCTION CHANGE DIRECTIVE

12.1 GENERAL

12.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract and without notice to any surety, by Work Orders, Change Orders, Field Orders, Pre-Authorization Letters and Construction Change Directives, and the Contract Sum and the Final Completion Date shall be adjusted as provided herein in connection therewith. If a time extension is granted, the Construction Schedule and any milestones set forth in the Contract Documents shall be adjusted accordingly.

12.1.2 Work Orders are issued in writing to Contractor and shall authorize Contractor to perform Work for payment from the General Allowance and Specific Allowance(s), if any, set forth in Article 2 of the Agreement between Owner and Contractor for the Project. Except for emergencies authorized by Ohio Revised Code § 6119.10, a Work Order authorizing payment from the General Allowance or the Specific Allowance requires prior written authorization from the Owner. A Work Order Pre-Authorization may be initiated by the Owner directing the Contractor to proceed with the Work in advance of the Contractor's receipt of a fully executed Work Order.

12.1.3 Deduct Orders are issued in writing to Contractor and shall authorize Contractor to non-perform an entire Bid Item, or any portion thereof. Except for emergencies authorized by Ohio Revised Code § 6119.10, a Deduct Order requires prior written authorization from the Owner. All Deduct Orders shall be tracked and will be included in the Final Adjusting Change Order for the project.

12.1.4 A Change Order is a document recommended by Engineer and signed by Contractor and Owner that authorizes an addition, deletion or revision in the Work that results in a Contract Modification, or an adjustment in the Contract Sum or extension of the Final Completion Date on or after the date of the Agreement between Owner and Contractor. Except for emergencies authorized by Ohio Revised Code § 6119.10, a Change Order requires prior written authorization by the Owner's Executive Director and approval, by resolution, by the Owner's Board of Trustees. Notwithstanding the above, Change Orders limited to an extension of the Final Completion Date by six (6) months or less shall not require Board of Trustees approval.

12.1.5 A Change Order signed by Contractor with no extension of time shall exclusively establish Contractor's agreement that there shall be no time extension in connection with that Change Order. Contractor acknowledges that any attempt to preserve a future request for a time extension due to the performance of any Work associated with a Work Order or Change Order or the cumulative effects of multiple Work Orders or Change Orders is ineffective and has no force or effect pursuant to this Agreement. Except for emergencies authorized by Ohio Revised Code § 6119.10, changes in the Contract Sum and extensions of the Final Completion Date may be made only by a written Change Order signed by the Owner's Executive Director and approved, by resolution, by the Owner's Board of Trustees. Notwithstanding the above, Change Orders limited to an extension of the Final Completion Date by six (6) months or less shall not require Board of Trustees approval. Contractor shall provide or perform additional Work, make other changes in the Work and comply with the provisions of a Work Order or Change Order, the same as though the Work had been a part of the original Contract Documents, according to the terms of the Work Order or Change Order.

12.1.6 For Work Orders authorized under the original Contract Sum, insurance and bonding costs are already included and as such no additional payment for insurance and/or bonding will be made. For Work Orders and Change Orders authorized under an increased Contract Sum as authorized by a Contract Modification the Contractor may add up to a 3% markup fee to cover the cost of insurance and bonding costs.

12.1.7 Work Order, Deduct Order or Change Order Process

- .1 Work Orders, Deduct Orders and Change Orders shall use the Request for Proposal (RFP) form specified by Owner. This process and the process for Contractor-initiated changes are as follows:
- .2 Contractor may initiate the process by submitting a Change Request (CR) or other written notification to the Owner which shall fully describe the changes sought, the reasons for the changes, and the impact, if any, on the contract Final Completion Date or Contract Sum. If the Final Completion Date will be impacted by the proposed change, Contractor shall submit a schedule highlighting the anticipated impact resulting from the proposed change. If Contractor is seeking payment from the General Allowance or a Specific Allowance, a Bid Item Number that comprises Contractor's Base Contract Price or the Contract Sum, it shall submit a price proposal which identifies the basis therefor and the net change to the General Allowance, a Specific Allowance, a Bid Item Number that comprises Contractor's Base Contract Price or the Contract Sum. Contractor shall also advise the Owner in writing the results of Contractor's technical evaluation of the proposed change stating any undesirable consequences then known or reasonably foreseeable to Contractor. Contractor shall indicate the potential severity of impact and effect to the Contractor's Schedule, the General Allowance, a Specific Allowance, a Bid Item Number that comprises Contractor's Base Contract Price, or the Contract Sum at the time the request is initially made.
- .3 The Owner may initiate the process by a Request For Proposal (RFP) to Contractor describing the change in sufficient detail to permit evaluation and Contractor shall promptly respond (within, no longer than, ten (10) Calendar Days) by submitting a price and time proposal to Owner. At the same time, Contractor shall also advise the Owner of Contractor's technical evaluation of the requested change stating any undesirable consequences then known or reasonably foreseeable to Contractor. Contractor shall indicate the potential severity of impact and effect to the Contractor's Schedule, the General Allowance, a Specific Allowance, a Bid Item Number that comprises Contractor's Base Contract Price or Contract Sum at the time the request is initially made.
- .4 Following Owner's receipt of a request from Contractor for any change in the price of the work and/or Contractor's Schedule, or following Contractor's submission of comments to a request initiated by the Owner, the Owner shall review the submitted material in a timely manner, accept or deny the request, and if acceptable, process the Work Order, Deduct Order or Change Order or request additional information, clarifications or corrections as may be appropriate, until the Work Order, Deduct Order or Change Order has been agreed upon by both Owner and Contractor.
- .5 Any time during the Request For Proposal or Work Order Request process, the Owner may reasonably elect to issue a Work Order Pre-Authorization or Construction Change Directive requiring Contractor to immediately carry out the Work or may cancel the proposed Work Order or Change Order. The Owner shall not be liable for any costs incurred by Contractor for proceeding with the contemplated Request For Proposal or Work Order Request in anticipation of: (i) a Work Order approved in writing by the Owner's Director of Engineering and Construction authorizing payment from a Specific Allowance; (ii) a Work Order approved in writing by both the Owner's Director of Engineering and Construction and the Owner's Executive Director authorizing payment from the General Allowance; or (iii) a Change Order authorized in writing by Owner's Executive Director and approved, by resolution, by Owner's Board of Trustees.
- .6 After the Owner's approval has been obtained, the Work Order, Deduct Order, or Change Order will be prepared by the Owner for execution by the parties. The documents shall be transmitted to Contractor for signature signifying acceptance of the terms contained therein. The documents will be similarly approved by the Owner, and one fully executed original returned to Contractor. The acceptance of a Work Order, Deduct Order, or

Change Order constitutes a mutual agreement with respect to all extensions of time regarding a Change Order and all direct or indirect costs related to the Work Order, Deduct Order, or Change Order.

12.1.8 The adjustment to the General Allowance, a Specific Allowance, a Bid Item Number that comprises Contractor's Base Contract Price or Contract Sum in connection with any Work Order, Deduct Order, or Change Order shall be determined in one of the following ways and, unless otherwise approved or directed by the Director of Engineering and Construction:

- .1** by mutual acceptance of a Lump Sum cost proposal with all elements of price separately itemized and supported by sufficient data to permit evaluation by the Owner as described in Article 12.2;
- .2** by mutually agreeable Unit Prices included in the Base Contract Price, the General Allowance, or Specific Allowance(s) unless Owner determines, at its sole discretion, that the unit prices are either excessive or insufficient;
- .3** on the actual cost of Time and Materials Work as tabulated on T&M sheets completed and signed by the Contractor and Owner daily listing all labor, material, and equipment utilized in the performance of the work and as reflected by paid receipts for materials and equipment utilized as described in Article 12.3.

12.1.9 Except for Unit Prices included in the Contract Documents, and unless otherwise approved by the Owner, for a proposed Work Order or Change Order, Contractor shall submit an itemized list of quantities with the applicable unit cost and extended price for each for both Lump Sum and Time and Materials Cost Summaries, in such form and detail as required by the Owner.

12.2 LUMP SUM

12.2.1 Unless otherwise approved by the Director of Engineering and Construction, at a minimum, the cost of the Lump Sum Work Order, Lump Sum Deduct Order, or Lump Sum Change Order Cost Summary prepared by Contractor shall include and indicate the items enumerated below. Rates for labor, equipment and material shall be the same for extra and credit computations. The Contractor shall utilize the Cost Summary form provided by the District. A separate Cost Summary shall be provided for both the prime and each tier of subcontractors. Notwithstanding the above, the District has the option to propose an acceptable lump sum price in lieu of the Contractor submitting a proposal.

- .1** Lump Sum Labor:
 - (a)** For all Lump Sum labor, the Contractor shall submit the proposed projected wage rates and projected fringe benefits rates that will be in effect at the time the Work Order or Change Order is performed or for the time period applicable to a Deduct Order. An example of prior wages rates paid in the form of a certified payroll report shall be provided. The proposed fringe benefits shall include costs paid to, or on behalf of, workers by reason of health and welfare benefits, pension fund benefits or other benefits, when such amounts are required by collective bargaining agreements or other employment contracts generally applicable to the class of labor employed to perform the Work Order, Deduct Order or Change Order. Fringe benefits on non-union employees shall not include discretionary pensions and/or bonuses and any other fringe benefit that is discretionary or based on profit sharing, including employee stock option plans. In addition to the above the Contractor shall receive the actual projected cost of social security tax, workers' compensation and state and federal unemployment insurance. No other markups or allocations as a percentage of labor shall be allowed. The Contractor is required to furnish auditable evidence of past percentages paid for Worker's Compensation and Unemployment Insurance as evidenced by forms from the State of Ohio.

- (b) The Contractor shall not propose payment for overtime unless necessitated by the work schedule, explained in the proposal cover letter and approved by the District.
- (c) The Contractor shall not propose payment for the designated field superintendent for the Project attributable to the Work Order or Change Order, unless specifically justified in the proposal cover letter and approved by the District.
- (d) The Contractor shall not propose payment for more than one foreman classification per work crew, unless specifically justified in the proposal cover letter and approved by the District.

.2 Lump Sum Material and Supplies:

- (a) For Lump Sum Work Orders, Deduct Orders, or Change Orders the Contractor will propose to be paid or the District will be credited the cost of material and supplies approved by the Owner and incorporated into the Work Order or Change Order as evidenced by supplier quotations or by example receipts for major materials previously purchased.

.3 Lump Sum Equipment:

- (a) The Contractor shall not include in the cost proposal of a Lump Sum Work Order or Change Order any proposed costs or rental of small tools (defined as tools with a replacement cost of \$1,500 or less), buildings, and field trailers. These costs shall be considered part of the Contractor's Markup Fee (as hereinafter defined).
- (b) For any construction equipment included in the Contractor's cost proposal, the Contractor shall propose to charge the applicable rental rate based on the Rental Rate Blue Book for Construction Equipment published by Equipment Watch, but under such conditions as contained herein. The use of any other publication for the determination of rental rates will be at the Owner's sole discretion.
- (c) The proposed rental of equipment or equipment owned by the Contractor will be paid for by the hour. The hourly charge for equipment will be 1/176 of the monthly rate shown in the Rental Rate Blue Book for Construction Equipment.
- (d) The proposed hourly charge for equipment on standby will be 1/176 of the monthly rate. Equipment on standby shall not be billed for more than eight (8) hours in any Calendar Day or for more than forty (40) hours in any calendar week. No operating or other costs shall be charged for equipment on standby.
- (e) The proposed hourly charge for equipment not listed in the Rental Rate Blue Book for Construction Equipment will be the local rental rate of such equipment from area suppliers as established by the Owner or as calculated through the use of any publication for the determination of rental rates, whichever is lower.
- (f) Equipment to be rented from a third party will be paid at quoted cost. In addition, at the request of the Owner, the Contractor shall present competitive quotes for the Owner's evaluation prior to renting equipment from a third party.
- (g) Equipment rates are for bare rental, without an operator.
- (h) The Contractor may add the actual operating costs of fuel, oil and lubricants used for the operation of the equipment used for a Work Order or Change Order based on published consumption rates for that piece of equipment. The Contractor will be required to provide documentation as required by Owner to support the above

charges. In lieu of that method and as approved by the Owner, the Contractor may utilize the operating rate for fuel, oil, and lubricants listed in the Rental Rate Blue Book for Construction Equipment. The Contractor shall not propose to be paid for fuel, oil, and lubricant cost for any piece of equipment on standby, or for equipment that does not utilize fuel and lubricants.

- (i) For Contractor owned equipment, the proposed aggregate equipment rental charge for any single piece of equipment used in any Work Order or Change Order shall be limited to fifty percent (50%) of the fair market value of the piece of equipment at the time the Work Order or Change Order will be performed.
- (j) For specialized construction equipment such as tunnel boring machine plants and spoils conveyance systems, it will be considered that the Contractor has been compensated in the Contract Sum for ownership and any lost opportunity costs on this or other projects. Therefore, should any Work Order or Change Order be performed for, or delays be incurred to, the tunnel excavation, the Contractor will be entitled to additional compensation only for the actual operating and maintenance costs of this equipment as determined by the Corp of Engineer's standard rate for idled specialty equipment in effect when the Work Order or Change Order is performed.
- (k) Equipment which is not in good condition as decided by the Owner shall be replaced at no additional cost to Owner.
- (l) If the Work Order or Change Order requires the use of construction equipment not already on the Site of the Work, the Contractor shall propose to only be paid for one (1) round-trip transportation charge per Work Order or Change Order for each piece of equipment brought to the Site, unless adequately justified in the proposal cover letter. The round-trip transportation charge shall be based on a round trip of no more than 50 miles.

.4 Lump Sum Markup Fee:

- (a) The percentages for overhead and profit as set forth herein for a Lump Sum Work Order, Deduct Order or Change Order may be less depending on the nature, extent or complexity of the Work Order or Change Order, where the percentage is not commensurate with the responsibility and administration involved but in no event shall they exceed:
 - (i) In the case of a Work Order, Deduct Order or Change Order performed by the Contractor's own forces or by its Subcontractors forces add a fifteen percent (15%) markup to the proposed costs identified and substantiated in Subparagraphs 12.2.1 through 12.2.4; and
 - (ii) For Work performed by Contractor's subcontractors, at whatever tier will receive a 15% markup, the next higher subcontractor and the following subcontractor or Contractor will receive a 5% mark-up each. The maximum allowable mark-up allowed on subcontractor performed work is 26.8% (15%/5%/5%).
- (b) The Markup Fee includes, but is not limited to the following costs, fees and expenses: home office, branch office, field office, project management, superintendents, estimating, engineering, training and safety meetings, coordination, expediting, purchasing, detailing, legal, accounting, data processing or other administrative services, shop drawings, permits, taxes comprehensive

general liability insurance, auto insurance, umbrella insurance and subcontractor bond premium.

.5 Contents of a Lump Sum Cost Proposal:

- (a) At a minimum the Contractor shall provide the following items before a Lump Sum cost proposal will be considered:
 - (iii) Lump Sum proposal cover letter stating total proposed cost for the additional or deducted work, and;
 - (iv) Lump Sum cost summary using the spreadsheet format supplied by the District for the prime contractor and each subcontractor, and;
 - (v) Auditable backup for proposed Worker's Compensation and Unemployment Insurance markup percentages for both prime and subcontractors, and;
 - (vi) Quotations and/or example invoices for any key proposed materials, and;
 - (vii) Copies of published rates for the proposed equipment.

12.3 TIME AND MATERIALS WORK ORDERS

12.3.1 The Contractor and/or Subcontractor shall utilize the cost summary form provided by the Owner when submitting invoices for a Work Order that is based on the actual cost of Time and Materials Work. The Contractor and/or Subcontractor shall keep daily Time and Materials reports for all Work Orders. The daily reports shall include the names of employees, the employees' classifications, the nature of work performed, the hours worked, materials and equipment incorporated, and machinery or equipment used, if any, in the prosecution of each Work Order. Invoices and paid receipts will be retained by the Contractor and submitted as part of the daily Time and Materials report. Contractor's daily report shall constitute verification that the Work Order was performed, shall be submitted to the Owner at the end of each shift, and must be signed both by the Contractor and the Owner. A complete daily report for each day worked shall be submitted for each Work Order cost proposal.

12.3.2 Unless otherwise approved by the Director of Engineering and Construction, at a minimum, the cost proposal for the Time and Materials Work Order prepared by Contractor shall include and indicate the items enumerated below. Rates for labor, equipment and material shall be the same for extra.

.1 Time and Materials Labor:

- (a) For all time and materials labor, the Contractor shall be paid the actual rate of wages and fringe benefits in effect at the time the Work Order was performed for each and every hour that said labor was actually engaged performing the Work Order. An example of the wage rate paid in the form of a certified payroll report for each employee shall be provided. Fringe benefits shall include costs paid to, or on behalf of, workers by reason of health and welfare benefits, pension fund benefits or other benefits, when such amounts are required by collective bargaining agreements or other employment contracts generally applicable to the class of labor employed to perform the Work Order. Fringe benefits on non-union employees shall not include discretionary pensions and/or bonuses and any other fringe benefit that is discretionary or based on profit sharing, including employee stock option plans. In addition to the above the Contractor shall receive the actual cost of social security tax, workers' compensation and state and federal unemployment insurance. No other markups or allocations as a percentage of labor shall be allowed. The Contractor is required to furnish auditable evidence of the actual percentages applicable at the time the Work Order was performed as evidenced by forms from the State of Ohio. Overtime will only be paid if authorized in writing by Owner. Any portion of the time of the designated field superintendent for the Project attributable to the Work Order or Change Order shall

not be billed as a direct cost, unless specifically authorized in writing by the Owner.

- (b) Payment will be made for only one foreman classification per work crew, unless specifically authorized in writing by Owner.

.2 Time and Materials - Materials and Supplies:

- (a) For a Time and Materials Work Order authorized per Article 12.1.7.3, the Contractor will be paid the cost of material and supplies approved by the Owner and incorporated into the Work Order as evidenced by invoices and paid receipts.

.3 Time and Materials Equipment:

- (a) The Contractor shall not include in the cost of a Work Order any cost or rental of small tools (defined as tools with a replacement cost of \$1,500 or less), buildings, and field trailers. These costs shall be considered part of the Contractor's Markup Fee (as hereinafter defined).
- (b) For any construction equipment, the Contractor shall charge the applicable rental rate based on the Rental Rate Blue Book for Construction Equipment published by Equipment Watch, but under such conditions as contained herein. The use of any other publication for the determination of rental rates will be at the Owner's sole discretion.
- (c) Rental of equipment or equipment owned by the Contractor will be paid for by the hour. The hourly charge for equipment will be 1/176 of the monthly rate shown in the Rental Rate Blue Book for Construction Equipment.
- (d) The hourly charge for equipment on standby will be 1/176 of the monthly rate. Equipment on standby shall not be billed for more than eight (8) hours in any Calendar Day or for more than forty (40) hours in any calendar week. Standby time is herein defined as the portion of an eight (8) hour Calendar day during which equipment is located on site, but is not in operation. No operating or other costs shall be applied to equipment on standby.
- (e) The hourly charge for equipment not listed in the Rental Rate Blue Book for Construction Equipment of the Contract Documents will be the local rental rate of such equipment from area suppliers as established by the Owner or as calculated through the use of any publication for the determination of rental rates, whichever is lower.
- (f) Equipment rented from a third party will be paid at invoice cost. In addition, at the request of the Owner, the Contractor shall present competitive quotes for the Owner's evaluation prior to renting equipment from a third party.
- (g) Equipment rates are for bare rental, without an operator.
- (h) The Contractor may add the actual cost of fuel, oil and lubricants used for the operation of the equipment used for a Work Order. The Contractor will be required to provide documentation as required by Owner to support the above charges. In lieu of that method and as approved by the Owner, the Contractor may utilize the operating rate for fuel, oil, and lubricants listed in the Rental Rate Blue Book for Construction Equipment. The Contractor shall not be paid for fuel, oil, and lubricant cost for any piece of equipment on standby.

- (i) For Contractor owned equipment, the aggregate equipment rental charge for any single piece of equipment used in any Work Order shall be limited to fifty percent (50%) of the fair market value of the piece of equipment at the time the Work Order was performed.
- (j) For specialized construction equipment such as tunnel boring machine plants and spoils conveyance systems, it will be considered that the Contractor has been compensated in the Contract Sum for ownership and any lost opportunity costs on this or other projects. Therefore, should any Work Order be performed for, or delays be incurred to, the tunnel excavation, the Contractor will be entitled to additional compensation only for the actual operating and maintenance costs of this equipment as determined by the Corp of Engineer's standard rate for idled specialty equipment in effect when the Work Order is performed.
- (k) Equipment which is not in good condition as decided by the Owner shall be replaced at no additional cost to Owner.
- (l) If the Work Order requires the use of construction equipment not already on the Site of the Work, Owner will only pay for one (1) round-trip transportation charge per Work Order for each piece of equipment brought to the Site, unless authorized in writing by the Owner. The round-trip transportation charge shall be based on a round trip of no more than 50 miles unless authorized in writing by the Owner.
- (m) A list of all equipment to be used must be approved by Owner in writing prior to commencement of a Work Order.

.4 Time and Materials Markup Fee:

- (a) The percentages for overhead and profit as set forth herein for a Time and Materials Work Order may be less depending on the nature, extent or complexity of the Work Order, where the percentage is not commensurate with the responsibility and administration involved but in no event shall they exceed:
 - (viii) In the case of a Time and Materials Work Order performed by the Contractor's own forces or by its Subcontractors forces add a fifteen percent (15%) markup to the costs identified and substantiated in Subparagraphs 12.3.2.1 through 12.3.2.4; and
 - (ix) For Work performed by Contractor's subcontractors, at whatever tier will receive a 15% markup, the next higher subcontractor and the following subcontractor or Contractor will receive a 5% mark-up each. The maximum allowable mark-up allowed on subcontractor performed work is 26.8% (15%/5%/5%).
- (b) The Markup Fee includes, but is not limited to the following costs, fees and expenses: home office, branch office, field office, project management, superintendents, estimating, engineering, training and safety meetings, coordination, expediting, purchasing, detailing, legal, accounting, data processing or other administrative services, shop drawing, permits, taxes comprehensive general liability insurance, auto insurance, umbrella insurance and subcontractor bond premium.

.5 Contents of a Time and Materials Cost Proposal:

- (a) At a minimum the Contractor shall provide the following items before a Time and Materials cost proposal will be considered:

- (x) Time and Materials proposal cover letter stating total proposed cost for the additional work, and;
- (xi) Time and Materials cost summary using the spreadsheet format supplied by the District for the prime contractor and each subcontractor, and;
- (xii) Auditable backup for proposed Worker's Compensation and Unemployment Insurance markup percentages for both prime and subcontractors, and;
- (xiii) Invoices for any key materials used, and;
- (xiv) Copies of published rates for the equipment that was utilized;
- (xv) Example Certified Payroll Reports for each employee billed.

12.4 WORK ORDER PRE-AUTHORIZATION

12.4.1 For a Work Order where the value or extent of the Work cannot be reasonably pre-determined or agreed upon, or where time is of the essence, the Owner may issue a written Work Order Pre-Authorization such that Work shall proceed on an agreed upon Time and Material basis, or that the work can proceed on a Lump Sum basis both not to exceed a pre-determined maximum amount. The final amounts of the Lump Sum or Time and Materials work order shall be determined pursuant to Subparagraph 12.2.1 for Lump Sum work, or Subparagraph 12.3.1 for Time and Materials work.

12.5 CONSTRUCTION CHANGE DIRECTIVES

12.5.1 A Construction Change Directive is a written order signed by the Owner, directing a change in Work pursuant to a Work Order or Change Order where there is a dispute as to the terms of the Work Order or Change Order. A Construction Change Directive for a Work Order authorizing payment from a Specific Allowance shall be signed, in writing, by Owner's Director of Engineering and Construction. A Construction Change Directive for a Work Order authorizing payment from the General Allowance shall be signed, in writing, by both the Owner's Director of Engineering and Construction and Owner's Executive Director. A Construction Change Directive for a Change Order shall be authorized in writing by Owner's Executive Director and approved, by resolution, by Owner's Board of Trustees. The Owner may by Construction Change Directive, without invalidating the Contract, authorize a Work Order or Change Order consisting of additions, deletions or other revisions with a change in the Base Contract Price, the General Allowance, Specific Allowance(s), Contract Sum and/or time of Completion being adjusted accordingly.

12.5.2 A Construction Change Directive shall be initiated by the Owner and used in the absence of total agreement on the terms of a Work Order or Change Order.

12.5.3 An adjustment to the cost of the Work resulting from a Construction Change Directive shall be documented in a signed written agreement. The cost of the Work shall be determined as set forth in Article 12 of this Agreement.

12.5.4 All Construction Change Directives shall be signed first by the Owner followed by the Contractor, respectively.

12.5.5 Upon receipt of a Construction Change Directive signed by Owner, Contractor shall promptly proceed with the Work Order or Change Order involved and advise the Owner of Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment to the Work Order or Change Order.

12.5.6 A Construction Change Directive signed by Contractor indicates the agreement of Contractor to its terms. Such agreement shall be effective immediately and shall be followed-up by a written Work Order signed by Owner's Director of Engineering and Construction authorizing payment from a Specific Allowance(s), or a written Work Order signed by both Owner's Director of Engineering and Construction and Owner's Executive Director authorizing payment from the General Allowance or a written Change Order signed by Owner's Executive Director and authorized, by resolution, by Owner's Board of Trustees.

12.5.7 Except as otherwise agreed by the Owner and Contractor, the method and the adjustment shall be initially determined by the Owner on the basis of reasonable expenditures and savings of those performing the Work attributable to the Work Order or Change Order, including expenditures for design services and revisions to the Contract Documents. If the Contractor does not respond promptly or disagrees with the method for adjustment, Contractor shall keep and present, in such form as Owner may prescribe, an itemized accounting together with appropriate supporting data to substantiate the accounting to the reasonable satisfaction of Owner.

12.5.8 Pending final determination of cost to the Owner for a Work Order or Change Order, amounts not in dispute may be included in Applications for Payment. The amount of credit to be allowed by Contractor to the Owner for a deletion or change which results in a net decrease in the Contract Sum shall be actual net cost. When both additions and credits covering related Work or substitutions are involved in a Work Order or Change Order, Contractor's Markup Fee shall be figured on the basis of net increase, if any, with respect to that change.

12.5.9 If the Owner and Contractor do not agree as to the terms of a Construction Change Directive or the method for determining it, the adjustment or the method shall be decided pursuant to Article 9.

12.5.10 When the Owner and Contractor, subsequent to the issuance of a Construction Change Directive, agree concerning the adjustments to the Work Order or Change Order, such agreement shall be effective immediately and shall be recorded by preparation and execution of an appropriate written Work Order signed by Owner's Director of Engineering and Construction and the Contractor authorizing payment from a Specific Allowance(s), or an appropriate written Work Order signed by both Owner's Executive Director of Engineering and Construction and Owner's Executive Director and the Contractor authorizing payment from the General Allowance or a Change Order signed by Owner's Executive Director and the Contractor and authorized, by resolution, by Owner's Board of Trustees.

12.6 CLAIMS FOR ADDITIONAL COST

12.6.1 All claims by Contractor for an increase in the Contract Sum, shall be made in writing to the Owner within seven (7) Calendar Days after the occurrence of the event giving rise to such claim. The Contractor's notice of claim shall indicate the Contractor's good faith, objective determination of the potential impact and effect to the Contract Sum and the Contractor's technical evaluation and recommendation on how to minimize the potential impact and effect to the Contract Sum.

12.6.2 The provision of notice to Owner by Contractor is a condition precedent to the Owner's obligation to pay Contractor an increase in the Contract Sum. Contractor expressly acknowledges and agrees that the notice and time of notice provisions in this Agreement are conditions precedent and necessary for Owner to determine the best course of action to implement in order to mitigate adverse consequences arising out of or related to Contractor's claim and to coordinate the Work affected by Contractor's claim with Owner's separate Contractors and other Owner-supplied Work. If a claim is made more than seven (7) Calendar Days after such occurrence, the claim shall be waived and Contractor fully and completely releases Owner from all responsibility there from pursuant to this Agreement.

12.7 FIELD ORDERS

12.7.1 The Construction Supervisor shall have the authority to issue Field Orders. The Owner also reserves the right to issue a Field Order to make minor changes in dimensions, location, arrangements, or details to accommodate changes in other materials and equipment, improve the Work or prevent unforeseen interference with structural or other features. Contractor shall carry out such Field Orders promptly.

ARTICLE 13 **PROGRESS AND COMPLETION**

13.1 PROGRESS AND COMPLETION

13.1.1 All time limits stated in the Contract Documents are essential conditions of the Contract. In executing the Contract, Contractor agrees that the number of days within which the Work shall be completed is reasonable for Contractor's Work.

13.1.2 The Contractor shall begin the Work in accordance with the Notice to Proceed. Contractor shall carry the Work forward expeditiously and continuously with adequate forces to make progress in accordance with the latest Owner accepted Contractor's Schedule and to complete Contractor's Work within the time for completion of the Work.

13.1.3 Except for constraints which may be specified for a certain part of the Work or otherwise imposed by Owner, the Work shall not be suspended or shut down, but shall progress continuously and expeditiously, unless otherwise approved by the Owner. Contractor shall assemble material and equipment in advance of the need and, as may be appropriate to the progress, shall prefabricate assemblies which will comply with the Contract Documents, as may be specified, to expedite the Work and ensure completion within the interim milestone dates and dates of Substantial Completion and Final Completion required by the Contract Documents.

13.2 DELAYS AND EXTENSIONS OF TIME

13.2.1 Should the progress, performance or completion of any portion or portions or the whole of Contractor's Work, which is on the latest Owner accepted Contractor's Schedule, be delayed as the result of:

- .1** Any failure or neglect of Owner;
- .2** Any Change Order requested by the Owner if the Change Order included additional time;
- .3** Labor disputes (including strikes affecting transportation) that do, in fact, directly and critically affect the progress of the Work, but only if the persons or entities taking such actions are not the fault or responsibility of Contractor. An extension of time on account of an individual labor strike shall not exceed the number of Calendar Days of the strike
- .4** Tornado, fire, hurricane, blizzard, earthquake, flood, other acts of God, or any other natural event not within the control of the Contractor that prevents the progress of the Work on the critical path of the latest Owner accepted Contractor's Schedule;
- .5** Delay authorized by the Owner pending resolution of a dispute;
- .6** Acts of the public enemy, acts of the state, federal or local government in its sovereign capacity;
- .7** Any other cause which the Owner determines may justify the delay;
- .8** Removal of Hazardous Materials/Regulated Substances from the Site that is not within the scope of the Work;
- .9** Delays incurred to investigate any claim by Contractor for Unforeseen Conditions pursuant to Subparagraph 8.1.6;
- .10** The occurrence of weather-related delays in excess of forty-six (46) Work Days per twelve (12)-month period as follows: three (3) Work Days per month between April and October and five (5) Work Days per month between November and March or
- .11** Order of any court of competent jurisdiction enjoining the performance of the Work that is not sought by Contractor in accordance with the Contract Documents;

The time of completion of the portion or portions of the Work directly affected by such delay, shall, upon request of Contractor as provided in Subparagraph 13.2.2, be extended by a reasonable period, in no event to exceed the time lost on the critical path of the latest Owner accepted Contractor's Schedule.

13.2.2 Should Contractor reasonably believe, in accordance with Subparagraph 13.2.1, that it is entitled to an extension of time for completion of any portion or portions of the Work, the Contractor shall, within seven (7) Calendar Days after the occurrence of the cause of the delay, notify the Owner in writing, setting forth (a) the cause for the delay; (b) the identity of the party or parties responsible for the delay; (c) a description of the portion or portions of Work on the critical path affected thereby; (d) an estimate of the probable impact and effect of the delay on the progress of the critical path Work and completion of the Work; a technical evaluation and recommendation on how to minimize the probable impact and effect on the critical path work; and (e) all Project Records that document the delay. A subsequent written application for the specific number of days of extension of time requested shall be made by the Contractor to the Owner within fourteen (14) Calendar Days after the effects of the delay can be ascertained through use of the latest Owner accepted Contractor's Schedule. Any time extension resulting from the claim shall be authorized by a Change Order. If the Owner and Contractor cannot agree on the number of days of the time extension, such matter shall be decided by dispute resolution pursuant to Article 9.

13.2.3 Where a critical path method schedule is specified in the Contract Documents it is a condition precedent to the consideration or prosecution of any claim for an extension of time that the foregoing provisions regarding the timing of notice be strictly adhered to in each and every instance so that Owner may determine the best course of action to implement to mitigate the impact to the critical path of the Contractor's Schedule or the Project Construction Schedule. Contractor expressly agrees that if Contractor fails to strictly comply with the notice provisions set forth in this Paragraph 13.2, the claim shall be deemed to have been waived by Contractor.

13.2.4 The Contractor agrees that it shall have no claim against the Owner for an increase in the Contract Sum or for any other monetary damages resulting from delays, disruptions or interference on account of or resulting from conditions set forth in Subparagraph 13.2.1 except only for substantiated claims for delays proximately caused by the Owner, as set forth in Subparagraph 13.2.1.1 and solely as provided in this Subparagraph 13.2.4. The Contractor may only recover funds in excess of the Contract Sum or for any other monetary damages resulting from delays, disruptions and interferences for Actual Costs incurred by the Contractor due to the proximate cause of the actions or inactions of the Owner, provided that the Contractor satisfies in full the following requirements for each claim: (1) claims must strictly satisfy the notice requirements of Subparagraph 13.2.2; (2) Contractor identifies, in writing, and demonstrates that it has used all reasonable efforts to mitigate the effects of the alleged delay; and (3) Contractor provides Owner with a written analysis which demonstrates the proximate cause and effect relationship between the alleged cause of the delay and the effect on the critical path of the Contractor's Schedule where a critical path method schedule is specified in the Contract Documents. Contractor agrees that after demonstrated satisfaction of the provisions of Subsection 13.2.4(1)-(3) as set forth above, any claim for an increase in the Contract Sum or for any other monetary damages resulting from delays, disruptions and interferences caused by the Owner shall be limited to Contractor's Actual Costs. Actual Costs shall not include other compensatory or consequential damages, including, but not limited to, loss of home office overhead, loss of profits, or loss of bonding capacity, which are expressly waived by Contractor.

13.2.5 Should changes in the Work pursuant to Article 12 significantly affect the critical path progress of the Work of the Project where a critical path method schedule is specified in of the Contract Documents, then any time extension request or any claim against the Owner resulting from the delay caused by the Work Order or Change Order shall be submitted to Owner simultaneously with the request for monetary adjustments. Contractor acknowledges that any attempt to preserve or reserve Contractor's right to assert a subsequent claim for the effects of a prior Work Order or Change Order or the cumulative effects of multiple Work Order or Change Order is ineffective and has no force or effect pursuant to this Agreement. For a Work Order or Change Order which does not affect the critical path of the Contractor's Schedule where a critical path method schedule is specified in the Contract Documents, the Contractor shall not be entitled to a time extension.

13.2.6 Delays resulting from a labor dispute not the fault or responsibility of Contractor will result in a time extension no longer than the dispute period, in addition to a reasonable mobilization period, and may be less depending on the actual effect on the critical path of the Contractor's Schedule where a critical path method schedule is specified in the Contract Documents and the operations that were actually curtailed or suspended. Lockouts and improper labor practices pursuant to Article 18, over which the Contractor has control or right of control, are not valid grounds for a time extension.

13.2.7 Delays to Subcontractors will be valid reasons for time extension only under the same conditions as set forth in this Paragraph 13.2. Contractor shall provide the required notice and information for all delays to the progress of the Work alleged by its Subcontractor(s) as set forth in Subparagraph 13.2.2.

13.2.8 Contractor acknowledges and agrees that there may be changes to the latest Owner accepted Contractor's Schedule which may require Contractor to reschedule and resequence the Work in order to meet its obligations, to schedule and coordinate its Work with the Work of Owner's other trade contractors, if any, and to accommodate the needs and requirements of Owner. In the event the rescheduling and resequencing of the Work results in an extension of the critical path of the Contractor's Schedule where a critical path method schedule is specified in the Contract Documents, a time extension may be granted to Contractor, but only to the extent the Contractor's critical path time of performance was actually extended. If there is no extension of the critical path, Contractor agrees it is not entitled to a time extension. Contractor agrees it shall have no claim against Owner for any additional loss, cost or expense alleged to be the result of any rescheduling or resequencing of the Work associated with or related to any adjustment to the Contractor's Schedule which does not extend the critical path.

13.2.9 Contractor agrees that it shall have no claim for an increase in the Base Contract Price, the General Allowance, any Specific Allowance or the Contract Sum for delay, disruption, interference, acceleration or hindrance caused, in whole or in part, by reason of any delay events not proximately caused by Owner for events expressly set forth in Subparagraphs 13.2.1.4, 13.2.1.5, 13.2.1.6, 13.2.1.7, 13.2.1.8, 13.2.1.9, 13.2.1.10 or 13.2.1.11. Contractor agrees to accept, as its sole and exclusive remedy, an extension of time unless the Owner elects to accelerate Contractor's performance in lieu of granting an extension of time. If Owner elects to accelerate Contractor's performance, Owner agrees to adjust the Base Contract Price, the General Allowance, any Specific Allowance or the Contract Sum pursuant to Subparagraph 12.1.8 of this Agreement.

13.2.10 The Owner may, if it deems necessary, direct the Contractor to work overtime (as permitted by law) or shift work, and, if so directed, Contractor shall work overtime or shift work, and the Owner shall pay the Contractor for the additional premium wages and benefits paid, plus taxes imposed by law on such additional wages pursuant to Subparagraph 12.3.2.1, plus Contractor's Mark-up Fee pursuant to Subparagraph 12.3.2.5 of this Agreement. If, however, Contractor is, in Owner's reasonable opinion, behind schedule with the Work, the Contractor shall, at its own expenses, work such reasonable overtime as may be necessary to complete the Work on time and in compliance with the latest Owner accepted Contractor's Schedule.

13.3 RESPONSIBILITY FOR COMPLETION

13.3.1 Contractor shall furnish such manpower, materials, facilities and equipment and shall work such hours, including night shifts and premium time operations, as may be necessary to insure the prosecution and Substantial and Final Completion of the Work within the number of days specified in the Contract for completion of the Work, as adjusted. If Work actually in place falls behind the latest Owner accepted Contractor's Schedule for reasons that are the responsibility of Contractor, and Owner determines that the Work will not be completed by the Final Completion Date, as adjusted, Contractor agrees that it will, as necessary, accelerate its efforts at no increase in the Contract Sum to improve its progress. Such acceleration shall include as necessary some or all of the following actions:

- .1** Increase manpower and crafts;

- .2 Increase the number of working hours per shift, shifts per Work Day, Work Days per week, or the amount of equipment, or any combination of the foregoing; and/or
- .3 Reschedule activities.

13.3.2 Owner may also require Contractor to submit a revised Contractor's Schedule and description of Corrective Action it intends to take to assure completion of Work by the Final Completion Date. If the Owner reasonably finds the Corrective Action not acceptable, Owner may require Contractor to submit revisions until acceptable to Owner.

13.3.3 Failure of Contractor to substantially comply with the requirements of this Paragraph 13.3 shall be considered grounds for a determination by the Owner that Contractor is failing to prosecute the Work with such diligence as will ensure its completion within the time specified and grounds for termination of this Agreement for cause, pursuant to Article 15.

ARTICLE 14

PROTECTION OF PERSONS AND PROPERTY

14.1 SAFETY OF PERSONS AND PROPERTY

14.1.1 Contractor agrees that between the Owner and the Contractor, the prevention of accidents to workmen engaged upon or in the vicinity of its Work and to any employee or invitee to the Project Site is Contractor's responsibility. Contractor shall be responsible for initiating, maintaining and supervising safety precautions and programs in connection with the Work in accordance with all Applicable Laws, including, but not limited to, the OSHA requirements, OSHA's Permit-Required Confined Space Entry (CSE) and Control of Hazardous Energy (Lockout/Threat) requirements. The Contractor shall maintain at the Project Site a sufficient number of safety hats and other appropriate personal protection equipment for the use of employees and invitees to the Project Site. Contractor shall refer to Division 1 of the specifications for specific District safety and security procedures and guidelines.

14.1.2 Prior to Contractor's performance of any Work at the Project Site, Contractor shall provide Owner with the phone number(s) of the individuals who may be contacted at any time 24 hours per day/7 days per week in the event of an emergency related to the Work required by the Contract Documents. Should any emergency condition arise out of whatever nature as a result of the Work, the Contractor will be notified by telephone and Corrective Action shall be immediately implemented. In the event the Contractor cannot be reached at the designated number(s) or Contractor fails to take immediate Corrective Action, the Owner may take such Corrective Action as it deems necessary and reasonable to mitigate or alleviate the emergency and will deduct the cost of such Corrective Action from payments due the Contractor and/or demand payment from Contractor. Contractor shall be responsible for reimbursing Owner for all damages resulting from taking such Corrective Action to mitigate or alleviate the emergency, including but not limited to, damage to the Owner's property and the plant, equipment, or new Work of the Contractor or its Subcontractors. Failure of the Owner to notify the Contractor of any emergency conditions as a result of any Work related to the Project shall not relieve the Contractor from any liability for any damage or loss resulting from the emergency conditions.

14.1.3 To assist the general public, emergency agencies, law enforcement or other entities in notifying the responsible party best able to respond to site emergencies, the Contractor will erect at each active construction site or at a location as directed by the Owner a sign, minimum size three (3) feet long by two (2) feet high, and containing the project name, project address, District project number, Contractor's name, Contractor's address and phone number, name and phone number of Contractor's site safety officer and name and phone number of Owner's construction supervisor.

14.1.4 Contractor shall maintain at the Site a current Materials Safety Data Sheet ("MSDS") Manual for all MSDS received from the manufacturer or supplier of all Hazardous Materials/Regulated Substances. If an MSDS is not received by Contractor, Contractor shall contact the manufacturer or supplier to request one or contact OSHA for assistance in obtaining the MSDS. Contractor shall maintain the MSDS Manual

in the format required by Owner and shall ensure that the MSDS form for each Hazardous Material/Regulated Substance contains the information required by the current OSHA Hazard Communication Standard. Contractor's MSDS Manual shall be made readily available, upon request, to Owner, and to OSHA representatives.

14.1.5 Contractor shall take all necessary precautions for safety of, and shall provide all reasonable protection to prevent damage, injury or loss to: (1) all persons engaged by the Contractor, its Subcontractors, suppliers and vendors in performance of the Work on the Site and other persons who may be affected thereby; (2) the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site under the care and custody of Contractor and/or its Subcontractors, suppliers and vendors; and (3) other property within the Contractor's care, custody or control at or adjacent to the Site.

14.1.6 Prior to commencement of any Work at the Project Site, Contractor shall submit to the Owner the required safety program documentation, as outlined in the Contract Documents.

14.1.7 Contractor shall give notices required by and comply with Applicable Laws of all authorities with jurisdiction bearing on the safety of persons and property and their protection from damage, injury, or loss. The Contractor shall notify the Owner of any adjacent utilities when prosecution of the Work may affect them. Fire hydrants and stop valves adjacent to the Work shall be kept readily accessible to fire-fighting apparatus and shall not be obstructed.

14.1.8 When so ordered, Contractor shall stop any part of the Work which the Owner deems unsafe until Corrective Action satisfactory to Owner have been taken, and Contractor agrees that it shall not have nor make any claim for adjustment in either Contract Time or the Contract Sum arising out of such Work stoppage. The failure of the Contractor to implement its own Project Specific Safety Program and/or abide by, follow, properly implement or supervise any safety standards established during the progress of the Work by Applicable Law shall constitute a breach of this Agreement by Contractor and shall entitle Owner to seek indemnity from Contractor to the full extent permitted by law and as further identified and described in Article 16 of this Agreement.

14.1.9 Contractor shall promptly remedy damage or loss (other than damage or loss to property insured under property insurance provided by Owner pursuant to this Agreement) to property at the Site, adjacent to the Site, or stored in other locations caused in whole or in part by Contractor, its Subcontractors or anyone directly or indirectly employed by either of them, or by anyone whose acts they may be liable, except damage or loss caused solely by the acts or omissions of Owner.

14.1.10 In the event the Contractor causes any sewage discharge to a lake, creek, storm sewer or other storm drainage structure, the Owner shall deduct from the monies due or to become due to the Contractor under this Agreement the Owner's reasonable costs to implement any Corrective Action it deems appropriate in addition to any fines and/or penalties issued by regulating agencies with jurisdiction over the Project.

14.2 HAZARDOUS MATERIALS/REGULATED SUBSTANCES

14.2.1 In the event that Contractor encounters on the Site material reasonably believed to be Hazardous Materials/Regulated Substances which has not been identified in the Contract Documents and has not been rendered harmless, Contractor shall immediately stop Work in the area affected and immediately report the condition to the Owner in writing. Work in the affected area shall resume when such Hazardous Materials/Regulated Substances has been rendered harmless or removed as determined by Owner.

14.2.2 The Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to verify that it has been rendered harmless. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. A time extension shall be granted as provided in Article 13 and the Contract Sum shall be increased in the amount of the Contractor's Actual Costs of shut-down, delay and start-up.

14.2.3 If Hazardous Materials/Regulated Substances of a type of which an employer is required by law to notify its employees are being used on the Site by Contractor, its Subcontractors or anyone directly or indirectly employed by them, Contractor shall, prior to harmful exposure of any employees on the Site to such substances, give written notice of the chemical composition to the Owner in sufficient detail and time to permit compliance with all Applicable Laws.

14.2.4 The Owner shall not be responsible under Section 14.2 for materials and substances brought to the Site by the Contractor and its Subcontractors unless such materials or substances were required by the Contract Documents.

14.3 EMERGENCIES

14.3.1 In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 12 and Article 13.

ARTICLE 15 **TERMINATION OF THE CONTRACT**

15.1 TERMINATION BY OWNER

15.1.1 Should the Contractor at any time refuse or neglect to supply a sufficiency of skilled workmen, materials or equipment of the proper quality and quantity, or fail in any respect to prosecute the Work with promptness and diligence, or cause by any act or omission the stoppage or delay of or interference with or damage to the Work or of any other contractors, use of the premises or adjacent property by the Owner or the public, or fail in the performance of any of the terms and provisions of this Agreement or of the other Contract Documents, or should the Owner determine that the Work or any portion thereof is not being performed in accordance with the Contract Documents, or should there be filed by or against the Contractor a petition in bankruptcy or for any arrangement of reorganization, or should the Contractor become insolvent or be adjudicated bankrupt or go into liquidation or dissolution, either voluntarily or involuntarily or under a court order, or make a general assignment for the benefit of creditors, or otherwise acknowledge insolvency, then in any of such events, each of which shall constitute a default on the Contractor's part, Owner shall have the right, in addition to any other right and remedies provided by the Contract Documents or by law, after three (3) Work Days written notice to the Contractor mailed or delivered to the Contractor's last known address: (a) to perform and furnish through itself or through others any such labor, materials or equipment for the Work and to deduct the cost thereof from any monies due or to become due to the Contractor under this Agreement; and/or (b) to terminate the employment of the Contractor for all or any portion of the Work, enter upon the premises and take possession, for the purpose of completing the Work, of all materials, equipment, special equipment, scaffolds, tools, appliances and other items, all of which the Contractor hereby transfers, assigns and sets over to Owner for such purpose, and to employ any person or persons to complete the Work and provide all the labor, services, materials, equipment and other items required by the Contract Documents. In case of such termination of the employment of the Contractor, the Contractor shall not be entitled to receive any further payment under this Agreement until the Work shall be wholly completed to the satisfaction of Owner and shall have been accepted by Owner, at which time, if the unpaid balance of the amount to be paid under this Agreement shall exceed the cost and expense incurred by Owner in completing the Work, such excess shall be paid by Owner to the Contractor; but if such cost and expense shall exceed the unpaid balance, then the Contractor shall pay the difference to the Owner. Such cost and expense shall include, not only the cost of completing the Work to the satisfaction of Owner and of performing and furnishing all labor, services, materials, equipment, and other items required by the Contract Documents, but also all losses, damages, costs and expenses including legal fees and disbursements sustained, incurred or suffered by reason or resulting from the Contractor's default. If, after termination of the Contractor's right to proceed, it is determined that the Contractor was not in default of its obligations under the Contract Documents or that any delay was excusable, the rights and obligations of the parties will be the same as if termination had been issued pursuant to Paragraph 15.2.

15.1.2 Nothing shall be deemed to preclude the Owner from recovering from Contractor, or from setting off against monies payable to or for the benefit of Contractor, any cost expense or damage the Owner may incur as a result of the matters set forth in Subparagraph 15.1.1 including, but not limited to damages arising directly or indirectly as a result of the Contractor's actions or inactions proximately causing a delay to the Project or Contractor's negligence proximately causing a claim from the Contractor for additional compensation.

15.2 TERMINATION BY OWNER FOR CONVENIENCE

15.2.1 In addition to other rights the Owner may have at law or under the Contract Documents with respect to cancellation or termination, the Owner may terminate performance of Work under this Contract in whole or, from time to time, in part, if the Owner determines a termination is for its convenience. The Owner shall terminate by delivering to the Contractor a written Notice of Termination for Convenience.

15.2.2 After receipt of a Notice of Termination for Convenience, and except as directed by the Owner, the Contractor shall immediately proceed with the following obligations, regardless of any delay in determining or adjusting any amounts due under this Subparagraph:

- .1** Stop work as specified in the Notice of Termination for Convenience;
- .2** Place no further subcontracts or orders (referred to as Subcontracts in this Paragraph) for materials, services, or facilities, except as necessary to complete the continued portion of the Work for the Project;
- .3** Terminate all subcontracts to the extent they relate to the Work terminated upon approval of Owner;
- .4** Assign to the Owner, as directed by the Owner, all right, title, and interest of the Contractor under any subcontract or purchase order, in which case the Owner shall have the right and obligation to settle or to pay any outstanding claims arising from said subcontracts or purchase orders;
- .5** With approval or ratification to the extent required by Owner, settle all outstanding liabilities and termination settlement proposals arising from the termination of subcontracts; the approval or ratification will be final for purposes of this Subparagraph;
- .6** As directed by the Owner, transfer title and deliver to the Owner (a) the fabricated or unfabricated parts, Work in progress, completed Work, supplies, and other material produced or required for the Work terminated, and (b) the completed or partially completed Project Records that if this Contract had been completed, would be required to be furnished to the Owner;
- .7** Complete performance of the Work not terminated;
- .8** Take any action that may be necessary, or that the Owner may direct, for the protection and preservation of the property related to this Contract that is in possession of the Contractor and which the Owner has or may acquire an interest; and
- .9** Use its best efforts to sell, as directed or authorized by the Owner, any property of the type referred to in Subparagraph 15.2.2.6; provided, however, that the Contractor (a) is not required to extend credit to any purchaser and (b) may acquire the property under the conditions prescribed by, and at prices approved, by the Owner. The proceeds of any transfer or disposition will be applied to reduce any payments to be made by the Owner under this Contract, credited to the price or cost of the Work, or paid in any other manner directed by the Owner.

15.2.3 After expiration of the agreed Site and plant clearance, the Contractor may submit to the Owner a list, certified as to quantity and quality, of termination inventory not previously disposed of, excluding items authorized for disposition by the Owner. The Contractor may request the Owner to remove those items or enter into an agreement for their storage. Within thirty (30) Calendar Days, the Owner will accept title to those items and remove them or enter into a storage agreement. The Owner may verify the list upon removal of the items, or if stored, within forty-five (45) Calendar Days from submission of the list, and shall correct the list, as necessary, before final settlement.

15.2.4 After termination, the Contractor shall submit a final termination settlement proposal to the Owner in the form prescribed by the Owner. The Contractor shall submit the proposal promptly, but no later than thirty (30) Calendar Days from the effective date of termination set forth in the Notice of Termination for Convenience, unless extended in writing by the Owner upon written request of the Contractor made within the thirty (30) Calendar Day period. However, if the Owner determines that the facts justify it, a termination settlement proposal may be received and acted on after said period or any extension. If the Contractor fails to submit the proposal within the time allowed, the Owner shall determine, on the basis of information available to it the amount, if any, due the Contractor for acceptance. Said determination shall be deemed by the parties as accepted unless, within fifteen (15) Calendar Days of the transmission by the Owner of said determination, the Contractor rejects said determination. A rejection of the determination is ineffective and null if not made in writing and accompanied by supporting data which clearly demonstrates error in the determination made by the Owner. Owner shall pay the amount which Owner has determined to be due to Contractor, in whole or in part, pending resolution of any dispute regarding same.

15.2.5 Subject to the requirements of Paragraph 15.2, the Owner and Contractor may agree upon the whole or any part of the amount to be paid because of termination. The amount shall not exceed the original Contract Sum (as adjusted by Change Orders previously made) reduced by the amount of payments previously made and by the price of Work not terminated and not then completed (as measured by the then current Schedule of Values).

15.2.6 If the Owner and Contractor fail to agree on the whole amount under Subparagraph 15.2.4 or if the Contractor properly rejects the Owner's determination made under Subparagraph 15.2.4, the Owner shall pay and the Contractor shall accept as full satisfaction amounts determined as follows, but without duplication of any amounts agreed upon under Subparagraph 15.2.4.

- .1** For Contract Work performed and not paid for before the Notice of Termination for Convenience, the cost of said Work and the actual reasonable costs of settling and paying termination settlement proposals under terminated subcontracts that are properly chargeable to the terminated portion of this Contract; and
- .2** The actual reasonable costs of settlement of the Work terminated, including accounting, legal, clerical, other expenses necessary for the preparation of termination settlement proposals and supporting data, storage, transportation and other costs necessary for the preservation, protection or disposition of termination inventory, but not including anticipated profits on not-performed Work and unabsorbed overhead allocated to the not-performed Work.

15.2.7 Except for normal spoilage, and except to the extent that the Owner expressly assumed the risk of loss, the Owner shall exclude from the amounts payable to the Contractor under Subparagraph 15.2.6 the fair value, as determined by the Owner, of property that is destroyed, lost, stolen or damaged so as to become undeliverable to the Owner.

15.2.8 In arriving at the amount due the Contractor under this Article 15, there shall be deducted:

- .1** All unliquidated advance or other payments to the Contractor under the terminated portion of this Contract;
- .2** Any claim which the Owner has against the Contractor under this Contract; and

- .3 The agreed price for, or the proceeds of sale of materials, supplies, or other things acquired by the Contractor, or sold under the provisions of Article 15 and not recovered by or credited to the Owner.

15.2.9 If the termination is partial, the Contractor may file a proposal with the Owner for an adjustment of the price(s) of the continued portion of the Contract. The Owner may make any adjustment agreed upon. Any proposal by the Contractor for an adjustment under this Subparagraph shall be requested within thirty (30) Calendar Days from the Notice of Termination for Convenience unless extended in writing by the Owner.

15.2.10 The Owner may, under the terms and conditions prescribed in Article 15, make partial payments and payments against costs incurred by the Contractor for the terminated portion of the Contract, if the Owner believes the total on these payments will not exceed the amount to which the Contractor will be entitled.

15.2.11 The Contractor shall maintain all records and documents relating to the terminated portion of this Contract for three (3) years after final settlement. This includes all Project Records and other evidence bearing on the Contractor's cost and expenses under this Contract and required by Article 7 of this Agreement.

15.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

15.3.1 The Owner may, at the Owner's convenience and without cause, order Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine. If the Owner suspends, delays or interrupts the Work for the Owner's convenience, the Owner shall pay to Contractor the Contractor's Actual Cost of such suspension, delay, or interruption, as documented by Contractor to the satisfaction of Owner and a time extension may be granted the period of such suspension, delay, or interruption plus a reasonable period for re-mobilization. No adjustment shall be made to the extent:

- .1 That performance is, was or would have been so suspended, delayed or interrupted by another cause for which Contractor is responsible in whole or in part; or
- .2 That an equitable adjustment is made under another provision of the Contract Documents.

15.3.2 If the Project is suspended by the Owner for more than one hundred twenty (120) consecutive Calendar Days, the Contractor shall be compensated for services performed prior to notice of such suspension. When the Project is resumed, the Contractor's compensation shall be equitably adjusted to provide reimbursement for Actual Costs incurred in the interruption and resumption of Contractor's Work.

ARTICLE 16 **INDEMNITY**

- 16.1** The Contractor agrees to indemnify and save harmless Owner, its respective trustees, board members, officers, members, employees, representatives, agents and consultants, including the Engineer and the Engineer's consultants for the Project (the "Indemnitees"), from and against all expenses, damages, claims, suits, actions, judgments and costs whatsoever (including reasonable attorneys' fees) to the extent arising out of, or in any way connected with, any claim or action based on: (a) Contractor's actual or alleged negligence or willful misconduct in connection with the Work furnished by Contractor to Owner; and (b) actual or alleged breach of any agreement of Contractor made by the Contract Documents. The provisions of this Paragraph shall survive the termination/expiration of this Agreement. However, in no case, shall the provisions of this Paragraph survive beyond the time limits established by the applicable statute of limitation. It is agreed that the Contractor will be responsible for primary loss investigation, defense and judgment costs when this indemnification is applicable.

- 16.2** In any and all claims against the Owner or any of the Indemnitees, the indemnification obligation under this Article 16 shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor under Workers' Compensation Acts, disability benefit acts or other employee benefit acts. As between the Owner and the Contractor, the Contractor waives its immunities under Ohio Revised Code Chapter 4123, Article 3 of the Ohio Constitution or any similar worker's compensation statutory immunity for purposes of conforming the indemnity obligations of Article 16.
- 16.3** The Contractor further agrees to indemnify, hold harmless, reimburse and defend Owner from: (1) payments made by Owner under Workers' Compensation Acts for injuries, sickness, disease, death or disability claimed by Owner's employees; or (2) claims made by employees of the Indemnitees for injuries, sickness, disease, death or disability which arise out of the acts or omissions of Contractor or pursuant to this Agreement.
- 16.4** All of Contractor's obligations set forth in this Article 16 shall survive the termination of the Contract or completion of Contractor's Work under the Contract Documents. Contractor expressly understands and agrees that any insurance or bond required by the Contract Documents, or otherwise provided by Contractor, shall in no way limit, modify, waive or release Contractor's obligations under this Article 16.
- 16.5** Contractor shall bear any expense, whether incurred or paid, of any Indemnatee because of any claim or other matter indemnified against hereunder, including reasonable attorneys' fees and expenses in the defense of, or preparing for the defense against, any such claim, even if such claim or any lawsuit arising there from is groundless, false or fraudulent. If any such claim has not been settled or discharged when the Work is finished, final settlement between Owner and Contractor and final payment of the Contract Sum and the acceptance of the Work shall be deferred until any such claim is paid or settled or Contractor provides a bond acceptable to Owner to satisfy such claim. At the request of any Indemnatee, Contractor, at its own expense, shall assume the defense, on behalf of such Indemnatee, of any such claim; provided, however, that any attorney employed in such defense must be satisfactory to the Indemnatee.
- 16.6** Owner shall have the right to retain out of any payment due or thereafter to become due to Contractor one hundred fifty percent (150%) of the amount of any mechanic's lien or attested account claim against the public funds being held by Owner for payment to Contractor arising out of the Work, which claims have not been removed or bonded off, to indemnify Owner against the cost of such claims that may appear at any time in favor of any person claiming by, through or under Contractor, which amount shall include, but is not limited to, attorneys' fees to defend any action in connection therewith or deposits which need to be made to have the claims released against the Project.
- 16.7** In the event that any party is requested but refuses to honor the indemnity obligations under this Article 16, then the party refusing to honor such request shall, in addition to all other obligations, pay the cost of bringing any claim, demand or action, including, without limitation, attorneys' and paralegals' fees and expenses, to enforce the rights of the party requesting indemnity.

ARTICLE 17

STRIKES AND WORK STOPPAGES

- 17.1** To the fullest extent not prohibited by Applicable Law and without limitation of any other provision in the Contract Documents, Contractor agrees as follows:
- 17.1.1** If for any reason any labor group or entity that is not a party to this Agreement, with the intent of impeding or stopping the progress of the Work, individually or in connection with others, unlawfully strikes, slows down or otherwise engages or participates in any other withholding of or interference with the Work (including, without limitation, honoring pickets or picket lines, improperly performing Work required to be performed under the Contract Documents or making claims resulting in Work jurisdiction disputes), and all or any of such actions impede or stop the progress of the Work, the Owner shall have the right reasonably to require that the Contractor and/or any such third party take immediate action to bring about a return to normal operations and in any event maintain the progress of the Contractor's Schedule.

17.1.2 In the event of any labor practice prohibited by Subparagraph 17.1.1, Contractor agrees to discipline any of its Subcontractor's employees or, if practicable, the third party person engaged in the above-described conduct in a manner consistent with lawful labor practices and calculated to bring about an end to such conduct.

17.1.3 In addition, if the conduct prohibited by Subparagraph 17.1.1 is subject to grievance and/or arbitration procedure under an applicable labor agreement between the Contractor and/or its Subcontractor(s) or such other person or entity and a union, Contractor shall be required, at Contractor's own expense, to (and Contractor shall require all such other persons or entities to) take all action, including legal action, as may be required to have the dispute resolved by such grievance or arbitration procedure (including, but not limited to, obtaining prompt injunctive relief under state or federal law). Notwithstanding such procedures, Contractor shall not be relieved of Contractor's obligation to maintain the progress of the Contractor's Schedule.

17.1.4 In the event that Contractor or any other such person or entity fails, in the reasonable opinion of the Owner, to take prompt remedial action as provided above, the Owner shall have the right to: (1) take such action in the name of Contractor and/or third party as may be reasonably necessary to obtain an end to the labor practice prohibited by Subparagraph 17.1.1, including legal action; and (b) charge all costs and expenses connected therewith to Contractor (including, but not limited to, legal, accounting, administrative and other direct, indirect, general, special and consequential damages and expenses).

ARTICLE 18

COMPLIANCE CERTIFICATION

18.1 The Owner and the Contractor shall perform their respective obligations pursuant to the Contract Documents in strict compliance with all Applicable Laws and Federal Labor Standards, to the extent such laws may be applicable to the obligations described in the Contract Documents.

18.2 Contractor certifies that:

18.2.1 Neither Contractor nor any officer, director, member or manager of Contractor has been debarred, excluded, suspended or otherwise determined to be ineligible to participate in the federal procurement or nonprocurement programs¹, or convicted of a criminal offense that could result in such party becoming Ineligible. Contractor shall not knowingly employ or contract with any individual or entity listed by a federal agency of the United States of America as Ineligible.

18.3 By signing the Agreement, Contractor and Owner agrees that:

18.3.1 The failure of Contractor to comply with Applicable Laws and Federal Labor Standards, if applicable, shall be grounds for immediate termination of this Agreement; provided, however, that except in cases of material noncompliance, Owner shall give Contractor reasonable notice and an opportunity to cure prior to terminating the Agreement.

18.3.2 Future changes in federal, state or local law, or future judicial decisions or regulatory interpretations of law may affect this Agreement and the relationships described by the Contract Documents. This Agreement is subject to adjustment at any time in the event, and to the extent, required by any state or federal government agency or authority, to maintain the tax exempt status of any Owner entity under the Internal Revenue code and/or the law of the State of Ohio and/or to comply with any other law or regulation. In the event of any proposed or actual change in law that, in the opinion of legal counsel for Owner or Contractor, would or does invalidate any provision of this Agreement or cause any party hereto to be in violation of law in performing its duties and obligations required by the Contract Documents, either party may request renegotiation of the Agreement by giving written notice to the other party. The parties agree to negotiate in good faith revisions to the provision or provisions which are in

¹ An individual or entity listed on the General Services Administration List of Parties Excluded from Federal Procurement and Non-Procurement Programs at www.epls.gov, as revised from time-to-time, is Ineligible.

violation of Applicable Laws or Federal Labor Standards, if applicable. In the event the parties are unable to agree to new or modified terms as required to bring the entire Agreement into compliance within thirty (30) Calendar Days, either party may terminate this Agreement on sixty (60) Calendar Days written notice to the other party.

18.3.3 If at any time during the term of this Agreement, Contractor: (i) becomes Ineligible; (ii) is charged with a criminal offense related to federal procurement and non-procurement Programs or is proposed for exclusion from participation in Federal procurement or non-procurement programs; or (iii) has notice that any of its directors, officers, key employees or agents has become Ineligible or has been charged with a criminal offense related to federal procurement and non-procurement programs or is proposed for exclusion, Contractor agrees to notify Owner immediately. In the event Contractor becomes Ineligible, Owner shall have the right to terminate this Agreement immediately upon notice to Contractor. Further, in the event that Owner becomes aware that any criminal charges or exclusions as described above are pending or proposed against Contractor, or that any director, officer, key employee, agent or Contractor has become Ineligible, Owner reserves the right in its sole discretion to terminate this Agreement or to exclude such party or parties from participation in this Agreement, or to take other appropriate steps to protect state and federal program funds

ARTICLE 19

MINORITY- AND WOMEN BUSINESS ENTERPRISE (MBE/WBE) POLICY AND SMALL BUSINESS ENTERPRISE (SBE) POLICY

- 19.1** It is the policy of the Owner that MBEs, WBEs, and SBEs shall have the maximum feasible opportunity to participate in the performance of the Work of the Project subject to this Agreement. The Owner has a compelling interest in maintaining and advancing the public welfare by assuring that its public expenditures promote the financial growth and stability of minority-owned, women-owned, and small businesses in the region. Contractor shall comply with the terms and conditions of the Owner's MBE/WBE Policy and/or SBE Policy included in the bid documents for and applicable to the Project subject to this Agreement.

ARTICLE 20

MISCELLANEOUS PROVISIONS

- 20.1** The Contract shall be governed by the law of the State of Ohio.
- 20.2** The Agreement and General Conditions to the Agreement between Owner and Contractor represents the entire and integrated agreement between the Owner and Contractor and supersedes all prior negotiations, representations or agreements, either written or oral. The Agreement and General Conditions to the Agreement between Owner and Contractor may be amended only by written instrument signed by both Owner and Contractor.
- 20.3** The Owner and Contractor, respectively, bind themselves, their partners, successors, assigns and legal representatives of such other party with respect to all covenants of this Agreement. The Contractor shall not assign this Agreement without the written consent of the Owner.
- 20.4** Any provision or part of this Agreement or Contract Documents held to be void or unenforceable under any law or regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor.
- 20.5** The duties and obligations imposed under this Agreement and Contract Documents and the rights and remedies available hereunder to the parties are in addition to, and are not to be construed in any way as a limitation of any rights or remedies available under law or terms of the Agreement.
- 20.6** All express representations, guarantees, warranties and indemnification obligations under this Agreement will survive completion or termination for any reason.
- 20.7** The Owner and Contractor expressly agree there are no third party beneficiaries in this Agreement.

20.8 Owner shall not be precluded or estopped from at any time establishing the true and correct amount and character of the Work performed by Contractor and materials furnished by Contractor or any other person performing Work for the Project or that the Work or a part thereof does not comply with the Contract Documents.

20.9 All notices required to be provided by Owner and Contractor pursuant to this Agreement shall be deemed to have been validly given and received as follows: (i) if delivered in person to the individual intended to receive such notice on the date delivered; or (ii) four (4) Calendar Days after being sent by registered or certified mail, postage prepaid to the address indicated in this Paragraph 20.9; or (iii) if transmitted by electronic means, by the time stated in a machine generated confirmation that notice was received at the machine or server of the recipient; or (iv) next Calendar Day if sent by nationally recognized overnight courier. All such notices shall be sent to:

If to Owner: Marlene Sundheimer
Director of Law
Northeast Ohio Regional Sewer District
3900 Euclid Avenue
Cleveland, OH 44115-2506

If to Contractor: _____

SPECIAL CONDITIONS

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SPECIAL CONDITIONS

SC-1 DISPUTE RESOLUTION BOARD

(NOT USED)

SC-2 LOAN FUNDING PROVISIONS

(NOT USED)



AGREEMENT

BETWEEN OWNER AND CONTRACTOR

AGREEMENT

effective as of the _____ day of _____ in the year of 20__.

BETWEEN the Owner:

Northeast Ohio Regional Sewer District
3900 Euclid Avenue
Cleveland, Ohio 44115-2506

and the Contractor:

The Engineer is:

CH2M HILL
1100 Superior Ave, East Suite 1420
Cleveland, Ohio 44114

The Project is:

Doan Brook Stream Enhancement Project

The Owner and Contractor agree as set forth below.

THIS AGREEMENT, effective as of the _____ day of _____, 20__, between the Northeast Ohio Regional Sewer District, a regional sewer district organized and existing as a political subdivision of the State of Ohio under Chapter 6119 of the Ohio Revised Code ("Owner"), by authority of Resolution No. ____ adopted by the Board of Trustees of the District on the _____ day of _____, 20__ and _____ with its principal place of business located at _____ ("Contractor"). The Owner and Contractor agree as set forth below and as further provided in the General Terms and Conditions to this Agreement between Owner and Contractor, which are attached and incorporated by reference:

ARTICLE 1 TIME OF COMPLETION

- 1.1** The Contractor shall begin the Work within ten (10) Work Days from the date of the Notice to Proceed. The date from which the time for Substantial Completion and Final Completion of the Work shall be measured from the date of the issuance of the Notice to Proceed by the Owner.
- 1.2** The Contractor shall achieve Substantial Completion of the entire Work as defined in the General Conditions to the Agreement Between Owner and Contractor not later than:
- 1.2.1** One Hundred Forty Nine (149) Calendar Days after issuance of the Notice To Proceed.
- 1.3** The Contractor shall achieve Final Completion of the entire Work as defined in the General Conditions to the Agreement between Owner and Contractor not later than:
- 1.3.1** Two Hundred Seventy Two (272) Calendar Days after Issuance of the Notice To Proceed.

ARTICLE 2 CONTRACT SUM

- 2.1** The Contract Sum in the amount of _____ Dollars (\$_____) includes:
- 2.1.1** The Contractor's Base Contract Price, excluding Specific Allowances, the General Allowance, and the Contractor's Bond premiums in the amount of _____ Dollars (\$_____);
- 2.1.2** The following General Allowance:
- .1** _____ percentage (____%) of the Contractor's Base Contract Price or the lump sum of _____ Dollars (\$_____).
- 2.1.3** The following Specific Allowances:
- .1** New Sandstone allowance in the amount of _____ Dollars (\$_____);
- .2** Sculpture allowance in the amount of _____ Dollars (\$_____);

.3 Zone 1A Aggregate allowance in the amount of _____ Dollars (\$_____);

.4 Parking Lot Improvements allowance in the amount of _____ Dollars (\$_____).

.5 Stone Block Wall Replacement allowance in the amount of _____ Dollars (\$_____).

2.1.4 The cost of Contractor's Bid, Performance and Payment Bond in the amount of _____ Dollars (\$_____).

2.2 The Contract Sum also includes all federal, state, county, municipal and other taxes imposed by law and based upon labor, materials, equipment and other items required, performed, furnished or used for or in connection with Contractor's performance of the Work, including, but not limited to all applicable prevailing wage and reporting requirements and compliance with all applicable Labor Department Standards and Owner's MBE/WBE/SBE Program.

ARTICLE 3 LIQUIDATED DAMAGES

3.1 The Contractor further covenants and agrees that, in the event that the Work or any interim milestone date included in the Contract Documents is delayed because of any reason which the Owner determines to be avoidable delay, as described in the General Conditions to this Agreement, then the Owner shall be entitled to and will retain monies due or that may become due to the Contractor in the amount of five hundred Dollars (\$500.00) per consecutive Calendar Day for each and every consecutive Calendar Day by which the milestone date is delayed beyond the time of completion stipulated in this Agreement, and such monies are expressly agreed and recognized as liquidated damages accruing to the Owner incident to such delays and not as a penalty to Contractor. The provision for liquidated damages is intended to compensate Owner for damages due to delay and shall be Owner's sole and exclusive remedy against Contractor for damages due to delay.

3.2 In the event the Contractor causes any sewage discharge to a lake, creek, storm sewer or other storm drainage structure, the Owner shall deduct from the monies due or to become due to the Contractor under this Agreement, liquidated damages at the rate of five thousand Dollars (\$5,000.00) per occurrence, which shall be defined as each day any such discharge shall be made, in addition to any fines or penalties issued by regulating agencies with jurisdiction over the Project.

ARTICLE 4 INSURANCE AND WAIVER OF SUBROGATION

4.1 INSURANCE TO BE PROVIDED BY CONTRACTOR AND ITS SUBCONTRACTOR(S)

4.1.1 LIABILITY INSURANCE

For any Work under these Contract Documents, and until Final Completion of the entire Work, the Contractor and its Subcontractor(s), shall purchase and maintain, at their own expense, insurance coverage as specified below. For purposes of this Article, the term Subcontractors shall include subcontractors as defined above and MBE/WBE/SBE Qualified Subcontractors (as defined above) unless specifically stated otherwise. All insurance required hereunder shall apply to and cover all loss or liability caused by, arising from, or resulting from the Work performed or required to be performed, provided or required to be provided, hereunder, it being understood and agreed that the Work may include hazardous and ultra-hazardous activities.

.1 **Auto Liability Insurance:** Auto Liability coverage for Owned, Non-owned and Hired Auto Liability with a limit of not less than Five Million Dollars (\$5,000,000) for the Contractor, not less than Three Million Dollars (\$3,000,000) for its Subcontractor(s), and not less than Two Million Dollars (\$2,000,000) for its MBE/WBE/SBE Qualified

Subcontractor(s) minimum annual combined single limit, bodily injury and property damage. Such insurance shall cover and include liability arising from all vehicles owned by, hired by, or used by or on behalf of the Contractor or its Subcontractor(s). The coverage must be endorsed with ISO Form CA 99 48, or a substitute form providing equivalent coverage, to include without limitation, coverage respecting liability arising out of the transporting, loading or unloading of Hazardous Materials/Regulated Substances. The Auto Liability Insurance limit requirement can be satisfied by the purchase and maintenance of any combination of primary, excess and/or umbrella insurance.

The Owner and its trustees, board members, officers, members, employees, representatives, agents, and consultants including Owner's Engineer, Engineer's consultants and Owner's consultant for the Project shall be named as additional insureds on the Contractor's and its Subcontractor's(s') Automobile Liability policies. The extent of the additional insured coverage shall be no less broad than that provided under ISO Form CA 20 48 02/99 for Auto Liability, or a substitute form providing equivalent coverage.

- .2 Workers' Compensation:** Workers' Compensation with statutory limits. Employers Liability with an annual limit of not less than Five Million Dollars (\$5,000,000) bodily injury by accident, each accident, Five Million Dollars (\$5,000,000) bodily injury by disease, each employee, and Five Million Dollars (\$5,000,000) bodily injury by disease, policy aggregate minimum coverage for the Contractor, not less than Three Million Dollars (\$3,000,000) bodily injury by accident, each accident, Three Million Dollars (\$3,000,000) bodily injury by disease, each employee, and Three Million Dollars (\$3,000,000) bodily injury by disease, for its subcontractor(s) and not less than Two Million Dollars (\$2,000,000) bodily injury by accident, each accident, Two Million Dollars (\$2,000,000) bodily injury by disease, each employee, and Two Million Dollars (\$2,000,000) bodily injury by disease, policy aggregate minimum coverage for its MBE/WBE/SBE Qualified Subcontractor(s); coverage shall include defense of an allegation against the employer for injury believed to have been substantially certain to occur. The Contractor and its Subcontractor(s) shall subscribe to and comply with, throughout all phases of the Project, the Workers' Compensation laws of the State of Ohio and shall pay such premiums. The Employers Liability insurance requirement may be satisfied by including such coverage within the General Liability policy.

- .3 General Liability Insurance:** Commercial General Liability insurance on an occurrence coverage basis (including without limitation, bodily injury, personal injury and advertising injury, property damage, and broad-form contractual liability arising from or relating to these Contract Documents, coverage as respects independent contractors, operating mobile equipment, products and completed operations, explosion, collapse and underground hazards) of not less than the following amounts:

- (a) Contractor's General Liability (occurrence basis, limits per occurrence and annual aggregate):

\$5,000,000	General Aggregate
\$5,000,000	Products/Completed Operations Aggregate
\$5,000,000	Personal Injury and Advertising Injury
\$5,000,000	Bodily Injury and Property Damage Limit - Each Occurrence

- (b) Subcontractor's(s') General Liability (occurrence basis, limits per occurrence and annual aggregate):

\$3,000,000	General Aggregate
\$3,000,000	Products/Completed Operations Aggregate
\$3,000,000	Personal Injury and Advertising Injury

\$3,000,000 Bodily Injury and Property Damage Limit - Each Occurrence

- (c) MBE/WBE/SBE Qualified Subcontractor's(s') General Liability (occurrence basis, limits per occurrence and annual aggregate):

\$2,000,000 General Aggregate
\$2,000,000 Products/Completed Operations Aggregate
\$2,000,000 Personal Injury and Advertising Injury
\$2,000,000 Bodily Injury and Property Damage Limit - Each Occurrence

The Owner and its trustees, board members, officers, members, employees, representatives, agents, and consultants including Owner's Engineer, Engineer's consultants and Owner's consultant for the Project shall be named as additional insureds on the Contractor's and its Subcontractor's(s') Commercial General Liability policy and Excess/Umbrella Liability. The extent of the additional insured coverage shall be no less broad than that provided under ISO Form CG 20 26 11/85 for General Liability, or substitute form providing equivalent coverage. The additional insured coverage afforded under the Contractor's and its Subcontractor's(s') policies shall include both ongoing operations (work in progress) and completed operations (completed work). All coverage shall be maintained for a minimum of five (5) years after Final Completion. The General Liability Insurance limit requirement can be satisfied by the purchase and maintenance of any combination of primary, excess and/or umbrella insurance. Commercial General Liability and Umbrella/Excess limits of liability (including Products/Completed Operations coverage) shall apply on a per project basis.

- .4 Contractors Pollution Liability:** If Work performed or provided by Contractor or its Subcontractor(s) includes activities that could result in or give rise to a contamination or pollution incident or condition, then Contractor or its Subcontractor(s) shall purchase and maintain in force insurance covering loss and liability arising out of or relating to Work. Insurance shall cover and include claims alleging bodily injury, property damage, or including claims alleging bodily injury, property damage or clean up which shall include investigation, response, removal, remediation and neutralization of the pollution condition both on and off site claims or to any other location to which Hazardous Materials/Regulated Substances were transported from the Site.

- (a) Contractor's - Contractors Pollution Liability limits of not less than:

\$5,000,000 Bodily Injury and Property Damage, Third-Party Claims, each occurrence
\$5,000,000 Bodily Injury and Property Damage, Third-Party Claims, annual aggregate
\$5,000,000 Clean-up, Response, and Remediation On-Site, each occurrence
\$5,000,000 Clean-up, Response, and Remediation Off-Site, each occurrence

- (b) Subcontractor's(s') and MBE/WBE/SBE Qualified Contractor's(s') - Contractors Pollution Liability limits of not less than:

\$1,000,000 Bodily Injury and Property Damage, Third-Party Claims, each occurrence
\$1,000,000 Bodily Injury and Property Damage, Third-Party Claims, annual aggregate
\$1,000,000 Clean-up, Response, and Remediation On-Site, each occurrence
\$1,000,000 Clean-up, Response, and Remediation Off-Site, each occurrence

Contractors Pollution Liability insurance may be written on a claims-made basis provided such policy shall either (i) be renewed annually for a period of not fewer than five (5) years following Final Completion with substantially the same terms and conditions or (ii) include an extended reporting period endorsement or clause providing not less than five (5) years within which a claim may be made under the policy respecting the Contractor's

performance of Work; the cost of coverage for such five (5) year period shall be borne exclusively by the Contractor or its Subcontractor(s) as the case may be, provided further that if such Contractors Pollution Liability insurance is written on a claims-made basis then the per occurrence limits stated above shall apply per incident; and if commercially feasible, limits of liability shall apply on a per-project basis with a designated limit applying to the Project Site.

- .5 Professional Liability Insurance:** If Work performed or provided by Contractor or its Subcontractor(s) includes activities that could result in or give rise to a Professional Liability claim or loss, then Contractor or its Subcontractor(s) shall purchase and maintain in force Professional Liability insurance (including contractual liability coverage) covering liability and damages arising out of or resulting from Contractor's professional services rendered, or which should have been rendered, pursuant to these Contract Documents. Each of Contractor's Subcontractor(s) who are required to render or provide professional services pursuant to these Contract Documents and/or these contract documents between the Contractor and such Subcontractor, or at any other Subcontractor-Sub-Subcontractor level, shall purchase and maintain Professional Liability insurance coverage with limits of liability of not less than and coverage no less broad than requested herein.

- (a) Contractor's Professional Liability limits of not less than:

\$4,000,000	Annual Aggregate
\$2,000,000	Per claim

- (b) Subcontractor's(s') and MBE/WBE/SBE Qualified Subcontractor's(s') Professional Liability limits of not less than:

\$1,000,000	Annual Aggregate
\$1,000,000	Per Claim

Professional Liability insurance may be written on a claims-made basis provided such policy shall either (i) be renewed annually for a period of not fewer than five (5) years following Final Completion with substantially the same terms and conditions or (ii) include an extended reporting period endorsement or clause providing not less than five (5) years within which a claim may be made under the policy respecting the Contractor's performance of Work; the cost of coverage for such five (5) year period shall be borne exclusively by the Contractor, or Subcontractor(s) as the case may be, provided further that if such Professional Liability insurance is written on a claims-made basis then the per occurrence limits stated above shall apply per incident; and if commercially feasible, limits of liability shall apply on a per-project basis with a designated limit applying to the Project Site.

- .6 Rigger's Liability:** If Work performed or provided by Contractor or its Subcontractor(s) required by these Contract Documents includes or involves the use of a crane or any other device or piece of equipment by which materials or equipment are rigged, hoisted, lowered, elevated, raised, or the movement of property, materials or equipment, loaded or unloaded, then Contractor or its Subcontractor(s) shall purchase and maintain in force Riggers Liability for the rigging, hoisting, lowering, elevating, raising or moving of property, materials or equipment, loaded or unloaded; such insurance shall cover damage or loss to such property, materials, or equipment, with a limit of liability of not less than One Million Dollars (\$1,000,000) property damage each occurrence; such coverage shall include a limit for liability arising from any consequential or indirect losses including without limitation, any delay or loss of use claim.

- .7 **Railroad Protective Liability:** If Work performed or provided by Contractor or its Subcontractor(s) required by these Contract Documents includes or involves work that either (i) is within Fifty (50) feet of a railroad, or (ii) will require the District to require a Contractor to purchase Railroad Protective Liability per an agreement with a railroad, then Railroad Protective Liability covering liability must be purchased and maintained and damages arising out of or resulting from Contractor's or its Subcontractor's(s') Work rendered, or which should have been rendered, pursuant to these Contract Documents naming the railroad as required by contract as a named insured and having combined single limits of not less than Two Million Dollars (\$2,000,000) for each occurrence and Six Million Dollars (\$6,000,000) in the aggregate applying separately for each annual period for (a) all damages arising out of bodily injuries to or death of one or more persons and (b) all damages arising out of injury to or destruction of property. Such policy shall be written using ISO Form Number CG 00 35 01 07 98 and Pollution Exclusion Amendment Form CG 28 31 07 98 or other form(s) providing equivalent coverage.

PROPERTY INSURANCE

- .1 The Contractor shall purchase and maintain Property insurance covering construction machinery, equipment, special equipment, falsework, scaffolding, materials, mobile equipment, valuable papers, trailers and tools used or owned by the Contractor in the performance of the Work. The Contractor also agrees to require all tiers of its Subcontractor(s) to insure any and all property listed above used or owned by its Subcontractor(s) in the performance of the Work. Owner shall in no circumstance be responsible or liable for the loss or damage to, or disappearance of, any property listed above used or owned by the Contractor or its Subcontractor(s) in the performance of the Work.
- .2 The Contractor shall purchase and maintain Property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus the value of subsequent Change Orders and cost of materials supplied or installed by others, comprising total value for the entire Project on a replacement cost basis. Such Property insurance shall be maintained, unless otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until Final Completion or until no person or entity other than the Owner has an insurable interest in the property required by this Article to be covered, whichever is later. In the event these Contract Documents are terminated by either party prior to Final Completion, then Contractor shall take all reasonable measures to protect and preserve Owner's rights under Property insurance purchased by Contractor pursuant to these Contract Documents. Property insurance purchased pursuant to these Contract Documents shall include interests of the Owner and the Contractor, for the Project as named insureds under such policy.
- .1 Contractor's Property insurance shall be written on an "all-risk" Special Cause of Loss form or equivalent policy form and include, without limitation, insurance against the perils of fire and extended coverage and physical loss or damage including, theft, vandalism, malicious mischief, collapse, earthquake, flood, surface water run-off, windstorm; coverage shall include and extend to testing and startup, temporary buildings, property in transit, off-premises storage for property under construction, land and water pollutant cleanup, delay in start up, extra expense and expediting costs, and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for soft costs, including construction loan fees, commitment fees and marketing expenses, architect and engineers additional fees, consultant fees, lawyer fees, and other professional fees including Engineer's and Contractor's services and expenses required as a result of such insured loss.

- .2 The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without the mutual written consent of Owner and Contractor, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.
- .3 If Owner requests in writing that insurance for risks other than those described herein or other causes of loss be included in the Property insurance policy, the Contractor shall, if possible, include such insurance, and the cost thereof shall be charged to the Owner by appropriate Change Order.

4.2 INSURANCE COVERAGE REQUIREMENTS

4.2.1 Primary Coverage: The insurance coverage to be purchased and maintained by the Contractor and its Subcontractor(s) as required herein shall be primary to any insurance, self-insurance, or self-funding arrangement maintained by Owner which shall not contribute therewith, and there shall be severability of interests under the insurance policies required herein for all coverages provided under said insurance policies and otherwise provide cross liability coverage.

4.2.2 Thirty Days Notice: The insurance coverage required of Contractor and its Subcontractor(s) herein shall incorporate a provision requiring the giving of written notice to Owner at least thirty (30) days prior to the cancellation, non-renewal, material modification of any insurance policy required to be purchased and maintained pursuant to these Contract Documents; this requirement may be satisfied by Contractor and its Subcontractor(s) providing Owner such written notice. Contractor and its Subcontractor(s) shall promptly notify Owner of any change in the A.M. Best Company rating of any insurance company providing the insurance coverage for Contractor or its Subcontractor(s); all such notice shall be issued in accordance with the General Terms and Conditions.

4.2.3 Financial Strength: The insurance coverage required of Contractor and its Subcontractor(s) herein shall be placed and maintained until Final Completion with insurance companies rated at least A-, Financial Size Category of at least VIII, by A.M. Best Company, licensed to do business in Ohio, and where commercially feasible, admitted to do business in Ohio.

4.2.4 Subcontractor(s) Insurance: Contractor shall not sublet or subcontract any part of these Contract Documents without assuming absolute responsibility for requiring and taking actions to know that its Subcontractor(s) (and each Sub-Subcontractor at every tier) purchase and maintain the types of insurance required hereby with the same terms and conditions as herein required of the Contractor and the limits of liability herein required of its Subcontractor(s). Failure of Contractor or its Subcontractor(s) to purchase and maintain insurance for a minimum of five (5) years after Final Completion may be deemed a material breach of these Contract Documents, allowing the Owner, in addition to all other remedies available to Owner under the Contract, at law and/or in equity, to terminate these Contract Documents or to provide insurance at the Contractor's sole expense, in neither case, however, shall the Contractor's liability hereunder be lessened.

4.2.5 Notice of Occurrence: Upon Contractor's knowledge of any actual or alleged occurrence, event, or third-party claim(s) which may result in or give rise to a claim against, liability imposed upon, or loss suffered by Contractor or its Subcontractor(s) which may exceed One Million Dollars (\$1,000,000), Contractor shall (i) immediately provide the Owner with written notice of such occurrence, event or third-party claim(s) with reasonable detail; this requirement applies irrespective of when, where, or how the claim, liability, or loss occurred, whether or not the claim, liability or loss relates to or arises from the Work, or the validity or status of such claim, liability or loss, and applies to the entire Contract term and the five years following Final Completion.

4.2.6 Deductibles: Contractor and its Subcontractor(s) shall be responsible for the payment of any and all deductible(s) or retention(s) under the policy or policies of insurance purchased and maintained by each pursuant to these Contract Documents; the deductibles and self-insured retentions existing in the policies required herein must be stated on the certificates of insurance required by these Contract Documents.

4.2.7 Evidence of Insurance: Contractor shall submit to the Owner within ten (10) Calendar Days after Owner's award of the Contract and prior to the issuance of the Notice to Proceed, certificates of insurance evidencing the effectiveness of the insurance policies required by these Contract Documents. Upon request of the Owner, the Contractor shall submit exact copies of the policies and all endorsements to any such policies within ten (10) calendar days of such request. The Project Site shall be identified on the certificate(s) and shall be delivered pursuant to the General Terms and Conditions.

At any time during the term of these Contract Documents and annually (measured from the issuance of the Notice to Proceed) for a period of five (5) years following Final Completion, the Contractor shall promptly provide certificates of insurance to the Owner evidencing the effectiveness of the insurance coverages required pursuant to these Contract Documents.

All endorsements to or modifications of insurance purchased and maintained by the Contractor and its Subcontractor(s) pursuant to these Contract Documents shall be subject to Owner's review and final acceptance. Owner's review, receipt and/or acceptance of any insurance policy purchased and maintained by the Contractor or its Subcontractor(s), or a certificate of insurance evidencing such insurance, shall not constitute nor be deemed to constitute Owner's approval of such insurance or Owner's agreement that such insurance satisfies the insurance requirements set forth in these Contract Documents.

4.2.8 Compliance: If any insurance purchased and maintained by the Contractor or its Subcontractor(s) pursuant to these Contract Documents contains a warranty or other clause providing that coverage is null and void (or words to that effect), or otherwise reduced in scope or limit if the Contractor or its Subcontractor(s) does not comply with the regulations or statutes governing the Project, such policy or policies shall be modified or endorsed so that coverage shall be afforded in all cases except for the Contractor's or its Subcontractor's(s') intentional or willful non-compliance with Applicable Laws.

4.2.9 No Limitation: The types and limits of insurance to be purchased and maintained by the Contractor and its Subcontractor(s) pursuant to these Contract Documents shall not be deemed to constitute a limitation of the Contractor's or its Subcontractor's(s') liability hereunder or otherwise, or otherwise to limit or affect the Contractor's indemnification obligations hereunder; by requiring insurance herein, Owner does not represent or warrant that coverage and limits will be adequate or sufficient to protect the Contractor or its Subcontractor(s).

4.2.10 Purchase of Insurance: If the Contractor or its Subcontractor(s) fail(s) to purchase and maintain, or fails to continue in force throughout the term of these Contract Documents and until Final Completion and where required herein, for the minimum of five (5) years after Final Completion, insurance in the types and with limits of liability required herein, Owner may purchase such insurance and the cost thereof shall be borne by the Contractor, and shall be deducted from any amounts due and owing by the Owner to the Contractor. If such amounts are insufficient, the Contractor agrees to promptly pay the Owner the amount incurred by the Owner to purchase such insurance.

4.2.11 Other Insurance: Any insurance or any increase of limits of liability not described in this Article which Contractor or its Subcontractor(s) requires for its own protection shall be its own responsibility and at its own expense and shall not be considered part of the Contract Sum.

4.3 WAIVER OF SUBROGATION

4.3.1 Notwithstanding anything to the contrary contained herein, the Contractor and its board members, officers, administrators, members, employees, representatives, agents, and consultants, waive all rights of recovery, and their insurer's(s') rights of subrogation against the Owner and its trustees, board members, officers, administrators, members, employees, representatives, agents, and consultants, including Owner's Engineer, Engineer's consultants, and Owner's Consultant for the Project for damages caused by fire or other causes of loss to the extent covered by Property insurance obtained or required to be obtained (whichever is broader) pursuant to these Contract Documents, except such rights as they have to proceeds of such insurance held by the Owner for prompt payment to the payee(s) under the Property insurance. The Contractor and its board members, officers, administrators, members, employees, representatives, agents, and consultants, as appropriate, shall require the Subcontractor(s), Sub-Subcontractors, its board members,

officers, administrators, members, employees, representatives, agents, and consultants, of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers by endorsement or otherwise. A waiver of right of recovery or subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

- 4.3.2** Notwithstanding anything to the contrary contained herein, the Contractor and its board members, officers, administrators, members, employees, representatives, agents, and consultants, waive all rights of recovery and their insurer's(s') rights of subrogation against the Owner and its trustees, board members, officers, administrators, members, employees, representatives, agents, and consultants, including Owner's Engineer, Engineer's consultants, and Owner's Consultant for the Project for any and all loss, liabilities, damages, costs, including defense and indemnity, incurred or arising an occurrence or incident to the extent covered by the insurance policies obtained or required to be obtained (whichever is broader) pursuant to these Contract Documents except such rights they may each have, individually or collectively, to the coverages and proceeds of such insurance. The Contractor and its board members, officers, administrators, members, employees, representatives, agents, and consultants, as appropriate, shall require its Subcontractor(s), Sub-Subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers by endorsement or otherwise. A waiver of right of recovery or subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged. The provisions of this Article 4.3.2 shall apply to all insurance subject to this agreement except the Professional Liability insurance and Workers' Compensation purchased and maintained and Property insurance referred to in and that is the subject of Article 4.3.1.

ARTICLE 5 ACCEPTANCE

The Contractor covenants and agrees that Contractor's signature to this Agreement constitutes full acceptance without reservation of and full intent to comply with and fully perform the Work subject to this Agreement and in strict compliance with the Contract Documents for the Project subject to this Agreement.

IN WITNESS WHEREOF, this Agreement entered into on the date and year first written above.

Witness:

**NORTHEAST OHIO REGIONAL SEWER
DISTRICT**

By: _____

(Title): Executive Director

And: _____

(Title): President, Board of Trustees

Witness:

(CONTRACTOR): _____

By: _____

(Title): _____

The legal form and correctness of this Agreement
is hereby approved:

Marlene Sundheimer, Director of Law
Northeast Ohio Regional Sewer District

By: _____
Assistant Director of Law

Date: _____

SECTION 01 11 00
SUMMARY OF WORK

PART 1 GENERAL

1.01 SUMMARY

- A. The Work to be performed under this Contract shall consist of furnishing all tools, equipment, materials, supplies, and manufactured articles; furnishing all labor, transportation, and services, including fuel, power, water, and essential communications; and performing all work or other operations required for the fulfillment of the Contract in accordance with the Contract Documents. The Work shall be complete and all work, materials, and services not expressly indicated or called for in the Contract Documents which may be necessary for the complete and proper construction of the Work in good faith shall be provided by the Contractor as though originally so indicated, at no increased cost to the Owner.
- B. Work Covered by Contract Documents:
1. Location: The project is located the City of Cleveland in Rockefeller Park along Martin Luther King Jr. Drive in the Rockefeller Park Historic District. The Rockefeller Lagoon resides in the middle of the project site. The project site is bordered at its upstream end (east) by Mt. Sinai Drive and East 105th Street where Doan Brook exists from a large arched culvert. The downstream end (north) of the project reach is the first bridge crossing of MLK Drive over Doan Brook. The project is bordered on its left bank (south and west) at the top of the slope/tree line and does not include the private apartment residences. The project is bordered on its right bank (north and east) by the north and east side of MLK Drive. The center of the project area is located at:
 - a. Latitude: 41.512105 degrees.
 - b. Longitude: -81.617810 degrees.
 2. Principal Features: The Doan Brook Stream Enhancement Project is focused on the stream channel stability and ecological enhancements of approximately 1,700 lineal feet of urban stream channel within an approximate 4-acre project area. Enhancements will be implemented to address required changes to address severe bank erosion and the stabilization of the contiguous lower riparian zone of the banks and landscape improvements to the contiguous parklands adjacent to the stream. Doan Brook is located in the Rockefeller Park Historic District and the project area is entirely within the larger historic district. This enhancement project is being implemented as mitigation for impacts

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associated with improvements to the Cleveland Hopkins Airport as stipulated in the Section 404 permit for the airport project. Therefore, the Federal Aviation Administration is the lead federal agency and is partnered with the City of Cleveland as the owners of the project. The Northeast Ohio Regional Sewer District (NEORSD) has been selected by the FAA and the City to act on their behalf as the local project implementer and therefore will be overseeing all aspects of the design and construction of this project on behalf of the project stakeholders. The project will be implemented as a single phase.

3. Specific elements of the project include:
 - a. Protection of historic “contributing” trees and sandstone walls in areas where they are noted to remain and be protected.
 - b. Removal, storage, and reinstallation of existing park infrastructure including garbage cans, benches, and overhead lights.
 - c. Installation of construction signage and fencing.
 - d. Installation and maintenance of erosion and sediment control.
 - e. Install and maintain river diversion/dewatering system, including energy dissipation at discharge end of diversion.
 - f. Construction of in-stream structures including cascades, riffles and a j-hook.
 - g. In-stream grading to reshape the channel bottom profile.
 - h. Construction of a reinforced soil slope in Zone 1A.
 - i. Bank and upland stabilization in Zones 1, 2, and 3.
 - j. Controlled removal of existing sandstone block walls where noted with stockpiling of material for beneficial reuse of stone elsewhere on-site.
 - k. Reconstruction of a sandstone wall in Zone 4 using reclaimed sandstone from the site.
 - l. Construction of new right bank block walls in areas where the existing walls have failed.
 - m. Removal of an upper portion of a sheetpile wall.
 - n. Construction of a bioretention area and underdrain system to collect and treat stormwater runoff from the existing parking lot.
 - o. Resurface and stripe the existing parking lot.
 - p. Construction of a Sculpture Play Area, complete with sculptures, play surface, benches, underdrain, stepping stone path, and landscaping.
 - q. Construction of a Stream Bank Terrace Area complete with sandstone terraces and vegetation plantings.
 - r. Construction of a temporary parking lot for public use during construction and removal and restoration of the area at the end of the project.
 - s. Construction of soil encapsulated lifts upstream and downstream of the Stream Bank Terraces.

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- t. Replacement of asphalt sidewalks in areas impacted by the construction.
- u. Installation of new trees, landscaping, decorative fence, mulch and sod along the stream banks and in the park.
- v. Installation of Victory Oak (Liberty Oak) trees along MLK Drive.
- w. Implementation of a 2-year monitoring and maintenance plan.
- 4. The playground, gazebo, fishing access to the lagoon, and the sidewalk bordering the site along MLK drive shall remain open to the public for the duration of the project.
- 5. Combined Sewer Outfall #236 includes a dedicated diversion berm and dewatering pump. Water flows from this outfall continuously, however the dry weather discharge is thought to be groundwater and not combined sewage.
- 6. Final completion of all earthwork, planting, landscaping and other functions related to landscaping and site restoration must be completed by October 15, 2013. Although the project has a maintenance and warranty period for the landscaping, extension beyond the October 15 completion date will not be allowed. The project schedule allows ample time for this these dates, including delays from weather conditions that may affect in-stream WORK.

C. Work by Others:

- 1. The Contractor shall coordinate performance of the Work with other Contracts the Owner may execute for work at this(these) site(s), as required by this and other specifications and the provisions of the General Terms and Conditions Article 11. Keep all drives, access ways, entrances and common areas not specifically identified on the drawings as being occupied by this CONTRACT, free for use by Owner and other Contractors. In the case of disputes regarding the use of the site by this CONTRACT and other Contractors, the Owner will decide which Contract has precedence.
- 2. The Owner anticipates the following work near the project site: Gas line relocation and round-a-bout reconstruction at East 105th Street.

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1.02 SUBMITTALS – NOT USED

1.03 QUALITY ASSURANCE– NOT USED

1.04 DELIVERY, STORAGE AND HANDLING– NOT USED

1.05 PROJECT/SITE CONDITIONS– NOT USED

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

**SECTION 01 14 00
WORK RESTRICTIONS**

PART 1 GENERAL

1.01 SUMMARY

- A. The CONTRACTOR shall perform the WORK in such a manner that existing utilities are not interrupted that affect infrastructure off-site.
- B. The CONTRACTOR shall perform the WORK in such a manner that allows portions of the park to be open to the public, including the playground, water park, gazebo and lagoon fishing from the eastern shoreline.
- C. The CONTRACTOR has the option of providing additional temporary facilities that can eliminate a constraint, provided it is done without additional cost to the OWNER, is submitted to and approved by the OWNER, and provided that all requirements of these Specifications are fulfilled.
- D. The CONTRACTOR shall not shut off or disconnect any operating system of the Owner's facilities. The OWNER shall execute all equipment operations and shutdowns. The CONTRACTOR should be aware that existing valves, sluice gates, flow control devices and other isolation devices may not be able to be completely closed, and that supplemental pumping and/or other means should be assumed to be provided by the CONTRACTOR to complete and maintain dry conditions where required.
- E. Tree and shrub cutting is not allowed between April 15 to June 1 and August 15 to October 15.
- F. WORK within the stream channel shall be completed in dry conditions with the stream diverted around the open construction.

1.02 SUBMITTALS

- A. Requests for shutdown of existing facilities shall be submitted 30 days prior to desired time of shut down.

1.03 QUALITY ASSURANCE – NOT USED

1.04 DELIVERY, STORAGE AND HANDLING – NOT USED

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1.05 PROJECT/SITE CONDITIONS

A. Shutdowns:

1. General

- a. Shutdown shall be defined to indicate that a portion of the normal operation of a treatment plant, pump station, sewer, forcemain or other facility unit, or any of their appurtenances, instrumentation, or control components, must be suspended or taken out of service in order to perform the specified work. For each shutdown, CONTRACTOR shall compile an inventory of his labor and materials required to perform the tasks, an estimate of the time required to perform the tasks, and a written description of steps required to complete the tasks. Contingency time shall be provided where existing shut-off devices do not close tight and supplemental pumping and/or other devices are required to maintain dry conditions. The inventory, time estimate and written procedure shall be submitted to the OWNER for review 30 calendar days prior to the proposed start date of the shutdown. CONTRACTOR shall also submit a "Request for Shutdown" to the OWNER, for each shutdown, a minimum of 30 calendar days prior to the proposed shutdown date. Shutdown request cannot be initiated until all relevant submittals have been approved. No shutdown shall be initiated until the list of materials and labor is verified on site prior to the proposed start date.
- b. If additional shutdowns are required to complete the work, the CONTRACTOR shall notify the OWNER, who will arrange the necessary shutdowns.
- c. Work required that might interrupt the normal operations shall be accomplished at such times that will be convenient to the OWNER. CONTRACTOR shall note that shutdowns will generally be at the OWNER'S discretion. Shutdowns may require continuous execution of work or overtime. CONTRACTOR shall include in its bid price all overtime and/or premium time required for performing any work associated with these shutdowns.
- d. CONTRACTOR shall have on hand, located in close proximity to the Work area, all tools, equipment and materials, both temporary and permanent, necessary to complete each work category, without interruption. Adequate numbers of personnel shall be scheduled for each shutdown, so that the work may be within the specified time frame. Prefabrication of all assemblies shall be completed to the greatest degree possible, prior to any shutdowns. The OWNER shall be satisfied that CONTRACTOR has

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complied with these requirements, to the fullest extent possible,
before shutdowns will be authorized.

B. Sequence of Construction

1. All the WORK shall be sequenced by the CONTRACTOR in such a way to be least disruptive to maintaining continuous operations and minimize the number of required shut downs for WORK that interfaces with existing facilities. Other specific construction sequence items are noted on the Drawings or specified in Section 01 13 13, Project Coordination.
2. The CONTRACTOR shall proceed immediately upon receipt of the Notice to Proceed.
3. The CONTRACTOR shall include the milestones and information about out-of-service units as a part of the Project Schedule required and described in the Section 01 13 16, Project Schedule.
4. The CONTRACTOR shall construct the WORK in stages to allow for the OWNER's continuous occupancy and for uninterrupted operation during construction. Coordinate construction schedule and operations with the OWNER.
5. The CONTRACTOR shall be responsible for temporary connections and other measures required to maintain the OWNER's operations. The CONTRACTOR shall coordinate all. The OWNER'S Construction Supervisor will consider sequences other than those specified, provided they afford continuity of operations.
6. The CONTRACTOR shall perform the Work continuously during critical connections, penetrations, changeovers, and as required to prevent interruption or degradation of OWNER's operations.
7. The CONTRACTOR shall not close lines, open valves, or take other action which would affect the operation of existing systems, except as specifically required by the Contract Documents and after the approval of the Construction Supervisor.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

**SECTION 01 20 00
MEASUREMENT AND PAYMENT**

PART 1 GENERAL

1.01 SUMMARY

- A. Payment for the various Items of the Bid, as further specified herein, shall include all compensation to be received by the CONTRACTOR for furnishing all tools, equipment, supplies, and manufactured articles, and for all labor, operations, and incidentals appurtenant to the items of work being described, as necessary to complete the various items of the WORK all in accordance with the requirements of the Contract Documents. Work also includes all costs of permits and cost of compliance with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of the State of Ohio and the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA). No separate payment will be made for any item that is not specifically set forth in the Bid, and all costs therefore shall be included in the prices named in the Bid for the various Items of work.
- B. Payment for each respective item shall include such costs for the furnishing of drawings, submittals, samples, tools and appliances necessary to complete the work as specified and shown on the Contract Drawings.

1.02 SUBMITTALS

- A. Format and Contents:
 - 1. CONTRACTOR shall submit Application for Payment in accordance with General Terms and Conditions Article 5, Progress Payments, and as specified herein.
 - 2. Application for Payment shall be made electronically on forms and spreadsheets provided by the OWNER.

1.03 QUALITY ASSURANCE- NOT USED

1.04 DELIVERY, STORAGE AND HANDLING

- A. The CONTRACTOR shall make his own arrangements for delivery and handling of equipment and materials as it may require for the prosecution of the WORK. The location of all temporary roadways and similar facilities shall be subject to the approval of the OWNER and these shall be located and operated

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so as not to interfere with other work carried on by the OWNER, by other contractors, or by municipalities.

- B. The OWNER shall be furnished each day with itemized delivery lists of the materials and equipment delivered to the site which are intended to be incorporated into the WORK. Any materials or equipment delivered to the site without prior approval of the OWNER will be at the sole risk of the CONTRACTOR and will be subject to rejection and removal. No WORK shall be done or material or equipment installed until such is fully approved, and no unapproved work, materials or equipment will be included in any estimate for payment. Before any materials or equipment on hand are included in any estimate for payment, the CONTRACTOR must furnish the OWNER an invoice or statement as to the cost of such.
- C. The CONTRACTOR shall make all necessary arrangements and provisions for the storage of materials and equipment to be used on this Contract. All excavated materials, construction equipment, and materials and equipment to be incorporated into the WORK shall be placed so as not to injure any part of the WORK or existing facilities and so that free access can be had at all times to all parts of the WORK and to all public utility installations in the vicinity of the WORK. Materials and equipment shall be kept neatly piled and compactly stored in such locations as will cause the minimum of inconvenience to public travel and adjoining property. Site area available on the construction site for storage of material and equipment shall be as shown on the Drawings.
- D. Material which are to become the property of the OWNER shall be so stored as to facilitate their inspection and insure preservation of their quality and fitness, including proper protection against damage by freezing and wet weather; and they shall be placed under cover on wooden platforms or other hard, clean surfaces, and not on the ground.
- E. Equipment shall be stored in strict accordance with the manufacturers recommendations, and shall be stored in a climate controlled building or enclosure if so recommended.
- F. Lawns and/or other private property shall not be used for storage purposes without written permission of the OWNER, its agent or other person in possession or control of such premises.
- G. When a pay estimate is allowed on account of material delivered to the site or in the vicinity thereof or under the possession and control of the CONTRACTOR but not yet incorporated therein, such materials shall become the property of the OWNER. If such material is stolen, destroyed or damaged by casualty before

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being used, the CONTRACTOR will be required to replace it at its own expense without further cost to the OWNER. The CONTRACTOR shall comply with the provisions of Chapter 1309 of the Ohio Revised Code (Secured Transactions).

1.05 PAYMENT ITEMS

A. Units of Measure:

1. Linear Feet (LF) – field measure by OWNER based on aerial/plan view extents.
2. Square Yard (SY) – field measure by OWNER based on aerial/plan view extents.
3. Cubic Yard (CY) – field measure by OWNER.
4. Each (EA) – field measure by OWNER.
5. Lump Sum (LS).
6. Face Square Feet (FSF) – field measure by OWNER based on elevation view (not slope view).
7. Million Square Feet (MSF) - field measure for sod by OWNER based on aerial/plan view extents.

B. Payment:

1. Payment for Lump Sum and Unit Price Work is summarized in Table 1.
2. Bid items include volumes for rock and aggregate instead of tonnages. Conversion of rock and aggregate tonnage to volume will be completed using the density reported by the quarry for each material submittal.
3. Partial payment of the LUMP SUM Mobilization (Limited to a maximum 5 percent of the SUBTOTAL) item will be paid based on the approved schedule of values for work done in the following categories:
 - a. Set-up of Temporary Facilities: 70 percent of Bid Item.
 - b. Submission and Acceptance of Record/As-Built Drawings and final survey: 10 percent of Bid
 - c. Remaining costs for Mobilization: 20 percent of Bid Item; to be prorated monthly through the construction duration.

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Table 1: Lump Sum and Unit Price Payment Items		
Bid Item	Unit of Measure	Description
Zone 1		
Block Wall	FSF	Includes all necessary labor, material and equipment to install as shown on the drawings. Vertical component of unit of measure is from bottom of footer block to top of block wall, in elevation view (not slope area).
Erosion Mat	SY	Includes all necessary labor, material and equipment to install as shown on the drawings. In areas where two layers of erosion matting are required, the area is that of which the two layers would be applied (i.e. the area is not doubled to account for both layers).
Container Plants	EA	Includes all necessary labor, material, equipment, and soil preparation to install plants as shown on the drawings
Plugs	EA	Includes all necessary labor, material, equipment and soil preparation to install as shown on the drawings.
Zone 1A		
Reinforced Soil Slope with 304 Aggregate	CY	Includes all necessary labor, material and equipment to install as shown on the drawings. Includes sandstone rock facing.
Reinforced Soil Slope with 57 Aggregate	CY	Includes all necessary labor, material and equipment to install as shown on the drawings. Includes excavation and stockpile of 370 cy riprap and soil from temporary slope riprap.
Limestone/Sandstone Lower Wall Block	CY	Includes all necessary labor, material and equipment to install as shown on the drawings. Includes terrace and excavation and backfill for footer installation.
Plugs	EA	Includes all necessary labor, material, equipment and soil preparation to install as shown on the drawings.
Zone 2		
Block Wall	FSF	Includes all necessary labor, material and equipment to install as shown on the drawings. Vertical component of unit of measure is from bottom of footer block to top of block wall, in elevation view (not slope area).

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Table 1: Lump Sum and Unit Price Payment Items		
Bid Item	Unit of Measure	Description
Erosion Mat	SY	Includes all necessary labor, material and equipment to install as shown on the drawings. In areas where two layers of erosion matting are required, the area is that of which the two layers would be applied (i.e. the area is not doubled to account for both layers).
Plugs	EA	Includes all necessary labor, material, equipment, and soil preparation to install plugs as shown on the drawings
Large Trees	EA	Includes all necessary labor, material, equipment, and soil preparation to install trees as shown on the drawings. Does not include Victory Oak trees.
Small Trees	EA	Includes all necessary labor, material, equipment, and soil preparation to install trees as shown on the drawings. Does not include Victory Oak trees.
Container Plants	EA	Includes all necessary labor, material, equipment, and soil preparation to install plants as shown on the drawings
Zone 3		
Block Wall	FSF	Includes all necessary labor, material and equipment to install as shown on the drawings. Vertical component of unit of measure is from bottom of footer block to top of block wall, in elevation view (not slope area).
Erosion Mat	SY	Includes all necessary labor, material and equipment to install as shown on the drawings. In areas where two layers of erosion matting are required, the area is that of which the two layers would be applied (i.e. the area is not doubled to account for both layers).
Plugs	EA	Includes all necessary labor, material, equipment, and soil preparation to install plugs as shown on the drawings
Large Trees	EA	Includes all necessary labor, material, equipment, and soil preparation to install trees as shown on the drawings. Does not include Victory Oak trees.
Small Trees	EA	Includes all necessary labor, material, equipment, and soil preparation to install trees as shown on the drawings. Does not include Victory Oak trees.

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Table 1: Lump Sum and Unit Price Payment Items		
Bid Item	Unit of Measure	Description
Container Plants	EA	Includes all necessary labor, material, equipment, and soil preparation to install plants as shown on the drawings
Zone 4		
Repurposed Block Wall	FSF	Includes all necessary labor, material and equipment to install as shown on the drawings. Vertical component of unit of measure is from bottom of footer block to top of block wall, in elevation view (not slope area).
PVC Pipe	LF	Includes all necessary labor, material and equipment to install piping, appurtenances, pipe bedding and backfill as shown on the drawings. This does not include surface restoration or the soil encapsulated lifts.
In-Stream Structures and Grading		
Constructed Riffle	CY	Includes all necessary labor, material and equipment to install constructed riffle as shown on the drawings.
Cascade Native Channel Rock Substrate	CY	Includes all necessary labor, material and equipment to install native channel rock substrate in the cascades as shown on the drawings.
Cascade Boulders	CY	Includes all necessary labor, material and equipment to install cascade boulders as shown on the drawings.
J-Hook	LF	Includes all necessary labor, material and equipment to install j-hook as shown on the drawings. (LF is the summed length of the inside arm, hook width and outside arm of crest stone. Outside arm dimension terminates at face of aggregate backfill. LF quantity is based on full thickness of J-hook stone from crest stone to bottom of excavation)
Stream Bottom (Bed) Grading	LS	Includes all necessary labor, material and equipment to regrade stream bed between banks in areas not included in the instream structure (cascade, j-hook and constructed riffle) installation. Does not include floodplain grading.

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Table 1: Lump Sum and Unit Price Payment Items		
Bid Item	Unit of Measure	Description
Bioretention Area		
Bioretention Area	SY	Includes all necessary labor, material and equipment to install bioretention area as shown on the drawings, including replacing the manhole lid, saw cutting the existing curb, and installing reclaimed cobble spillway. This does not include landscape planting, or subsurface piping and pipe bedding in the Bioretention Area.
Bioretention Area Piping	LF	Includes all necessary labor, material and equipment to install piping, appurtenances, pipe bedding and backfill as shown on the drawings to the underdrain outlet.
Plugs	EA	Includes all necessary labor, material, equipment, and soil preparation to install plugs as shown on the drawings
#1 Container Plants	EA	Includes all necessary labor, material, equipment, and soil preparation to install plants as shown on the drawings
#3 Container Plants	EA	Includes all necessary labor, material, equipment, and soil preparation to install plants as shown on the drawings
Erosion Mat	SY	Includes all necessary labor, material and equipment to install as shown on the drawings. In areas where two layers of erosion matting are required, the area is that of which the two layers would be applied (i.e. the area is not doubled to account for both layers).
Sculpture Play Area		
Sculpture Play Area Surface	LS	Includes all necessary labor, material and equipment to install Sculpture Play Area surface, including bedding, concrete base, and the concrete edge as shown on the drawings. Unit of measure is to the outside face of the concrete edge.
Sculpture Play Area Piping	LF	Includes all necessary labor, material and equipment to install piping and appurtenances as shown on the drawings to the connection with the Bioretention Area piping.
Stepping Stone Path	LS	Includes all necessary labor, material and equipment to reclaim stones and install stepping stone path as shown on the drawings.

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Table 1: Lump Sum and Unit Price Payment Items		
Bid Item	Unit of Measure	Description
Play Area Reclaimed Stone Benches	EA	Includes all necessary labor, material and equipment to reclaim stones and install stone benches as shown on the drawings.
Stream Bank Terraces		
Stream Bank Terraces	SY	Includes all necessary labor, material and equipment to install stream bank terraces, landscaping, and erosion control as shown on the drawings. This item is measured based on the aerial extent shown on Detail 2 on Sheet L-08.
Victory Oak Trees		
Victory Oak (Liberty Oak) Trees	EA	Includes all necessary labor, material, equipment, and soil preparation to install Victory Oak (Liberty Oak) Trees as shown on the drawings.
Parking and Temporary Parking		
Temporary Parking Lot	SY	Includes all necessary labor, material and equipment to install, remove, dispose, and restore the temporary parking lot area as shown on the drawings. This includes the entrance to the temporary parking lot, the safety fencing, and signage. The unit of measurement is the size of the temporary parking lot.
Existing Parking Lot Resurfacing	LS	Includes all necessary labor, material and equipment to mill, overlay and stripe the existing parking lot used for construction staging and access. Includes disposal of milled asphalt.
General		
Miscellaneous Tree Pruning	EA	Includes pruning trees, including disposal of trimmings, within and immediately adjacent to the project area as directed by the Engineer, Landscape Architect, or Arborist.

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Table 1: Lump Sum and Unit Price Payment Items		
Bid Item	Unit of Measure	Description
Mobilization	LS	Mobilization includes all necessary labor, material, and equipment to move in personnel and equipment, set up and maintain all temporary offices, contractor parking areas, facilities, utilities and prepare the site for work. Also includes preconstruction survey, utility locating, removing and storing park infrastructure, such as park benches, garbage cans, signs, and light poles as shown on the drawing or as needed within the construction limits. Also includes submission of all submittals required prior to start of work. Also includes all necessary labor, material and equipment to move out personnel and equipment, clean entire project site, remove all debris and rubbish related to construction activities, and reinstalling park infrastructure removed during construction. Also includes record/as-built drawings and final surveying.
Site Preparation	LS	Includes all necessary labor, material, and equipment to perform clearing and grubbing, topsoil stripping, and dispose of clearing and grubbing debris as shown on drawings.
Tree Removal	EA	Includes all necessary labor, material, and equipment to remove and dispose of trees as shown on drawings.
Stream Dewatering	LS	Includes all necessary labor, material, and equipment to install, maintain, operate and remove the temporary diversion(s) and dewatering pumps, pipelines, appurtenances, and outfalls.
Haul Roads	LS	Includes all necessary labor, materials, and equipment to install, maintain, and remove haul roads as shown on the drawings.
Traffic and Pedestrian Control Signage	LS	Includes all necessary labor, materials, and equipment to install, maintain, and remove traffic control signs as shown on the drawings.
Temporary Fencing	LS	Includes all necessary labor, materials, and equipment to install, maintain and remove temporary fence as specified and shown on the drawings.
Contract Closeout	LS	As required in General Terms & Conditions.
Stockpile of demolished sandstone walls	LS	Includes all necessary labor, material, and equipment to stockpile sandstone blocks that have either fallen into the channel or are removed from existing walls as directed by engineer or as shown on the drawings. Does not include blocks from Sandstone Block Wall Height Reduction bid item.

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Table 1: Lump Sum and Unit Price Payment Items		
Bid Item	Unit of Measure	Description
Earthwork	LS	Includes all necessary labor, material, and equipment to excavate, fill, backfill, grade, compact, and stockpile site soils as shown on the drawings. Also includes disposal of all debris and unsuitable or excess stockpile soils. Also includes disposal of stockpile sandstone walls that are not claimed by the Owner. (Does not include in-stream structures and grading, Zones 1, 1A, 2, 3, 4, the bioretention area, the sculpture play area, the stream bank terrace area, the new block walls, or the parking lots. Those costs are included in the respective bid item.)
New Block Walls	FSF	Includes all necessary labor, material and equipment to remove existing sandstone block walls and rebuild them with new stone block walls as shown on the drawings. This does not include the stone walls in Zones 1, 1A, 2, 3, or 4. Vertical component of unit of measure is from bottom of footer block to top of block wall, in elevation view (not slope area).
Sandstone Block Wall Height Reduction	FSF	Includes all necessary labor, material and equipment to remove the top section of existing sandstone wall as shown on the drawings and salvage the blocks. Includes stockpiling block at onsite location. Vertical component of unit of measure is from bottom of footer block to top of block wall, in elevation view (not slope area).
Cut and Dispose Sheet Pile	FSF	Includes all necessary labor, material and equipment to remove and dispose the top portion of existing sheet pile as shown on the drawings.
Temporary Erosion and Sediment Control	LS	Includes all necessary labor, material and equipment to comply with the stormwater pollution prevention plan, permits, and requirements as shown on the drawings.
Coir Net with Erosion Mat	SY	Includes all necessary labor, material and equipment to install coir net and erosion mat (e.g. coir/straw matting) placed on stream banks and floodplain. Does not include the soil lifts, Zones 1, 1A, 2, 3 or stream bank terraces. In areas where two layers of erosion matting are required, the area is that of which the two layers would be applied (i.e. the area is not doubled to account for both layers).
Coir Wattle	LF	Includes all necessary labor, material and equipment to install coir wattle as shown on the drawings. This does not include the stream bank terraces.

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Table 1: Lump Sum and Unit Price Payment Items		
Bid Item	Unit of Measure	Description
Soil Encapsulated Lift	LF	Includes all necessary labor, material and equipment to install <u>one</u> soil encapsulated lift as shown on the drawings.
Erosion Mat	SY	Includes all necessary labor, material and equipment to install erosion mat (e.g. ECSC-2B matting) placed on stream banks and floodplain in areas that does NOT also include the coir netting (e.g. BioD Mat 90). This also does not include the soil lifts or stream bank terraces. This does not include Zones 1, 1A, 2, or 3. In areas where two layers of erosion matting are required, the area is that of which the two layers would be applied (i.e. the area is not doubled to account for both layers).
Sidewalks	SY	Includes all necessary labor, material and equipment to remove and dispose existing asphalt sidewalks, and install new asphalt sidewalks as shown on the drawings.
2-Year Monitoring and Maintenance	LS	Includes all necessary labor, material and equipment to complete maintenance, inspections, reporting, and repairs, as specified in 32 93 00B Plants and Supplement A in the same specification. The 2-year period begins when Substantial Completion is achieved. Payment shall be 60 percent of the lump sum price at the completion of the first year, with the balance of the payment at the completion of the second year, provided the documentation and success criteria are satisfactory to the Owner.
Decorative Fencing	LF	Includes all necessary labor, material and equipment to install decorative landscape fencing as shown on the drawings.
Tree Protection	LS	Includes all necessary labor, material and equipment to install tree protection as shown on the drawings.
Large Trees	EA	Includes all necessary labor, material, equipment, and soil preparation to install trees as shown on the drawings. Does not include Victory Oak trees.
Small Trees	EA	Includes all necessary labor, material, equipment, and soil preparation to install trees as shown on the drawings. Does not include Victory Oak trees.
Plugs	EA	Includes all necessary labor, material, equipment, and soil preparation to install plugs as shown on the drawings

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Table 1: Lump Sum and Unit Price Payment Items		
Bid Item	Unit of Measure	Description
#1 Container Plants	EA	Includes all necessary labor, material, equipment, and soil preparation to install plants as shown on the drawings
#3 Container Plants	EA	Includes all necessary labor, material, equipment, and soil preparation to install plants as shown on the drawings
Sod	MSF	Includes all necessary labor, material, equipment and soil preparation to install sod as shown on the drawings or as needed to restore the site as specified.
Educational Signage	EA	Includes all necessary labor, material and equipment to install as shown on the drawings.

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1.06 BID, PERFORMANCE AND PAYMENT BOND, AND INSURANCE

- A. The Lump Sum price stipulated for Bid Item BID, PERFORMANCE AND PAYMENT BOND, AND INSURANCE shall be in full compensation for the combined cost for the Bid, Performance and Payment Bonds, and Insurance. Payment of this Lump Sum item will be made to the Contractor as described in the General Terms and Conditions, and shall be paid within the first pay application. This item shall not be bid in excess of three (3) percent of the Unofficial Total Bid Amount.

1.07 GENERAL ALLOWANCE

- A. The Allowance amount stipulated for GENERAL ALLOWANCE shall be an amount of ten (10) percent of the SUBTOTAL on the Bid Form, to be used at the discretion of the OWNER. The allowance may be used for payment of any unforeseen work items other than as specified or shown on the Contract Drawings and/or work directed by the OWNER.
- B. The allowance will be used to compensate the CONTRACTOR for all labor, materials, tolls and equipment required for this work or for any other miscellaneous work to enhance the quality of the final product as directed. Authorization for work to be performed under this allowance shall be by work order.
- C. The allowance will not be used to correct CONTRACTOR's errors or omissions.
- D. The CONTRACTOR will be compensated for work performed under this item in accordance with the procedures set forth in Article 12 of the General Terms and Conditions. At the end of the Contract, all remaining funds will be deleted from the Contract by a change order.

1.08 SPECIFIC ALLOWANCES

The Allowance amount is stipulated in the Bid Form and is to be used at the discretion of the OWNER or Engineer. The SPECIFIC ALLOWANCES are summarized in Table 2:

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Table 2: Specific Allowances	
Specific Allowance Bid Items	Description
New Sandstone	This allowance may be used for work related to purchasing and delivering sandstone blocks or cobble in areas where reclaimed rock from the site is anticipated to be available for use. These areas may include purchasing rock for use in the Bioretention Area entrance, Sculpture Play Area benches and stone path, Stream Bank Terraces Area pavers or the blocks for the Zone 4 wall repair.
Sculptures	This allowance may be used to purchase and install sculptures on the concrete bases in the Sculpture Play Area.
Zone 1A Aggregate	This allowance may be used for work related to providing additional aggregate for construction of the Zone 1A. Additional material may be needed due to erosion or to achieve suitable foundation for which to build Zone 1A slope.
Parking Lot Improvements	This allowance may be used for labor, material and equipment for the demolition and disposal of the existing asphalt parking lot, curb and gutter, and unsuitable base material, and the replacement of unsuitable base, preparation of base, and preparation and installation of new asphalt, curb and gutter, grassed island with two trees, handicap ramp and pavement markings of the same layout (or mostly similar) as the existing parking lot.
Stone Block Wall Replacement	This allowance may be used for all necessary labor, material and equipment for the demolition and stockpiling of the right bank sandstone wall from station 18+40 to 18+95 from the top of the wall to the foundation bottom. It may also include all necessary labor, material and equipment for rebuilding the wall with new block as shown on the drawings and Detail 2 on Sheet GT-04. Vertical component of unit of measure is from bottom of footer block to top of block wall, in elevation view (not slope area).

- A. This work does not serve as payment for any WORK already outlined in the Contract Documents.
- B. The CONTRACTOR shall be responsible for its own errors of workmanship, improper work scheduling and delay, etc., and this allowance shall not be used to compensate for that responsibility.
- C. The CONTRACTOR shall be compensated for work performed under this item in accordance with the procedures set forth in Article 12 of the General Terms and Conditions. All remaining funds at the end of the contract, will be deleted by a deduct order.

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1.09 PARTIAL PAYMENTS

- A. The Project includes large number of plugs, containers, sod, and limestone and sandstone blocks. The CONTRACTOR is permitted to make arrangements with suppliers to secure in advance of the installation dates the materials necessary to complete the restoration in a timely manner. For this purpose, the CONTRACTOR may submit for partial payment, of the bid prices for the items listed above according to the following:

1. Purchase order to supplier: 20 percent.
2. Installation complete: 80 percent.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 30 10
CERTIFIED PAYROLL REPORT FILING

PART 1 GENERAL

1.01 SCOPE

- A. The General Terms and Conditions require the Contractor and every lower-tier Subcontractor to submit certified payrolls and labor compliance documentation.
- B. The District is currently utilizing a web-based system for filing and managing certified payroll reports. The current provider of this web based system is LCPtracker™. LCP Tracker™ is a paperless, online system used for entering certified payroll reports. Payroll data may be entered directly into the system or uploaded directly from the Contractor's payroll system. The system eliminates the need for contractors to submit prevailing wage documents and forms while providing an online database of all certified payroll reports.
- C. The Contractor shall pay all costs associated with complying with the Monthly electronic certified payroll submission.
- D. Online training is available to the Contractor and subcontractors at no cost. Contractors may access the training after receiving a login identification (ID) and password from the Prevailing Wage Coordinator.

1.02 SUBMITTALS

- A. The Contractor shall submit certified payroll reports on a monthly basis using LCPtracker™ web-based software. There are four methods that can be used to submit payroll data:
 - 1. Manual Method :The Contractor can enter payroll data directly into the system using the data entry screens inside of LCPtracker™.
 - 2. Uploading: The Contractor can upload payroll records to LCPtracker™ using an excel spreadsheet template provided by LCPtracker™. Use of this template will enable the Contractor to upload all of the payroll data for a week at one time.
 - 3. Payroll Records Interface: The Contractor may be able to utilize the interface (if available) within their accounting system software program to upload directly into LCPtracker™. The Contractor should contact LCPtracker™ during bidding to determine if programming is required and if there will be a charge for this service.

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4. Payroll Records: Direct Payroll Interface (DPI) –The Contractor can purchase an interface which will map the accounting system to the LCPtracker™ system.

1.03 QUALITY ASSURANCE—NOT USED

1.04 DELIVERY, STORAGE AND HANDLING—NOT USED

1.05 PROJECT SITE CONDITIONS

- A. Questions in regard to specific certified payroll issues please contact the District's Prevailing Wage Officer at 216-881-6600. LCP Tracker™ application issues please contact LCP Tracker at 714-669-0052 Option 4 or via email to support@lcptracker.com.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 31 13
PROJECT COORDINATION

PART 1 GENERAL

1.01 SUMMARY

- A. The CONTRACTOR shall adhere to the project coordination activities and descriptions outlined herein.
- B. Work by Others:
 - 1. Interference With Work On Utilities: The CONTRACTOR shall cooperate fully with all forces of the OWNER or forces of other public or private agencies engaged in the relocation, altering, or otherwise rearranging of any facilities which interfere with the progress of the WORK, and shall schedule the WORK so as to minimize interference with said relocation, altering, or other rearranging of facilities.
 - 2. The County is planning road and gas line work east of the project boundary at the East 105th Street round-a-bout that may overlap with WORK in this contract. County work is not anticipated to impact the staging areas or construction limits for this project. CONTRACTOR shall cooperate fully with the County and OWNER to accommodate these projects.
- C. Contractor Use of Project Site: The CONTRACTOR's use of the project site shall be limited to its construction operations and on-site storage of construction materials and equipment, material and worker trailers, and employee parking at the locations designated on the Contract Drawings. Coordinate location of and access to underground utilities, erosion control requirements, surveying, temporary roadways and on-site storage with General Terms and Conditions Article 8.13 Use of Site.
- D. Owner Access to Project Site:
 - 1. The OWNER shall have access to the existing facilities and the project site during the entire period of construction for the conduct of the OWNER's normal operations. The CONTRACTOR shall cooperate and coordinate with the OWNER to facilitate the OWNER's access and to minimize interference with the CONTRACTOR's operations at the same time.

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2. OWNER'S facilities may be removed from service only as specified in Division 1 Specifications Maintenance of Operations, and/or Construction and Schedule Constraints.

E. Notification of Municipalities:

1. The Contractor shall, at least four (4) working days prior to commencing construction operations in areas in which they may be affected, contact the appropriate municipality.
2. Notification shall be approved by the Owner prior to distribution.

1.02 SUBMITTALS

A. Contractor's Daily Reports:

1. At the end of each week the CONTRACTOR shall furnish to the OWNER the CONTRACTOR's Daily Reports containing the following information:
 - a. Company name, address, phone numbers, date, day of the week, project name, job number, temperature, precipitation, sky conditions, and wind speed. Report number, name of author of the Daily Report and signature.
 - b. Summary of dewatering activities, including average flow rates and any overtopping of the temporary diversions. Include summary of changes to dewatering approach and equipment for future dewatering efforts.
 - c. Each activity completed including the location on the job site, list of accidents, list of safety issues. Include any critical issues that may impact future work activities.
 - d. Field force labor at the site by category, company source, list of labor classification (Supervisor, Foreman, Journeyman, and Apprentice), work area, location on the job site, and purposes.
 - e. Construction equipment on hand (including utility vehicles such as pickup trucks, and maintenance vehicles), Company/Source, Units and type, location on the job site and purpose.
 - f. Visitors' log. Include Company, visitor name, time and reason for visit.
 - g. Materials Delivered. Include time of delivery, material name and quantity, location of the job site, description and purpose.

B. Contractor's Critical Path Method (CPM) Schedule Submittals: Requirements for CONTRACTOR'S Project Schedule are in the Division 1 Specification, Project Schedule.

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C. As-built Documents:

1. Maintain in good condition a complete set of contract drawings at the project site. Record on these drawings all data, measurements, elevations and other information pertaining to as-constructed conditions.
2. Record information daily, or more often as necessary to compile accurate information. See the Division 1 Specification Record Documents.
3. OWNER and ENGINEER shall have access to these drawings during normal working hours.
4. As-built documents shall be reviewed with OWNER during monthly progress meetings, and submitted during project closeout.

1.03 QUALITY ASSURANCE

A. Preconstruction Conference:

1. Prior to the commencement of WORK at the site, a preconstruction conference will be held at a mutually agreed time and place and shall be attended by the CONTRACTOR'S Project Manager, its superintendent, and its Subcontractors as the CONTRACTOR deems appropriate. Other attendees will be as follows:
 - a. OWNER'S Construction Manager and other representatives of the OWNER.
 - b. CONSULTANT'S Construction Administrator or Resident Project Representative.
 - c. Others as requested by CONTRACTOR or OWNER.
2. The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The complete agenda will be furnished to the CONTRACTOR prior to the meeting date. However, the CONTRACTOR should be prepared to discuss all of the items listed below.
 - a. Designation of responsible personnel.
 - b. Coordination with OWNER's operations and other construction.
 - c. Transmittal, review, and distribution of CONTRACTOR's submittals.
 - d. Subcontractors.
 - e. Review of Contract Times and Milestones.
 - f. Status of CONTRACTOR's insurance and bonds.
 - g. CONTRACTOR's tentative schedules.
 - h. Processing of applications for payment.
 - i. Maintenance of as-built documents.
 - j. Critical work sequencing.

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- k. Field decisions and Change Orders.
- l. Use of project site, office and storage areas, security, housekeeping, and OWNER's needs.
- m. Equipment deliveries and priorities.
- n. CONTRACTOR's assignments for safety and first aid.
- o. Hours of Work and Overtime.
- p. Review of Scope of Work for other Contracts.
- q. Cost and schedule status against the plan during project life cycle.
- 3. The OWNER will preside at the preconstruction conference and the OWNER will arrange for keeping and distributing the minutes to all persons in attendance.
- 4. The CONTRACTOR and its Subcontractors should plan on the conference taking up to 4 hours.

B. Progress Meetings:

- 1. The OWNER shall schedule and hold regular progress meetings at least monthly and at other times as requested by OWNER or CONTRACTOR or as required by progress of the WORK. The CONTRACTOR and OWNER shall attend each meeting. CONTRACTOR may at its discretion request attendance by representatives of its Suppliers, Manufacturers, and other Subcontractors.
- 2. The OWNER shall preside at the meetings and the OWNER will arrange for keeping and distributing the minutes to all persons in attendance. The purpose of the meetings will be to review the progress of the WORK, maintain coordination of efforts, discuss changes in scheduling, and resolve other problems which may develop. During each meeting, the CONTRACTOR is required to present any issues which may impact the CONTRACTOR's WORK, with a view to resolve these issues expeditiously.
- 3. In general, the meeting agenda shall follow the format described below:
 - a. Discuss objections, if any, to minutes of previous meeting.
 - b. Review WORK progress since previous meeting.
 - c. Review field observations, problems and conflicts.
 - d. Review problems which impede Construction Schedules.
 - e. Review delivery schedules.
 - f. Review the status of the project with respect to schedule and identify corrective measures and procedures to regain required schedule, if necessary.
 - g. Review revisions to Construction Schedules.
 - 1) Work completed versus planned.
 - 2) Schedule variance from baseline.
 - 3) Cost analysis.

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- 4) Two (2) month look ahead schedule.
 - 5) Risk issues.
 - h. Review planned progress during subsequent WORK periods (until next meeting).
 - i. Review coordination of schedules.
 - j. Review submittal schedules; expedite as required.
 - k. Review maintenance of quality standards.
 - l. Review proposed changes for the following:
 - 1) Effect on Construction Schedule and completion date.
 - 2) Effect on Contract Cost.
 - m. Other Business.
- C. Safety Meetings: There shall be at least one safety meeting to address OWNER'S Lock out Tag Out Procedure, Confined Space Entries, Fall Protections and other concerns initiated by any of the parties to this Contract.
- D. Permits:
 - 1. The CONTRACTOR shall obtain permits that relate to construction procedures. All necessary permits or licenses required from any municipality, utility owners, and other agencies concerning construction procedures shall be obtained by and at the expense of the CONTRACTOR unless otherwise specified. The construction shall be performed by the CONTRACTOR in full accordance with any and all permit requirements, including those applying to barricades, watchmen, guarding, lighting, storage of supplies, equipment and excavated materials, and all other conditions or requirements which may be stipulated by the permits, whether or not specifically shown on the drawings or mentioned in the specifications.
- E. Additional Engineering Services:
 - 1. In the event that the Engineer or his consultants are required to provide substantial additional engineering services as a result of substitution of materials or equipment by the Contractor, or to evaluate any substantive changes proposed by the Contractor for the convenience of the Contractor, then the Contractor shall reimburse the District for the charges of the Engineer and his consultants for evaluating the proposed substitution or changes. These expenses of the Engineer will be reimbursed in any case by the Contractor, and are not dependent on the acceptance of the proposed Contract change.
 - 2. The Engineers will notify the Contractor and the District in writing when any of the above stated items will result in additional engineering

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services and will obtain the Contractor's and the District's written authority to proceed prior to performing the review. Expenses will be computed in accordance with the Engineer's established billing procedures.

F. Project Signs:

1. The Contractor shall, as part of the work of this Contract, provide one (1) project sign of the size and type as illustrated on the following page. Materials of construction shall be as indicated on the sketches except as modified by the specifications below. The signs must be erected at the site within 30 days after Notice to Proceed and shall be fabricated, erected and maintained by the Contractor in accordance with the following specifications:
 - a. Sign panel: The sign panel shall be constructed of 3/4" minimum thickness marine plywood inset into a 1-1/4"x 4" redwood frame. All fasteners used in the construction of the sign shall be of a rust-proof nature.
 - b. Sign image/graphics: The sign graphics seen in the sketches shall be provided to the Contractor on CD as an electronic file ready for printing. The Contractor shall provide this CD with all necessary images and files to a signage company for production.
 - c. The sign image/graphics shall be a three (3)-color imprint (using the colors as specified in the electronic file and on sketches) on white exterior-grade adhesive vinyl, trimmed to 48" high x 96" wide, and applied to the sign panel prior to framing.
 - d. Painting:
2. Posts: Use brown paint for the post supports above grade.
3. Frame and Back: The frame and back of the sign panel shall be painted with a prime coat and at least two (2) finish coats of the same white paint used on the sign.
4. General: All paint/vinyl used shall be exterior grade, suitable for use on or adhesion to wood.
 - a. Location: The signs shall be located in prominent position as determined by the NEORS D representative.
 - b. Sign Supports: Minimum support for the signs is indicated on the NEORS D sketch, but additional supports or bracing, as determined by the NEORS D, shall be provided by the Contractor. Adequate support will include the positioning and alignment of the signs as determined by the NEORS D.
 - c. Maintenance: The project signs shall be maintained by the Contractor, in good condition, at all times, for the duration of construction.

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- d. Removal of Signs from Project Site: The removal of the project signs from the construction site by the Contractor shall be at the completion of construction, but only when ordered by the NEORS D.
- e. Payment: The cost of the fabrication, erection, maintenance and removal of the project signs, including all labor and materials, shall be included in the price bid for the work of this Contract and no extra payment shall be made for work related to the project signs.

1.04 DELIVERY, STORAGE AND HANDLING – NOT USED

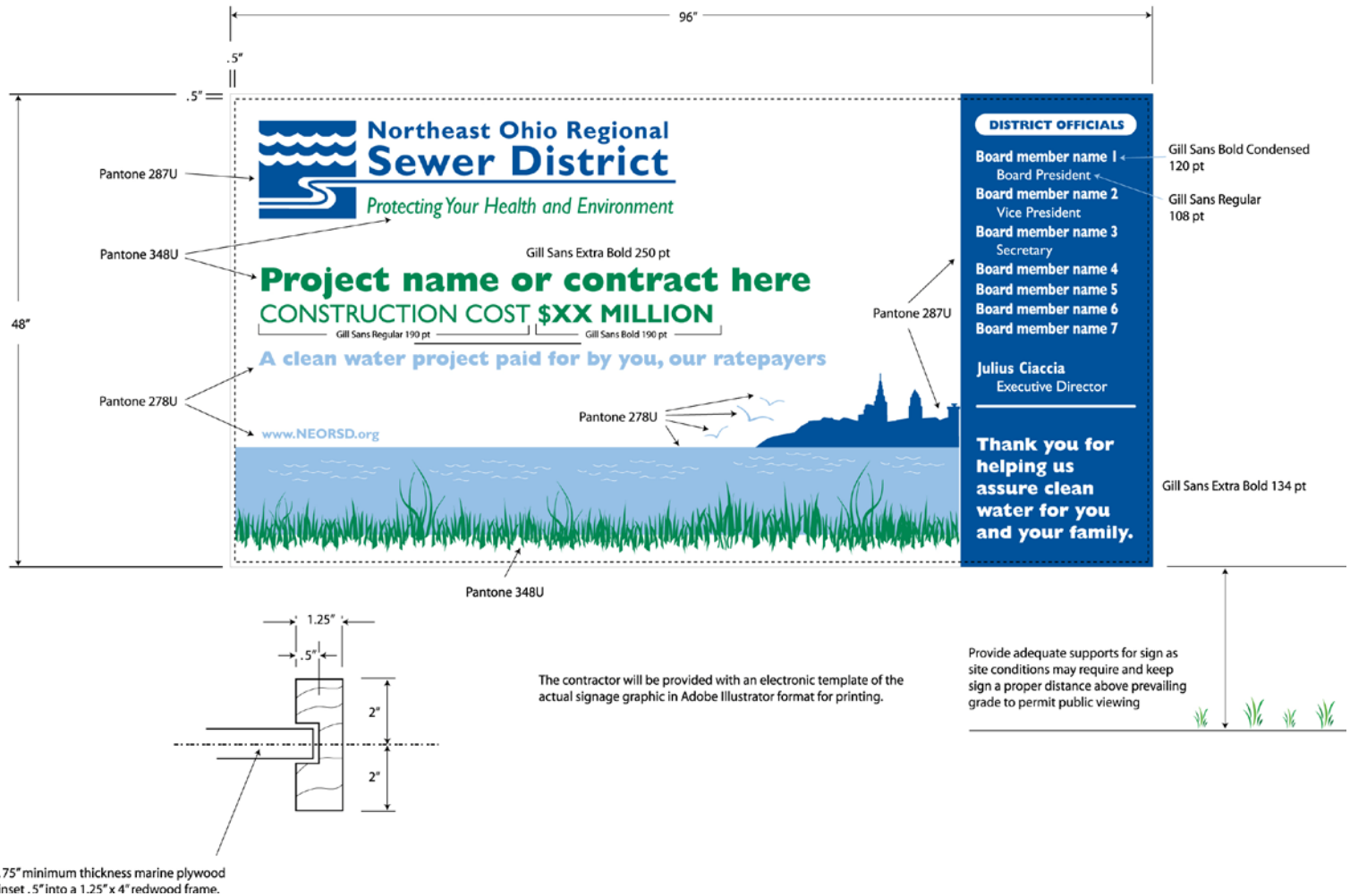
1.05 PROJECT/SITE CONDITIONS – NOT USED

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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**SECTION 01 32 13
CONSTRUCTION AND SCHEDULE CONSTRAINTS**

PART 1 GENERAL

1.01 SUMMARY

- A. Work shall be scheduled, sequenced, and performed in a manner which minimizes disruption to the public and to the operation and maintenance of the existing facilities.
- B. The CONTRACTOR shall allow for construction and schedule constraints in preparing the construction schedules. The schedules shall include the CONTRACTOR's activities necessary to satisfy all constraints included and referenced in the Contract Documents.

1.02 TIME OF COMPLETION

- A. The Contractor shall complete all work activities included in this contract as defined in the General Conditions to the Agreement between Owner and Contractor based on the Time of Completion table shown below:

Time of Completion Table

Milestone	Number of Calendar Days After NTP
Interim Milestone #1: Completion of Zones 1, 1A, 2, 3, 4, less plantings for those Zones. Completion of all in-stream structures and right-bank block walls.	105
Substantial Completion	149
Final Completion	272

1.03 LIQUIDATED DAMAGES

- A. The Contractor shall complete all work activities included in this contract as defined in the General Conditions to the Agreement between Owner and Contractor based on the Time of Completion table. If the Contractor does not meet the contract schedule the liquidated damages shown below will be applied:

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Liquidated Damages Table

Milestone	Liquidated Damages Amount per Calendar Day
Interim Milestone #1	\$500.00
Substantial Completion	\$500.00
Final Completion	\$500.00

- 1.04 SUBMITTALS - NOT USED
- 1.05 QUALITY ASSURANCE - NOT USED
- 1.06 DELIVERY, STORAGE, AND HANDLING - NOT USED
- 1.07 PROJECT/SITE CONDITIONS

A. General:

1. **WORK HOUR LIMITATIONS:** Working hours are 7:00AM to 7:00PM Monday through Saturday. Permission is required from the City of Cleveland to work on Sunday, Legal Holidays, or any weekday night past the hours specified. This permission must be requested 72 hours in advance.
2. It is the CONTRACTOR's responsibility to coordinate and plan the construction activities to integrate each schedule constraint into the performance of the WORK (also see Division 1 Specification 01 14 00, Work Restrictions).
3. The listing of schedule constraints below does not mean that all constraints or special conditions have been identified. The list does not substitute for the CONTRACTOR's coordination and planning for completion of the WORK within the Contract Completion date in the Agreement.
 - a. Constraint No. 1: The CONTRACTOR shall make every possible effort to perform work in a continuous manner at the project site. Abandoning the site and re-mobilizing at a later date will not be permitted without permission from the OWNER.
 - b. Constraint No. 2: The CONTRACTOR shall make every possible effort to coordinate work with the adjacent round-a-bout and gas line relocation construction work at the east end of the Doan Brook Stream Enhancement Project site at East 105th Street and Martin Luther King Drive.

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- c. Constraint No. 3: The CONTRACTOR shall follow truck restrictions on Martin Luther King Drive and coordinate site access routes with local traffic restrictions.
- d. Constraint No. 4: The CONTRACTOR is not be allowed to park construction or employee vehicles or equipment along Martin Luther King Drive or in the temporary public parking lot that is to be constructed during this project.
- e. Constraint No. 5: Tree and shrub cutting is not allowed between April 15 to June 1 and August 15 to October 15.
- f. Constraint No. 6: Project includes a significant amount of plug and container plantings, sod, and limestone and sandstone blocks. The CONTRACTOR shall plan accordingly with material suppliers to ensure that production and delivery capacity does not affect product installation and the project schedule.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 32 16
PROJECT SCHEDULE

PART 1 GENERAL

1.01 SUMMARY - GENERAL REQUIREMENTS

- A. CONTRACTOR shall prepare and submit a Project Schedule complying with the requirements of this specification.

1.02 SUBMITTALS

- A. Project Schedule submittals shall be made electronically in compliance with specification Section 01 33 00, Submittals. Submit Project Schedule in native format and pdf files.
- B. The CONTRACTOR shall submit a preliminary Project Schedule including a Phasing and Staging Plan, Water Control Plan as specified in Dewatering specification, and a site layout showing access and haul routes, within 10 calendar days of the OWNER'S Notice to Proceed. OWNER will review the preliminary Project Schedule for conformance with contract requirements, and return comments to the CONTRACTOR.
- C. CONTRACTOR shall incorporate OWNER'S comments regarding the preliminary Project Schedule, and submit the final Project Schedule within 20 days of the OWNER'S Notice to Proceed.
- D. The CONTRACTOR shall submit with each application for payment, a progress schedule showing progress of work accomplished and any proposed revisions. All activities are to be updated projecting progress through the last working day of the month.
 - 1. A narrative will accompany the monthly submission of the progressed schedule to explain progress achieved to date and any changes that have been made to the schedule. It will also explain the plan for the coming month.
 - 2. The progressed schedule will be submitted electronically in PDF file format and also the native planning software.
 - 3. The narrative contents of the report shall include the following, unless otherwise agreed:
 - a. Contract summary and highlights.
 - b. Work accomplishments for the month.
 - c. Work planned for next month.

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- d. Immediate threats, opportunities, risks, and issues.
- e. Actions/decisions needed.
- f. Contract milestone reporting.
- g. Updated cash flow.

1.03 PHASING AND STAGING PLAN

A. Plan shall include stages and phases for the following WORK, at a minimum:

- 1. Installation of tree protection.
- 2. Temporary Parking lot.
- 3. Each Zone (Zone 1, 1A, 2, 3, 4, etc).
- 4. Each in-stream structure.
- 5. Each right-bank wall reconstruction.
- 6. Stream Bank Terraces.
- 7. Victory Oaks.
- 8. Sculpture Play Area.
- 9. Bioretention Facility.
- 10. Existing parking lot reconstruction.
- 11. General park site restoration (not included in areas above).

1.04 QUALITY ASSURANCE

A. The Contractor shall employ or retain the services of a qualified Project Scheduler to develop the required schedules. Project Scheduler would have the following minimum capabilities and experience.

- 1. Experience preparing and maintaining construction schedules.
- 2. Understanding of engineering, design, and construction work processes to the extent that a logical schedule can be developed, maintained, and progressed that accurately represents the scope of work performed.

1.05 DELIVERY, STORAGE, AND HANDLING – NOT USED

1.06 PROJECT / SITE CONDITIONS

A. The Project Schedule shall be prepared to show the execution of the Work from Notice to Proceed through Contract completion. The schedule detail shall allow for analysis of schedule compliance of the major portions of the Work.

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- B. The Project Schedule, and each monthly update, shall contain integrally or as a companion document, a cash flow estimate. The cash flow shall present anticipated monthly payment requests for the entire contract period. Monthly updates shall also show previous actual pay requests.
- C. The schedule shall include, but not be limited to:
 - 1. Approvals / licenses required from statutory authorities and licensing authorities as set out in the Contract.
 - 2. Submittals, including shop drawings, delegated design submittals, and material submittals.
 - 3. Long lead time procurement items.
 - 4. Construction deliverables.
 - 5. Contract Completion Date.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 32 31
PRE AND POST-CONSTRUCTION INSPECTIONS

PART 1 GENERAL

1.01 SUMMARY

- A. The WORK in this Section includes requirements of the CONTRACTOR to perform pre and post-construction inspections for existing structures, houses, buildings, sewers, subsurface utilities, roads, structures, fences, and surface features and other facilities as described herein.
- B. The coverage of inspection shall accurately document the existing conditions within the zone of influence of the proposed construction.
- C. Methods of documentation include photographs, video, and reports as described herein.
- D. This specification section does not cover acceptance and/or inspection of new WORK.

1.02 SUBMITTALS

- A. The CONTRACTOR shall submit pre- and post-construction Inspection Documentation Reports as described herein.
- B. All video and photographs shall be accompanied by a notarized statement verifying the original unedited quality of the media.
- C. Identification: Identify each photograph with label or image caption on the front side, lower left corner with the date taken, project name and location, orientation, and description of view.
- D. Video Logs: Displayed on the storage case of each video shall be a log of the contents. The log shall describe the various segments of coverage contained within the video in terms of the names and sides of the streets or easements, coverage beginning and end points, directions of coverage, and video counter numbers.
 - 1. A cumulative alphabetical index correlating the various segments of coverage to their corresponding video shall be supplied to the OWNER.

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E. Digital files shall be organized according to the following convention:

Site/Date/Filename.jpg

- Folder Level 1 – Site: Stream, ECT-1, ECT-2, ECT-3, ECT-4, ECT-5
- Folder Level 2 – Subject
- Folder Level 3 – Date: YYYY.MM.DD folder name format

F. Preliminary Submittals:

1. At least 30 days prior to construction submit a sample video of a route similar to this project to verify video and audio quality. When approved, this video will be the standard on which quality will be based and judged.
2. At least 30 days prior to construction submit sample construction photographs of three (3) different projects to verify image quality. When approved, these photographs will be the standard on which quality will be based and judged.
3. At least 30 days prior to construction submit planned format and outline of a typical report.

G. Pre-construction Documentation:

1. The CONTRACTOR shall prepare and deliver to the OWNER 30 days prior to the start of construction at each site, three (3) bound copies of each of the pre-construction inspections containing:
 - a. Submittal index detailing contents and extent of coverage.
 - b. All field notes taken.
 - c. Sketches and diagrams prepared.
 - d. CDs of all image digital files obtained.
 - e. DVDs of video surveys recorded.
 - f. Pre-con field survey.
 - g. Descriptions and reports, all signed and witnessed by those taking part in the inspection.

H. Progress Documentation: If documentation is required for a re-inspection resulting from a damage complaint, three (3) copies of all data obtained by the CONTRACTOR from each re-inspection shall be promptly delivered to the OWNER within three days of re-inspection.

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I. Post-Construction Documentation:

1. The CONTRACTOR shall prepare and deliver to the OWNER after completion of construction at each site, three (3) bound copies of each of the post-construction inspections containing:
 - a. Submittal index detailing contents and extent of coverage.
 - b. All field notes taken.
 - c. Sketches and diagrams prepared.
 - d. CDs of all image digital files obtained.
 - e. DVDs of video surveys recorded.
 - f. Post-con field survey.
 - g. Descriptions and reports, all signed and witnessed by those taking part in the inspection.

J. Inspection Documentation Report:

1. The report shall include:
 - a. Location and description of site.
 - b. Results of visual inspection.
 - c. Color video and photographs.
 - d. Sketches.
 - e. Points where deterioration has occurred shall be noted and color photographs taken on all structures to show existing condition and any deterioration or other deficiencies.
 - f. The absence of deficiencies shall also be recorded.
 - g. The age of each structure, trees, shrubs, utilities, pavement and all other details pertinent to the replacement of each item should be documented.
 - h. Field surveys:
 - 1) Field surveys shall be performed by the CONTRACTOR'S approved, surveyor, licensed in the state of Ohio. Perform field surveys as required to supplement CONTRACT documents and to establish pre-construction baseline elevations and post-construction or progress surveys to be used in the assessment of structural or property damage. The minimum requirements shall be as follows:
 - a) Various locations along Doan Brook within the construction limits.
 - b) The location of each elevation shall be fully described in words and located on a survey plan to be included in the report.

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2. The reports for each of the structures shall be signed by the CONTRACTOR's Representative that was present during the examination of each property. The OWNER shall examine said reports and may indicate additional information that is required.

1.03 QUALITY ASSURANCE – NOT USED

1.04 DELIVERY, STORAGE AND HANDLING – NOT USED

1.05 PROJECT/SITE CONDITIONS – NOT USED

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Only high-quality video and photographs will be considered acceptable during the initial submittals to develop the project standard. It is the Contractor's responsibility to maintain, repair, replace, and/or update the equipment such that the quality standard is achieved throughout the project duration.
- B. Photographs: Digital photographs shall contain a minimum of ten (10) million pixels.
- C. Video:
 1. All video recordings must be in high-definition and must, by electronic means display continuously and simultaneously generated, transparent, alpha-numeric information to include the following:
 - a. Video Index Number.
 - b. Project Title.
 - c. General Project Location.
 2. Each video shall begin with a single, multi-line alpha-numeric display indicating the video index number, project title, and general location of the project.
 3. Time and Date: During the entire duration of the recordings, the time and date.
 4. Camera Position: During the entire duration of the recordings, the position of the camera, accurately referenced and displayed in terms of the construction's engineering stationing or coordinates, shall be displayed (in standard stationing format) in the lower left hand corner of the picture. Where no stationing or coordinates appear on the drawings, an appropriate system acceptable to the OWNER, shall be established and utilized.

PART 3 EXECUTION

3.01 RESPONSIBILITIES

- A. Nothing contained herein shall relieve the CONTRACTOR of responsibility for claims arising from his construction operations. Failure to inspect any structure, whether or not required by these Contract Documents or inadequacy of the inspections shall not relieve the CONTRACTOR of its responsibility. The CONTRACTOR shall indemnify the OWNER and the ENGINEER from such claims.
- B. Re-inspections: The CONTRACTOR shall also be responsible for re-inspection as often as necessary in the opinion of the OWNER to verify the adequacy of his construction methods for prevention of damage and to obtain sufficient evidence for use in defense against possible claims for damage from third parties.

3.02 TIME OF EXECUTION

- A. The CONTRACTOR shall coordinate the inspections with the construction schedule so that those portions of the construction that will be completed first will be recorded first.
- B. The inspections shall be performed prior to the placement of any construction materials or equipment on the proposed construction site.
- C. Visibility: All recordings shall be performed during times of good visibility. No recording shall be done during periods of significant precipitation, mist, or fog. The recording shall only be done when sufficient sunlight is present to properly illuminate the subjects of recording and to produce bright, sharp video recordings of those subjects.
- D. Snow: No inspection of site/surface conditions shall be performed when more than 10 percent of the ground area is covered with snow, unless otherwise authorized by the OWNER.

3.03 NOTIFICATION:

- A. Dates for pre-construction survey at the site shall be coordinated with the OWNER.

3.04 DOCUMENTATION

- A. The number of pre-construction photographs required will be the amount necessary to document the scope of the work as described herein.
- B. Coverage Continuity: In order to reduce the number of recording edits and increase the continuity of the coverage, the coverage shall not consist of a group of recordings at various positions along a proposed construction area, but shall consist of a single, continuous, unedited recording which begins at one end of the particular construction area and continues to the other end of the construction area. However, where coverage is required in areas not accessible by conventional wheeled vehicles and smooth transport of the recording system is not possible, such coverage shall consist of an organized, interrelated sequence of recordings at various positions along that proposed construction area (e.g., wooded easement area).
- C. The subject or purpose of the photograph shall be made obvious to the viewer with techniques such as pointing, a painted arrow, or pane circled around the subject, using bright paint.
- D. Close-up, detailed color photographs shall be taken of all cracks, deterioration and other observable effects including, but not limited to, retaining walls, driveways and sidewalks.
- E. Camera Height and Stability: When conventional wheeled vehicles are used as conveyances for the recording system, the distance between the camera lens and the ground shall not be less than 8 feet. The camera shall be firmly mounted, such that transport of the camera during the recording process will not cause an unsteady picture.
- F. Camera Control: Camera pan, tilt, zoom-in, and zoom-out rates shall be sufficiently controlled such that recorded objects will be clearly viewed during videotape playback. In addition, all other camera and recording system controls, such as lens focus and aperture, video level, pedestal, chroma, white balance, and electrical focus, shall be properly controlled or adjusted to maximize recorded picture quality.
- G. Viewer Orientation Techniques:
 - 1. The audio and video portions of the recording shall maintain viewer orientation. To this end, overall establishing views and visual displays of all visible house and building addresses shall be utilized. In easements where the proposed construction location will not be readily apparent to

- the video viewer, highly visible yellow flags shall be placed in such fashion as to clearly indicate the proposed centerline of construction.
2. Name and Side of Street or Easement: During the entire duration of the recordings, the name and side of the street or easement being recorded must appear across the bottom of the picture.
 3. Audio shall accompany the video recording and shall be a corresponding and simultaneously recorded audio recording. This audio recording, exclusively containing the commentary of the camera operator, shall assist in the maintenance of viewer orientation and in any needed identification, differentiation, clarification, or objective descriptive of the structures being shown in the video portion of the recording.

3.05 SCOPE OF INSPECTION COVERAGE

- A. Streets: Where construction will extend in or adjacent to a street the full width of the construction's zone of influence including the street right-of-way and the areas adjacent to both sides of that right-of-way shall be recorded. The term street shall be understood to mean a highway, road, street, avenue, boulevard, lane, circle, alley, etc., and be inclusive of any associated catch basins, sidewalks, and curbs.
- B. Color photographs showing visually evident external structural cracks and damage. Document the location and width of existing cracks in each structure. Install crack monitors selectively where crack width exceeds 1/8-inch if approved by the Property Owner. A photograph shall be taken of each crack monitor installation.
- C. Internal video survey shall be conducted for all underground sanitary and storm sewer utilities, pipelines, and culverts within the limits and distances specified in this Section. A remotely-controlled and operated robotic camera shall be used for non-man entry sewer diameters.
- D. Easements: Where construction will extend through easement areas, the permanent and temporary easements and all other adjacent areas lying within the construction's zone of influence shall be recorded. The term easement shall be understood to mean all areas not defined as streets.
 1. Easements: In easements where hand-held video equipment must be used and the engineering stationing cannot automatically be reproduced on the tape, local landmarks along the route or other recognizable features off to the side of the sewer route shall be visually and audibly noted at frequent intervals to identify camera location.

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- E. Detour & Haul Streets: Where construction traffic will extend to a street the full width of the street right-of-way and the areas adjacent to both sides of that right-of-way shall be recorded. The term street shall be understood to mean a highway, road, street, avenue, boulevard, lane, circle, alley, etc.; and be inclusive of any associated catch basins, sidewalks, and curbs.
- F. Visible utilities features including but not limited to power poles, overhead lines and fire hydrants.
- G. Utilities (including underground water, sewer, gas laterals and electric cables etc. for each building or structure).

3.06 ZONE OF INSPECTION COVERAGE

- A. The recordings shall contain coverage of all surface features located within the construction's zone of influence. The construction's zone of influence shall be defined as:
 - 1. The area within right-of-ways and easements and adjacent areas which may be affected by routine construction operations; and
 - 2. The areas directed by the OWNER.
- B. The CONTRACTOR shall conduct inspections at the following locations for pre- and post-construction inspection, progress documentation, and re-inspection documentation:
 - 1. Near Surface Structures: Perform pre-construction inspection for all structures, utilities and other facilities located entirely or partially within a 100 foot radius from the centerline of each excavation.
 - 2. Open-cut Sewer: Perform pre-construction inspection for all structures, utilities and other facilities located entirely or partially within a 100 foot radius from the centerline of each open-cut excavation.
 - 3. In addition to the locations identified above, the survey shall extend to all areas expected to be disturbed by the CONTRACTOR's operations, including but not limited to all roadways, pavements, curbs, driveways, sidewalks, culverts, headwalls, retaining walls, landscaping, trees, shrubbery, and fences. Of particular concern shall be the existence or nonexistence of any faults, fractures, or defects.

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- C. Completion: Upon completion of all excavation, the CONTRACTOR shall make similar examination of any properties structures, and conditions where complaints of damage have been received or damage claims have been filed. Give notice to all interested parties so that the parties may be present during the final examination. Records of the final examination shall be signed and distributed.

END OF SECTION

SECTION 01 32 33
PHOTOGRAPHIC DOCUMENTATION

PART 1 GENERAL

1.01 SCOPE

- A. This Section includes preconstruction and construction progress digital photographs of major components of the work before they are covered, and other views as determined by the OWNER.
- B. The photographer shall be a professional, commercial photographer actively engaged in photographing similar projects for municipal agencies.

1.02 SUBMITTALS

- A. The CONTRACTOR shall submit information for proposed Photographer for OWNER's approval, including qualifications and sample photographs which will be kept by the OWNER.
- B. For the preconstruction photos and each month submit three (3) sets of compact discs containing the photographs taken for that month. Electronic photograph files shall be in JPEG (.jpg) format.
- C. At the completion of the project submit three (3) sets of compact discs or flash drives storing all photographs taken on the project. The photos shall be in a format supported by Microsoft Windows based software.
- D. All photographs will become the property of the OWNER.

1.03 QUALITY ASSURANCE AND QUALITY CONTROL – NOT USED

1.04 DELIVERY, STORAGE AND HANDLING – NOT USED

1.05 PROJECT/SITE CONDITIONS – NOT USED

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PART 2 PRODUCTS

2.01 PHOTOGRAPHS

- A. General Description: Sharp, clearly showing details and excluding non-related objects. Good focus with maximum depth of field and no distortion. Factually show the subject by including a scale in the view to define size, such as a yardstick. OWNER employees shall not be in the view of any photographs.
- B. Resolution: Photographs shall be taken with a digital camera with a minimum of 10 megapixel, with a resolution of 3548 x 2736.
- C. Each photograph shall be submitted in JPEG (.jpg) file format.
- D. Each photograph shall have a date and time stamp visible on the digital image.

2.02 ELECTRONIC FILES

- A. Each photograph shall be named as follows:

XXXX_ACRON_Xxxx_0001.jpg
XXXX: NEORSD Project Number (1131)
ACRON: NEORSD Project Acronym (Doan)
Xxxx: View Point of Photo (e.g. Zone1, Zone2, SculpturePlay, etc)
0001: Photograph Number
- B. Photographs shall be named sequentially for the entire project beginning at 0001.
- C. Naming of View Point of photograph shall be determined by the OWNER after the View Point is chosen or when a new View Point is chosen.
- D. For each photograph, submit electronic photo files on compact disc in JPEG (.jpg) file format. Submit each compact disk in paper sleeve. Compact disc labels shall include the following information:
 - 1. Project Name.
 - 2. Project Acronym.
 - 3. Project Number.
 - 4. Date through Date (for pictures included on the compact disc).
 - 5. Photo # through Photo # (for pictures included on the compact disc).
 - 6. Prime Contractor.
 - 7. Photographer.

PART 3 EXECUTION

3.01 NUMBER OF PHOTOGRAPHS AND LOCATION

- A. Preconstruction Photos: Minimum of sixty (60) preconstruction photographs from viewpoints designated by the OWNER, including each zone, landscaped area, Martin Luther King Drive, and throughout the stream length and park.
- B. Monthly Progress Photos: A minimum of one hundred (100) photographs shall be taken each month for the duration of the project from viewpoints designated by the OWNER. Photographs shall be taken to document the construction progress for the project duration. Views shall be such that an above-grade landmark can be used to roughly identify the location of the work and underground utilities if applicable.
- C. The OWNER reserves the right to adjust the number of views taken each month and the actual day the pictures are taken, in order to take advantage of construction procedures and weather.
- D. The general views taken will be approved by the OWNER.
- E. The OWNER reserves the right to require photographs be taken at any time other than at the regularly scheduled visits; however, if this occurs the regularly scheduled visit will be cancelled.

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. This Section describes the expected contents and procedures by which the CONTRACTOR is to compile and provide project submittal documentation to the OWNER for review and acceptance.
- B. Wherever the Contract Documents reference or indicate submittals are required, the CONTRACTOR is to submit them directly to the OWNER using the OWNER's SharePoint website.
- C. In addition to the submittal requirements for the Work in this Section, CONTRACTOR shall provide submittals as indicated and specified throughout the Contract Documents.

1.02 SUBMITTALS

- A. Submittals shall include the following, as well as any other submittals specified by the Contract Documents:
 - 1. Contractor's Organizational Chart.
 - 2. Contractor's Schedule of Values.
 - 3. Contractor's Warranty, as required and described by General Terms and Conditions.
 - 4. A list of all permits and licenses that the CONTRACTOR shall obtain; indicating the agency required to grant the permit, the expected date of submittal for the permit, and the required date for receipt of the permit.
 - 5. Contractor's Schedule for the Work.
 - 6. Contractor's Submittal Schedule.
 - 7. Shop Drawings, Product Data and Samples.
 - 8. Contractor's Inspection Reports.
 - 9. Construction Photographs.
 - 10. Prevailing Wage Rate data, final affidavit to the Prevailing Wage Rate Coordinator and certified.
 - 11. Emergency phone numbers.
 - 12. Contractor's Project Specific Safety Program.
 - 13. Inspection and Testing Reports.
 - 14. Security Submittals.

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15. Traffic Maintenance Plan.
16. Red-lined drawings.

B. Shop Drawings:

1. Wherever called for in the Contract Documents, or where required by the OWNER, the CONTRACTOR shall furnish to the OWNER for review, electronic submittals through the OWNER's SharePoint website as described in Part 3 of this Section. If the CONTRACTOR determines there is a submittal(s) that cannot be delivered electronically, the CONTRACTOR shall obtain approval to submit as a hard copy from the OWNER and/or the OWNER's Representative. If approval is obtained, the CONTRACTOR shall furnish eight (8) copies of each Shop Drawing submittal package.
2. The term "Shop Drawings" as used herein shall be understood to include detailed design calculations, shop-prepared drawings, fabrication drawings, installation drawings, erection drawings, lists, graphs, catalog sheets, data sheets, product samples, personnel qualifications, installation/inspection data, performance reports, test data, product and material certifications, mock-ups, warranties, and similar items. Contractor shall submit all items as specified and described in each Specification Section. Whenever design calculations are part of a submittal, such calculations shall bear the signature and seal of a professional engineer registered in the State of Ohio.
3. Shop Drawing submittals shall be accompanied by a submittal transmittal form, indicating the date of the submittal, item being submitted, specification section(s) reference, and for non-electronic submittals, the number of copies transmitted.
4. Submittals shall be numbered by specification section, then sequentially, and A, B, etc for subsequent re-submittals.
 - a. Example: The first submittal for concrete could be 03 33 00-001; the re-submittal of the revised information should then be 03 33 00-001A.
5. Organization:
 - a. A single submittal transmittal form shall be used for each technical specification section or item or class of material or equipment for which a submittal is required. A single submittal covering multiple sections will not be acceptable, unless the primary specification references other sections for components.
 - 1) Example: If a pump section references other sections for the motor, protective coating, anchor bolts, local control panel, and/or variable frequency drive, a single submittal would be

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- accepted; a single submittal covering vertical turbine pumps and horizontal split case pumps would not be acceptable.
- b. On the transmittal form, index the components of the submittal and insert tabs in the submittal to match the components. Relate the submittal components to specification paragraph, subparagraph, drawing number, detail number, schedule title (or room number, or building name), as applicable.
 - c. Unless otherwise indicated, terminology and equipment names and numbers used in submittals shall match the Contract Documents.
6. Format:
- a. All shop drawings shall be submitted in electronic pdf format. Each submittal shall be uploaded in OWNER'S Web-based file format. Printable sheet sizes shall be 8.5" x 11", 11" x 17" and 22" x 34".
 - b. Where product data from a manufacturer is submitted, clearly mark which model, finish, accessory, etc. is proposed, with all pertinent data, capacities, dimensions, clearances, diagrams, controls, connections, anchorage, and supports. Sufficient level of detail shall be presented for assessment of compliance with the Contract Documents.
 - c. Any portions of the submittal not pertinent to the equipment or component shall be crossed out with a bold line or marked with "Does Not Apply", or identify clearly and without questions the portions of the submittal that are not pertinent. Highlighting of submittals is not an acceptable means of denoting information. It either does not persist on copies of the submittal, or interferes with making photocopies.

1.03 QUALITY ASSURANCE

- A. Disorganized submittals which do not meet the requirements above will be returned without review.
- B. Except as may otherwise be indicated herein, the OWNER will return each submittal to the CONTRACTOR, with comments noted thereon, within twenty (20) working days following receipt by the OWNER. It is considered reasonable that the CONTRACTOR shall make a complete and acceptable submittal to the OWNER by the second submission of a submittal item. The OWNER reserves the right to withhold monies due the CONTRACTOR to cover additional costs incurred by the OWNER for review beyond the second submittal. Upon receipt of such large or complex submittals, the OWNER will notify the CONTRACTOR that additional time will be required for review and comment.

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- C. If a submittal is returned to the CONTRACTOR marked “APPROVED”, formal revision and resubmission of said submittal will not be required.
- D. If a submittal is returned marked “APPROVED AS CORRECTED”, the CONTRACTOR shall make the corrections on the submittal, but formal revision and resubmission of said submittal will not be required. However, the corrections noted shall be incorporated into the WORK. If the CONTRACTOR disagrees with and determines not to incorporate all comments, it is the CONTRACTOR’s responsibility to so notify the OWNER and to resubmit the submittal addressing all corrections.
- E. If a submittal is returned marked “REVISE AND RESUBMIT”, the CONTRACTOR shall revise said submittal and shall resubmit the required number of copies of said revised submittal to the OWNER for review.
- F. If a submittal is returned marked “NOT APPROVED”, it means that the submitted material or product does not satisfy the specification; the submittal is so incomplete that it cannot be reviewed; or is a substitution request not submitted in accordance with the Contract Documents. The CONTRACTOR shall prepare a new submittal with a new transmittal and submittal number, incorporating specified materials and/or products and shall submit the required number of copies of said new submittal to the OWNER for review.
- G. If a submittal is returned “SUBMITTAL NOT REQUIRED”, it means that no further action is required regarding this submittal.
- H. Fabrication of an item shall be commenced only after the OWNER has reviewed the pertinent submittals and returned copies to the CONTRACTOR marked either “APPROVED” or “APPROVED AS CORRECTED”. Corrections indicated on submittals shall be considered changes necessary to meet the requirements of the Contract Documents and shall not be taken as changes to the contract requirements.
- I. Prior to submission to the OWNER, all submittals shall be carefully reviewed by an authorized representative of the CONTRACTOR. Each submittal shall be dated, signed, and certified by the CONTRACTOR as being correct and in strict conformance with the Contract Documents. In the case of Shop Drawings, each sheet shall be so dated, signed, and certified. The OWNER will only review submittals which have been so certified by the CONTRACTOR. All non-certified submittals will be returned to the CONTRACTOR without action taken by the OWNER, and any delays caused thereby shall be the total responsibility of the CONTRACTOR.

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- J. Written notification of a request for a deviation must be provided at the time of submittal, and indicated as such on the Submittal Transmittal Form, including written reasons for the deviation and approval of the deviation by any affected CONTRACTORS. If approved, all costs associated with or caused by the deviation shall be the sole responsibility of the CONTRACTOR requesting the deviation. Approval of a submittal containing an undisclosed deviation does not constitute approval of said deviation. Procedures are defined in General Terms and Conditions Article 8.4 for CONTRACTOR proposal of substitutions, and must be presented in writing with any proposed submittal.
- K. The OWNER's review of submittals shall not relieve the CONTRACTOR of the entire responsibility for the correctness of details and dimensions. The CONTRACTOR shall assume all responsibility and risk for any misfits due to any errors to submittals. The CONTRACTOR shall be responsible for the dimensions and the design of adequate connections and details.

1.04 DELIVERY, STORAGE AND HANDLING – NOT USED

1.05 PROJECT/SITE CONDITIONS – NOT USED

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 ACCESS AND USE OF THE OWNER'S SHAREPOINT WEBSITE

- A. The CONTRACTOR shall utilize the OWNER's SharePoint website for all written CONTRACTOR correspondence, submittals, transmittals or other communication where feasible. CONTRACTOR shall utilize OWNER-established SharePoint workflows for RFIs, Construction Submittals, Schedules, and Pay Applications.
- B. The CONTRACTOR shall request access to the OWNER's SharePoint website through the project's Construction Supervisor, by providing the name, employer, and e-mail address of each individual for which access is requested.
- C. All SharePoint workflow functions require one (1) individual to be designated as the point of contact to receive workflow e-mail alerts from the system. The CONTRACTOR shall designate one individual as the point of contact for these workflows at the time access is requested. The point of contact can be changed upon the request from the CONTRACTOR at any time during the execution of the project.

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- D. The OWNER will determine the level of access to the SharePoint website that will be granted to each individual.
- E. The OWNER and or OWNER's Representative shall provide SharePoint training to the CONTRACTOR(s).
- F. The OWNER shall provide instruction sheets for the electronic workflows executed through the SharePoint site.
- G. CONTRACTOR is required to have access to computer hardware and software that is compatible with the District's SharePoint system, capable of running automated process workflows, and supporting electronic signatures in Adobe Acrobat. Minimum system requirements include:
 - 1. Windows XP or Window 7.
 - 2. Microsoft Internet Explorer version 7 or 8.
 - 3. Microsoft Office 2007 or 2010.
 - 4. Latest version of Adobe Acrobat (at a minimum Reader, Standard or Professional for editing).
 - 5. Broadband internet connection.
 - 6. Open access to <https://neorsdpmo.org>.
- H. CONTRACTOR shall verify current system requirements at start of contract and may need to adjust requirements during the contract period to accommodate upgrades or changes to the District's system. The District's system is configured to work with any open internet connection however specific firewall or security settings limiting internet content on the CONTRACTOR's system could impact performance. Often, adjustments to these settings or work around processes can be implemented to mitigate the issues.

3.02 REQUESTS FOR INFORMATION (RFI)

- A. Requests for Information shall be made electronically through the workflow function of the District's SharePoint website. Access to this website will be provided to the CONTRACTOR through coordination with the OWNER's Construction Supervisor.
- B. The CONTRACTOR shall initiate the workflow by inputting the necessary information required into the OWNERS RFI Template on the SharePoint website. The RFI shall include the following:
 - 1. Project name.
 - 2. Project number.
 - 3. Name of the originator.

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4. RFI subject.
 5. Specification or Drawing reference number.
- C. The OWNER and/ or OWNER's Representative will assign the RFI number, review and answer the RFI.
- D. The CONTRACTOR will receive an e-mail alert from the OWNER's SharePoint website stating that the RFI has been reviewed, at which time the CONTRACTOR will review the RFI response and electronically acknowledge that the RFI has been received.
- E. Upon electronically acknowledging receipt of the final RFI, the CONTRACTOR shall deliver three (3) hard copies of each RFI including attachments to the OWNER's Construction Supervisor within five (5) days or the start of the activity, whichever is sooner, for inspection and field purposes. The final RFI package shall only be submitted in electronic copy after all items, components, etc., in the package are accepted or responded to.

3.03 SUBMITTALS

- A. Submittals shall be made electronically through the workflow function of the District's SharePoint website. Access to this website will be provided to the CONTRACTOR through coordination with the OWNER's Construction Supervisor.
- B. The CONTRACTOR shall initiate the workflow by uploading the electronic submittal documents into the OWNER's SharePoint website. After the submittal documents are uploaded, the CONTRACTOR shall input the necessary information required into the OWNER's Submittal Transmittal Template on the SharePoint website. The Submittal Transmittal shall include the following information, in accordance with and in addition to the information required by Paragraph 1.2.B of this Section:
1. Project name.
 2. OWNER's project number.
 3. Submittal number.
 4. Specification and/or drawing reference number.
 5. Date of the Submittal.
 6. Submittal description.

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- C. If the Submittal includes a sample, or objects that cannot be transmitted electronically, the CONTRACTOR shall complete the Submittal Transmittal through the OWNER's SharePoint website noting in the "Description of Item Submitted" that the necessary number of items will be given to the Construction Supervisor.
- D. The OWNER and/ or OWNER's Representative will review and make comments to the Submittal, as required.
- E. The CONTRACTOR will receive an e-mail alert from the OWNER's SharePoint website stating that the Submittal has been reviewed, at which time the CONTRACTOR will review the Submittal response and electronically acknowledge that the Submittal has been received.
- F. Upon electronically acknowledging receipt of the final Shop Drawing submittal package as described in the previous paragraph, the CONTRACTOR shall deliver three (3) hard copies of each Shop Drawing submittal package to the OWNER's Construction Supervisor within five (5) days or the start of the activity, whichever is sooner, for inspection and field purposes. The final Shop Drawing submittal package shall be considered complete after all items, components, etc., in the submittal package are "APPROVED" and/or "APPROVED AS CORRECTED" as described as herein.

3.04 SUBMITTING PROJECT SCHEDULES

- A. Project Schedules shall be made electronically through the workflow function of the District's SharePoint website. Access to this website will be provided to the CONTRACTOR through coordination with the OWNER's Construction Supervisor.
- B. The CONTRACTOR shall initiate the workflow by uploading the electronic P-6 CPM schedule into the OWNER's SharePoint website. After the schedule is uploaded, the CONTRACTOR shall input the necessary information required into the OWNER's Schedule Narrative Template on the SharePoint website. The Schedule Narrative shall include the following information:
 - 1. Month / Year of the Schedule.
 - 2. Project name.
 - 3. OWNER's project number.
 - 4. Period start / end.
 - 5. Schedule narrative report.
 - 6. Name and company of the individual that prepared the schedule.

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- C. The OWNER and/ or OWNER's Representative will review and make comments to the Schedule, as required.
- D. The CONTRACTOR will receive an e-mail alert from the OWNER's SharePoint website stating that the Project Schedule has been reviewed, at which time the CONTRACTOR will review the Schedule comments and electronically acknowledge that the Schedule comments have been received.
- E. See Section 01 32 16, Project Schedule for technical requirements of the Project Schedule.

END OF SECTION

**SECTION 01 35 29
SAFETY PROGRAM**

PART 1 GENERAL

1.01 SUMMARY

- A. The work of this Section includes preparation and implementation of the CONTRACTOR's safety provisions for the WORK.
- B. Related Work specified elsewhere: Security, Section 01 35 53, Security Procedures.

1.02 SUBMITTALS

- A. Submit ten (10) days prior to the start of any field work:
 - 1. Copy of the CONTRACTOR's Project Specific Safety Program;
 - 2. Copy of the CONTRACTOR's Emergency Response Plan;
 - 3. Copy of the CONTRACTOR's Confined Space Entry Program;
 - 4. Description of any prior arrangements made with local authorities or emergency service providers (fire, police, ambulance) to be implemented in the event of an emergency;
 - 5. A resume of the Safety Coordinator's qualifications and experience. Include a description of the Safety Coordinator's education, safety and first aid training, safety conferences attended, and experience in trench excavation, tunnel and underground construction.
- B. Submit, for information only, monthly reports by the Safety Coordinator; and copies of accident reports, OSHA citations, and accident claims; as specified herein.
- C. Project Specific Safety Plan:
 - 1. Assess the risks posed to the CONTRACTOR's work force in the construction of potentially hazardous aspects of the WORK. Use this assessment in devising safe systems of work, and document these safe systems in a Project Specific Safety Plan to be implemented throughout the construction.
 - 2. The Project Specific Safety Plan (PSSP) shall provide for regular safety meetings and safety training programs for all personnel engaged in the WORK.

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3. The PSSP shall address the availability and maintenance of safety and rescue equipment. Equipment shall include such items as fire extinguishers, first aid kits, safety ropes and harnesses, stretchers, breathing apparatus, resuscitators, gas detectors, equipment required by law, and any other equipment deemed necessary by the CONTRACTOR.
4. The PSSP shall include a Confined Space Entry (CSE) Program, including identification of the primary rescue team.
5. The PSSP shall include requirements to obtain a permit for Hot Work (non electrical).
6. The PSSP shall include requirements for Lockout-Tagout practices for work on motor driven equipment or electrical systems.
7. The Project Specific Safety Plan shall be designed and operated to correct safety hazards and violations as they are discovered and reported.
8. The OWNER is committed to maintain a “drug and alcohol-free” work place. Employees shall be advised that remaining “drug and alcohol-free” is a condition on all construction projects. The Project Specific Safety Plan shall include requirements that the project site be “drug and alcohol-free”.

D. Safety Training:

1. Properly train all persons working on the site so that they are able to carry out their tasks and duties safely and in a manner that will not endanger their own health nor the health of others. Instruct persons when first employed on the site in the hazards inherent in the site, precautions to be taken, the form of construction, and emergency procedures.
2. Reinforce safety and emergency training by periodic practice drills.
3. Document employee safety training to establish that the CONTRACTOR has a structured program of training; that the training is held on a planned basis; and that all members of the work force receive the training.

E. Emergency Response Plan:

1. Prepare an Emergency Response Plan to be implemented in the event of a serious injury or general emergency (such as fire, explosion, collapse), to ensure a rapid, coordinated, and effective response. The CONTRACTOR shall be solely responsible for implementation of the Plan.
2. The Emergency Response Plan shall:
 - a. Identify key personnel, and define their roles and responsibilities;
 - b. List telephone numbers for key personnel;
 - c. Identify the emergency command center;
 - d. Establish lines of communication between the incident location and the command center;

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- e. Identify internal and external support services to be called upon in the event of an emergency (rescue team, fire, police, ambulance);
- f. Provide a plan of action to speed the transfer of injured persons from working areas and to ensure that ambulances can reach access points quickly;
- g. Define procedures for emergency evacuation for ensuring that injured persons are not left behind or unaccounted for;
- h. Provide immediate notification of the OWNER in the event of an emergency.

F. Public Safety:

- 1. Install surveillance equipment and employ watchman as necessary to safeguard the work, equipment, or the public.
- 2. Install and maintain trench safety systems in accordance with the detail specifications set out in the provision of Excavations, Trenching, and Shoring, Federal Occupation Safety and Health Administration (OSHA) Standards, 29CFR, Part 1926, Subpart P, (current edition).
- 3. Maintain railings, barricades, steel plates, or other barriers at openings, obstructions, or other hazards in roadways, walkways, and other travel ways accessible to the public. Place flashing lights and proper signs as necessary to provide adequate warning to the public day and night.
- 4. Maintain secure fencing around worksites, equipment, or materials stockpiles to prevent unauthorized entry.

G. Safety Coordinator:

- 1. The CONTRACTOR shall employ a safety coordinator qualified in areas of safety related to the WORK under this Contract, having a minimum of two years of construction site experience, and meet the requirements of the General Terms and Conditions, Article 14. Such person(s) shall report directly to a corporate officer and shall be regularly at the worksite and authorized to enforce compliance with the CONTRACTOR's safety program.
- 2. The Safety Coordinator or a qualified and approved deputy shall be on site at all times.
- 3. The Safety Coordinator shall be conversant with corporate safety policy, management operational instructions, regulations, legislation, and current best practice and how these relate to site safety.

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4. The Safety Coordinator shall be capable of identifying the existing and predictable hazards in the areas surrounding the project or those working conditions at the project that are dangerous to employees or are unsanitary. The Safety Coordinator shall have the authority to make prompt corrective measures to eliminate those hazards.
5. The Safety Coordinator's duties shall include:
 - a. Hazard recognition, accident prevention, new employee orientation (including subcontractors), and supervising a safety program;
 - b. Posting appropriate notices regarding safety and health regulations at locations that afford maximum exposure to affected personnel, and posting appropriate instructions and warning signs with regard to hazardous areas or conditions;
 - c. Maintaining safety records and current copies of all pertinent safety rules and regulations.
6. The Safety Coordinator shall prepare monthly audit reports for the CONTRACTOR's project manager and responsible corporate officer. As a minimum, these reports shall include activities of safety personnel, records of training, log of equipment safety checks, summary of safety meetings, records of accidents and citations, and critical review of the Project Specific Safety Plan, including revisions, if required.
7. The Safety Coordinator shall submit a monthly report to the OWNER within 7 days of the end of the month, providing the following information:
 - a. Summary of routine site safety inspections, deficiencies noted, and disposition of such deficiencies;
 - b. Site visits by OSHA and other regulatory enforcement agencies;
 - c. Certification of new employee orientation;
 - d. Safety meeting topics and reports;
 - e. Status of lost-time injuries;
 - f. Status of citations;
 - g. Major equipment problems.

H. Notifications to Owner:

1. Notify the OWNER immediately, by telephone or messenger, of any serious injury or damage, or of any emergency threatening life, limb, or property, resulting from the WORK.
2. Provide a preliminary accident report to the OWNER, in writing, describing any accident involving injury to persons or damage to the WORK or property, within 24 hours of the event.

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3. Follow any preliminary accident report with a summary accident report to the OWNER, in writing, describing known details of the accident, and corrective actions to be taken to reduce the possibility of recurrence, to be submitted within two weeks of the event.
4. Submit to the OWNER, within two days of receipt, a copy of any citations concerning safety aspects of the project received from OSHA or any other regulatory enforcement agency.
5. Submit to the OWNER, within two days of receipt, a report of any claim against the CONTRACTOR or Subcontractor resulting from an accident, giving full details of the claim, including investigation and restitution.

1.03 QUALITY ASSURANCE

A. Performance Requirements:

1. Safety requirements of the Contract Documents represent the minimum measures for performance of the WORK. The CONTRACTOR shall implement additional safety measures as necessary to protect persons and property from injury that may result from construction operations or from the passage of the general public through the work zones.
2. The CONTRACTOR's obligations to ensure safety under this Contract shall be executed in such a manner that they are understood and carried out by all, including non-English speaking, employees.
3. Compliance with health and safety requirements shall be the responsibility of the CONTRACTOR's managers and work force at every level.
4. The OWNER may bring to the CONTRACTOR's attention any apparent deficiencies in their compliance with the CONTRACTOR's safety program. These deficiencies shall be corrected within 24 hours of notice. A report describing the deficiency and corrective action taken by the CONTRACTOR shall be submitted within 48 hours.
5. The OWNER's review of submittals required under this Section are for the purpose of determining general conformance with Contract requirements, and shall not be construed to alter the CONTRACTOR's responsibility for safety as defined in the General Terms and Conditions, Article 14.
6. The OWNER, if requested, will provide copies of the OWNER'S Safety and CSE Programs for CONTRACTOR'S reference. The OWNER'S programs shall not be used by the CONTRACTOR as a substitute for preparing and submitted CONTRACTOR'S PSSP and CSE.

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1.04 DELIVERY, STORAGE AND HANDLING – NOT USED

1.05 PROJECT/SITE CONDITIONS – NOT USED

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 35 53
SECURITY PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. CONTRACTOR shall safely guard all the Work, products, equipment, and property from loss, theft, damage, and vandalism until OWNER takes beneficial occupancy and the Work is substantially complete. CONTRACTOR's duty includes safely guarding OWNER's property in vicinity of the Work and other private property from injury or loss in connection with performance of the Work.
2. Employ watchmen as required to provide required security.
3. Costs for security specified in this Section shall be paid by CONTRACTOR.
4. At no additional cost, the CONTRACTOR shall:
 - a. Make no claim against OWNER for damage resulting from trespass.
 - b. Provide full compensation for damage to property of OWNER and others arising from failure to provide adequate security.
 - c. Provide temporary fencing in accordance with the Contract Documents.
5. CONTRACTOR's security measures shall be at least equal to those usually provided by OWNER to protect existing facilities during normal operation.

1.02 SUBMITTALS

- A. Conform to the OWNER's security procedures and access restrictions at the Site for the duration of the entire Contract. The CONTRACTOR, including all Subcontractors, shall comply with the following:**
1. **Personnel Identification:** All CONTRACTOR personnel shall wear at all times on-Site a badge bearing CONTRACTOR's name, employee's name and, as applicable, employee number.
 2. **Vehicle Identification:** All CONTRACTOR vehicles, including employee vehicles, shall display vehicle identification tag in clearly visible location on dashboard.
 - a. Vehicle tag shall include the following information:
 - 1) Site name.

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- 2) CONTRACTOR name.
- 3) Contract number.
- 4) Vehicle license plate number and state of issue.
- 5) Name and employer of vehicle owner.
- 6) Vehicle owner contact telephone number.
- b. Submit a list of vehicles descriptions and to the OWNER prior to beginning work on site.
3. Submit CONTRACTORS Drug and Alcohol Free program, including drug testing certification.
4. Submit drug testing results when needed as specified herein.

1.03 QUALITY ASSURANCE – NOT USED

1.04 DELIVERY, STORAGE AND HANDLING – NOT USED

1.05 PROJECT/SITE CONDITIONS – NOT USED

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 DRUG AND ALCOHOL FREE WORK PLACE

- A. The OWNER is committed to maintain a "drug and alcohol-free" workplace. Employees are advised that remaining "drug and alcohol-free" is a condition of access on all Construction projects.
 1. Each CONTRACTOR and subcontractor shall have a written Drug and Alcohol Free Workplace Substance Abuse Program on this project. The Program shall include, but is not limited to: educating all employees, who will be working on the project, on the requirements of the subcontractor's Drug and Alcohol Free Workplace Program for this project; a pre-employment drug screen testing procedure; a "for-cause" drug and alcohol testing procedure; and a return to work procedure. Copies of CONTRACTOR and subcontractor written program shall include all requirements and be provided to the OWNER prior to beginning work or gaining access on the project.
 2. The use, possession, sale, transfer, acceptance, or purchase of illegal drugs at any time is strictly prohibited. The use, possession of an open container, personal sale, transfers or acceptance of alcohol on the construction project property or while performing business is strictly prohibited. Any violation of this policy by Contractor or his workforce will result in that employee(s) being prohibited from access to Owner's

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Facilities or project site, and may result in a report to the appropriate law enforcement authorities.

3. Any person other than the individual to whom it is prescribed shall not use prescription drugs. Such substances or non-prescription (over-the-counter) drugs shall be used only as prescribed or indicated. Employees shall be removed from the project if the side effects of prescription drugs adversely affects the safe completion of work their work activity.
4. Employees of CONTRACTORS and subcontractors shall be tested for drugs and alcohol when involved in an accident that results in injury to them or causes injury to another employee or damage to property. Any subcontractor employee that refuses a “post incident/accident” (for-cause) drug and alcohol test will be immediately denied access to the project.
5. Compliance with this policy is a condition of continued access to this construction project.
6. All CONTRACTORS and subcontractors shall implement a drug/alcohol free work place program that is consistent with this program.

B. CONTRACTOR and Subcontractor Employee Testing Requirements:

1. CONTRACTORS and Subcontractors are responsible for drug screening tests of all employees assigned to work at the OWNER’s project site. Testing shall have been performed within three months prior to the employee commencing work on the Project. The CONTRACTOR and subcontractor must supply the OWNER with a completed “CONTRACTOR’s Drug Testing Certification” with a copy of his/her “Chain of Custody” form and “Notification and Consent – Employee Acknowledgement” for each employee requesting access.
2. The drug screening protocol must be at least a 5-panel screen.
3. The cost associated with the implementation of pre-access drug screening will be the responsibility of the CONTRACTOR and subcontractor.

C. POST Incident/Accident Testing (for-cause); Post Incident/Accident drug and alcohol testing program will be implemented on this project as follows:

1. When there is an incident of property damage as a result of the operation of equipment, or any employee injured in an accident that requires medical treatment other than first-aid. CONTRACTOR and subcontractor employee must test and if test results are returned positive that employee shall be denied access to the project. If the worker is not

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- tested within 24 hours of the incident/accident occurrence, the worker will be denied access to the project unless approved by the OWNER.
2. When an employee's actions have contributed substantially in an accident or near accident to another employee or the public, and if the test results are returned positive that worker will be denied access to the project.
 3. The post incident/accident (for cause) Drug and Alcohol Test will be performed by a medical treatment center. A Return-to-Work authorization from a medical provider will be required for returning to work on the Project.
 4. The cost associated with the implementation of Post Incident/Accident Testing will be the responsibility the CONTRACTOR and subcontractor.
- D. Reasonable Suspicion of Illegal Drug or Alcohol Use: Where reasonable suspicion that an employee exhibits signs of intoxication, drug influence or other behavior causing a prudent and reasonable person to have concern for the safety of such employee, other employees or the general public a drug screening and alcohol test may be requested. Failure to comply with this request will be grounds for immediate denial of access to the project. A return of a positive test result will be grounds for immediate denial of access to the project.
- E. Return To Work: Employees who fail a drug or alcohol test shall not be allowed to work on the OWNER's project site for a period of 90 days and then, only after the CONTRACTOR and subcontractor supplies evidence to the OWNER's Manager of successful completion of an appropriate health care provider rehabilitation program. Any person who has failed a drug or alcohol test per this paragraph shall have his/her access to the construction project prohibited. This is a one-time opportunity for the duration of the project.
- F. Employee Training:
1. The CONTRACTOR and Subcontractor shall require that all employees working on this project be trained in the requirements of their substance abuse program/policy and periodically retrained to ensure compliance. This training shall be documented and made available for the OWNER to review.
 2. From time to time the OWNER may sponsor or organize training in the recognition of Substance Abuse. CONTRACTORS and Subcontractors may be required to send representatives of supervision or management to these training sessions.

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3.02 FIREARMS FREE WORKPLACE

- A. Firearms are prohibited from all Owner's projects except when carried by Owner's Security forces or law enforcement personnel. This prohibition is in force regardless of Contractor's or employees licenses issued by others.

3.03 SECURITY PROTECTIONS

- A. Provide adequate protection in the form of fences, gates and barricades, as needed and when necessary for the safety of the public, adjacent properties, plant personnel and CONTRACTOR's employees. Maintain protection of Work areas until safety measures can be safely removed.
- B. Provide protections, barricades, signs, etc., as necessary so that persons will be protected from Work areas where trenching and excavation occur. Fill in excavations as soon as possible when work and inspections are complete. Cover excavations in roadways with steel plates adequate to carry H2O loading until such time that the excavation can be filled.

END OF SECTION

SECTION 01 45 00
QUALITY CONTROL

PART 1 GENERAL

1.01 SUMMARY

- A. Specific quality control requirements for the WORK are indicated throughout the Contract Documents. The requirements of this Section are primarily related to performance of the WORK beyond furnishing of manufactured products. The CONTRACTOR shall provide a "Quality Control" program for their work. The term "Quality Control" includes inspection, sampling and testing, and associated requirements.

1.02 SUBMITTALS

- A. Submit inspection, sampling and testing reports as required by individual technical specification sections in accordance with Section 01 33 00, Submittal Procedures.
- B. Submit notification of inspection, sampling and testing needs as specified in this Section.

1.03 QUALITY ASSURANCE -- NOT USED

1.04 DELIVERY, STORAGE AND HANDLING -- NOT USED

1.05 PROJECT/SITE CONDITIONS

- A. Unless otherwise indicated, all products, materials, and equipment shall be subject to inspection by the OWNER at the place of manufacture.
- B. The presence of the OWNER at the place of manufacturer, however, shall not relieve the CONTRACTOR of the responsibility for furnishing products, materials, and equipment which comply with all requirements of the Contract Documents. Compliance is a duty of the CONTRACTOR, and said duty shall not be avoided by any act or omission on the part of the OWNER.

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- C. Unless otherwise indicated, all sampling and testing shall be in accordance with the methods prescribed in the current standards of the ASTM, as applicable to the class and nature of the article or materials considered; however, the OWNER reserves the right to use any generally-accepted system of sampling and testing which, in the opinion of the OWNER will assure the OWNER that the quality of the workmanship is in full accord with the Contract Documents.
- D. Any waiver by the OWNER of any specific testing or other quality assurance measures, whether or not such waiver is accompanied by a guarantee of substantial performance as a relief from the specified testing or other quality assurance requirements as originally specified, and whether or not such guarantee is accompanied by a performance bond to assure execution of any necessary corrective or remedial WORK, shall not be construed as a waiver of any requirements of the Contract Documents.
- E. Notwithstanding the existence of such waiver, the OWNER reserves the right to make independent investigations and tests, and failure of any portion of the WORK to meet any of the requirements of the Contract Documents, shall be reasonable cause for the OWNER to require the removal or correction and reconstruction of any such WORK in accordance with the General Conditions.
- F. Inspection and testing laboratory service shall comply with the following:
 - 1. The OWNER will appoint, employ and pay for services of an independent firm to perform testing and inspection of the CONTRACTOR'S work. This does not relieve the CONTRACTOR from providing inspection and laboratory services to meet quality control requirements.
 - 2. The CONTRACTOR shall utilize the services of the independent firm, OWNER employed, to perform sampling and testing of their work to verify that quality of the workmanship is in full accord with the Contract Documents as part of their Quality Control.
 - 3. The CONTRACTOR shall provide the OWNER copies of all inspection, sampling and testing reports that the CONTRACTOR receives from the independent firm.
 - 4. The CONTRACTOR shall cooperate with the OWNER or independent firm and furnish samples of materials, design mix, equipment, tools, storage and assistance as requested.
 - 5. The CONTRACTOR shall notify the OWNER and independent firm a minimum of 24 hours prior to the expected time for operations requiring sampling and laboratory testing services.

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6. Retesting required because of non-conformance to specified requirements shall be performed by the same independent firm on instructions by the OWNER. The CONTRACTOR shall bear all costs from such retesting at no additional cost to the OWNER.
 7. For samples and tests required for CONTRACTOR'S use, the CONTRACTOR shall make arrangements with an independent firm for payment and scheduling of testing. The cost of sampling and testing for the CONTRACTOR'S use shall be included in the Contract Price.
- G. Inspection, sampling and testing shall be as specified in the individual Sections.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 INSTALLATION

- A. Inspection: The CONTRACTOR shall inspect materials or equipment upon the arrival on the job site and immediately prior to installation, and reject damaged and defective items.
- B. Measurements: The CONTRACTOR shall verify measurements and dimensions of the WORK, as an integral step of starting each installation.
- C. Manufacturer's Instructions: Where installations include manufactured products, the CONTRACTOR shall comply with manufacturer's applicable instructions and recommendations for installation, to whatever extent these are more explicit or more stringent than applicable requirements indicated in Contract Documents.

END OF SECTION

SECTION 01 50 00
TEMPORARY FACILITIES

PART 1 GENERAL

1.01 SUMMARY

- A. The requirement: This Section specifies procedural and administrative requirements for temporary services and facilities.
- B. Unless otherwise provided in these Specifications, CONTRACTOR shall make CONTRACTOR's own arrangements for electricity, gas, water, and sewer services for use during the construction of the Work and shall pay for all temporary facilities, connections, extensions, permits, inspections and services.
 - 1. Cost or use charges for temporary facilities are not chargeable to OWNER or ENGINEER, and will not be accepted as a basis of claims for a Change Order.
- C. Temporary Utilities include, but are not limited to:
 - 1. Temporary electric power.
 - 2. Temporary lighting.
 - 3. Public and private utilities coordination.
- D. Temporary Construction and Support Facilities include, but are not limited to:
 - 1. Temporary heating facilities.
 - 2. CONTRACTOR's field offices and storage sheds.
 - 3. Temporary roads and paving.
 - 4. Drinking water.
 - 5. Sanitary facilities.
 - 6. Dewatering facilities and drains.
- E. Construction Buildings and Facilities include, but are not limited to.
 - 1. Temporary enclosures.
 - 2. Temporary Project identification signs.
 - 3. Temporary Site identification signs.
 - 4. Temporary Project bulletin boards.
 - 5. Stairs.
 - 6. Ongoing construction cleanup.

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- 7. Storage of equipment and material.
- F. Safety and Security facilities required include, but are not limited to:
 - 1. Temporary fire protection.
 - 2. Barricades, warning signs, lights.
 - 3. Enclosure fence for the Site.
 - 4. Private Owner fences.
 - 5. Security enclosure and lockup.
 - 6. Environmental protection.
 - 7. Control of noise.
 - 8. On-site burning.
 - 9. Dust control.
- G. Traffic Control Facilities required as specified in Section 01 55 26, Traffic Maintenance.
- H. Sedimentation Control Facilities are required as specified in Section 01 57 13, Source Controls for Erosion Control and Sedimentation.

1.02 SUBMITTALS

- A. Shop Drawings: Submit in accordance with Section 01 33 00, Submittal Procedures covering the items included under this Section. Submittals shall include:
 - 1. Temporary Utilities: Submit a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to OWNER, change over from use of temporary service to use of the permanent service.

1.03 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to:
 - 1. Building Code requirements.
 - 2. Health and Safety regulations.
 - 3. Utility Company regulations.
 - 4. NEORSD Safety and Security requirements.
 - 5. Police, Fire Department, and Rescue Squad rules.
 - 6. Environmental Protection regulations.

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- B. Inspection: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.04 DELIVERY, STORAGE AND HANDLING – NOT USED

1.05 PROJECT/SITE CONDITIONS

- A. Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities or permit them to interfere with progress. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on Site.

1.06 SEQUENCING AND SCHEDULING

- A. CONTRACTOR shall inform the local Fire Department in advance of CONTRACTOR's program of street obstruction and detours, so that the Fire Department can set up plans for servicing the area in case of an emergency.
 - 1. CONTRACTOR shall also notify the public agency having jurisdiction over the roads at least 1 week prior to obstructing any street.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide new materials; if acceptable to ENGINEER, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.
- B. Water: Provide potable water approved by local health authorities.

2.02 EQUIPMENT

- A. Provide new equipment; if acceptable to ENGINEER, undamaged, previously used equipment in serviceable condition may be used. Provide equipment suitable for use intended.
- B. Electrical Outlets: Provide properly configured NEMA polarized outlets to prevent insertion of 110 to 120 volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.

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- C. Electrical Power Cords: Provide grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress.
- D. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM, or another recognized trade association related to the type of fuel being consumed.
- E. Temporary Offices: Provide prefabricated or mobile units or similar on-site construction with lockable entrances, operable windows, and serviceable finishes. Provide heated and air conditioned units on foundations adequate for normal loading.
- F. Temporary Toilet Units: Provide self-contained single-occupant toilet units, properly vented and fully enclosed with a glass fiber-reinforced polyester shell or similar nonabsorbent material.
- G. First Aid Supplies: Comply with governing regulations.
- H. Fire Extinguishers: Provide hand-carried, portable, UL rated, Class "A" fire extinguishers for temporary offices and similar spaces.
 - 1. In other locations, provide hand-carried, portable, UL rated, Class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.
 - 2. Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.
- I. Project Identification Signs: Provide 8-foot wide by 4-foot high Project sign as detailed, of solid cedar wood and MDO plywood, painted, with exhibit lettering by a professional sign painter, with final graphics as approved by ENGINEER.
- J. Bulletin Board: Provide a weather-protected enclosed bulletin board at Site. The bulletin board shall be mounted in a conspicuous and public outside location.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Use qualified personnel for installation of temporary facilities. Locate facilities where they shall serve the Project adequately and result in minimum

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interference with performance of the Work. Relocate and modify facilities as required.

- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed, or are replaced by authorized use of completed permanent facilities.

3.02 TEMPORARY UTILITY INSTALLATION

- A. Engage the appropriate local utility company to install temporary service or to connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment; comply with the company's recommendations.
 - 1. Arrange with the company and existing users for a time when service can be interrupted, where necessary, to make connections for temporary services.
- B. Temporary Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload protected disconnects, automatic ground fault interrupters, and main distribution switchgear.
 - 1. Except where overhead service must be used, install electric power service underground.
 - 2. Install wiring overhead, and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 volts, AC 20 ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.
- C. Public and Private Utilities: Where any utilities, water, sewer, gas, telephone, or any other either public or private, are encountered, CONTRACTOR must provide adequate protection for them, and CONTRACTOR shall be held responsible for any damages to such utilities arising from CONTRACTOR's operations.
 - 1. When it is apparent that construction operations may endanger the foundation of any utility conduit or the support of any structure, CONTRACTOR shall notify the utility Owner of this possibility and CONTRACTOR shall take such steps as may be required to provide temporary bracing or support of conduits or structures.
 - 2. Where it is the policy of utility Owners to make repairs to damaged conduit or other structures, CONTRACTOR shall cooperate to the

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fullest extent with the utility, and CONTRACTOR shall see that CONTRACTOR's operations interfere as little as possible with those operations.

3. When it is necessary to carry out the Work, that an electric, telephone, or light pole be moved to a new location, or moved and replaced after construction, CONTRACTOR shall arrange for the moving of such poles and the lines thereof, and shall pay any charges therefore.
4. Where existing utilities are encountered along the line of Work, CONTRACTOR shall perform CONTRACTOR's operations in such a manner that service will not be interrupted, and shall, at CONTRACTOR's own expense, make all temporary provisions to maintain service.
5. Unless otherwise indicated on Drawings, CONTRACTOR shall replace any disturbed sewer or drain, or relay same at a new grade to be established by ENGINEER, such that sufficient clearance for the sewer will be provided.
6. CONTRACTOR will receive no extra compensation for replacement of sewers or drains encountered, or for relaying at a new grade and/or line where necessary, except where specifically noted otherwise on Drawings or Specifications.
7. Where existing gas mains and services are encountered, CONTRACTOR shall arrange with the gas company for any necessary relaying, and shall pay for the cost of such work.
8. Materials used in repairing or relaying utilities shall be the same type and strength as the existing Work.

D. Storm and Sanitary Sewers: If sewers are available, CONTRACTOR may provide temporary connections to remove effluent that can be discharged lawfully. If sewers are not available or cannot be used, provide portable units.

1. If gas is present in existing sewers or tanks where CONTRACTOR must work, they shall be cleared of gas before entering. If the gas cannot be removed by natural ventilation by the removal of covers, CONTRACTOR shall maintain forced draft to render the area safe as determined by gas detection equipment.
2. Filter out excessive amounts of soil, construction debris, chemicals, oils, and similar contaminants that might clog sewers or pollute waterways before discharge.
3. Connect temporary sewers to the municipal system as directed by the sewer department officials.
4. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. Following heavy use, restore normal conditions promptly.

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5. Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of stormwater from heavy rains.

3.03 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES
INSTALLATION

- A. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access in areas shown on drawings or approved by OWNER.
 1. Maintain temporary construction and support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to OWNER.
 2. Provide incombustible construction for offices, shops, and sheds located within the construction area, or within 30 feet of building lines. Comply with requirements of NFPA 241.
- B. Temporary Heating Facilities: Provide temporary heat required by construction activities for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.
 1. Except where use of the permanent system is authorized, provide vented self-contained LP gas or fuel oil heaters with individual space thermostatic control.
 2. Use of gasoline-burning space heaters, open flame, or salamander-type heating units is prohibited.
- C. CONTRACTOR's Field Offices: Provide insulated, weathertight temporary offices of sufficient size to accommodate required office personnel at Site. Keep the office clean and orderly for use for small progress meetings.
- D. OWNER's Field Office: Before the construction Work is laid out or started, an office for OWNER's Resident Project Representative shall be provided by CONTRACTOR at a point on the Site to be designated.
 1. This office shall be a minimum of 10 feet by 30 feet in plan. Two doors, 2 single windows, and a double window shall be provided. The doors shall be equipped with a cylinder lock. The office shall be equipped

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using acceptable second-hand or on-site constructed furniture as follows:

- a. Three plan racks and four-drawer cabinets.
 - b. Drawing table and stool.
 - c. Three desks with drawers.
 - d. Three desk chairs.
 - e. Instrument rack.
 - f. Six electric convenience outlets.
 - g. Three wastebaskets.
 - h. Two plan (reference) tables and stools.
 - i. Two smoke alarms.
 - j. Two 10-pound fire extinguishers for Class "ABC" fires.
 2. OWNER's field office shall be for the exclusive use of OWNER and shall be securely anchored for stability in high winds.
 3. CONTRACTOR shall provide electric or propane heat, electric air conditioning, screened and locking windows, toilet and lavatory facilities with potable water, wardrobe closet, electric light, local phone service with two phone lines, and semi-weekly janitorial service in OWNER's office during the continuance of this Contract. Offices shall have a minimum of a 6-foot 9-inch ceiling height.
 4. Two parking spaces close to OWNER's office shall be provided and reserved for OWNER.
 5. CONTRACTOR shall arrange, furnish and provide service for during the Contract Times: DSL service.
- E. Temporary Roads and Paving: Construct and maintain temporary roads and paving to adequately support the indicated loading and to withstand exposure to traffic during the construction period. Locate temporary paving for roads, storage areas and parking where the same permanent facilities will be located. Review proposed modifications to permanent paving with OWNER.
1. Comply with for construction and maintenance of temporary asphalt concrete paving.
 2. Coordinate temporary paving development with subgrade grading, compaction, installation and stabilization of subbase, and installation of base and finish courses of permanent paving.
 3. Install temporary paving to minimize the need to rework the installations and to result in permanent roads and paved areas that are without damage or deterioration when occupied by OWNER.
 4. Delay installation of the final course of permanent asphalt concrete paving until immediately before Substantial Completion. Coordinate with weather conditions to avoid unsatisfactory results.

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5. Extend temporary paving in and around the construction area as necessary to accommodate delivery and storage of materials, equipment usage, administration, and supervision.
- F. Sanitary Facilities: Sanitary facilities include temporary toilets, wash facilities, and drinking water fixtures. Comply with regulations and health Codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best service the Project's needs.
1. Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Provide covered waste containers for used material.
 2. Install self-contained toilet units. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted.
 3. Install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up for a healthy and sanitary condition. Dispose of drainage properly. Supply cleaning compounds appropriate for each condition.
- G. Dewatering Facilities and Drains: For temporary drainage and dewatering facilities and operations not directly associated with construction activities included under individual Sections, comply with dewatering requirements of applicable Division 2 Sections. Where feasible, utilize the same facilities. Maintain the Site, excavations, and construction free of water.

3.04 CONSTRUCTION BUILDINGS AND FACILITIES INSTALLATION

- A. Temporary Project Identification Signs: Engage an experienced sign painter to apply graphics. Comply with details indicated. Verify with ENGINEER final wording of graphics to be placed on sign and final location of sign. Obtain sign permit from local authority.
- B. Temporary Site Identification and Signs: Prepare Site identification and other signs of the size indicated; install signs where indicated or as directed by ENGINEER to inform construction personnel, public and visitors seeking entrance to Site. Do not permit installation of unauthorized signs.
- C. Temporary Project Bulletin Board: As a minimum, the following items must be posted:
1. Wage Rates.
 2. Safety Poster (OSHA or Ohio OSHA).
 3. Nondiscrimination Poster.

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4. Equal Employment Opportunity Statement signed by a Company official.
- D. Ongoing Construction Cleanup: Project cleanup shall be an ongoing operation. CONTRACTOR shall maintain an order of neatness and good housekeeping comparable to that maintained by OWNER. Project cleanup applies to the Site and all areas affected by construction operations. CONTRACTOR shall:
1. Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 degrees F (27 degrees C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner.
 2. Maintain dirt and debris resulting from CONTRACTOR's operations in designated spoil piles as approved by OWNER or remove from the Site daily. Dirt and debris shall not collect or interfere with OWNER's facility operations. Excess dirt and debris shall be removed from the Site as needed to confine spoil piles in designated areas.
 3. Keep tools, equipment, and materials in a neat and orderly arrangement.
 4. Maintain culverts, sewers, and drainage structures by removing sediment and debris from construction operations.
 5. Repair all holes and ruts resulting from construction operations that affect OWNER's use of property with approved material; compact, level, and restore.
 6. All trash cans, dumpsters, roll off containers, shall be equipped with an impervious cover (lid, tarp, etc.) arranged to prevent the collection of rainwater and secured to prevent blowing away.

3.05 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour-day basis where required to achieve indicated results and to avoid possibility of damage.

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- C. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- D. Termination and Removal: Unless OWNER requires that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired. Materials and facilities that constitute temporary facilities are property of CONTRACTOR. OWNER reserves the right to take possession of Project identification signs.

END OF SECTION

SECTION 01 55 26
TRAFFIC MAINTENANCE

PART 1 GENERAL

1.01 SUMMARY

- A. The CONTRACTOR shall maintain and protect vehicular and pedestrian traffic and the WORK while the Contract is in force in accordance with the provisions of this Section.
- B. The CONTRACTOR shall coordinate work under this Contract with authorities having jurisdiction.
- C. Before starting any WORK on the Project, the CONTRACTOR shall submit, in writing to the OWNER a detailed plan for maintaining traffic on Martin Luther King Jr. Drive. The CONTRACTOR shall attend a pre-construction conference with the proper authorities to discuss in detail his proposed work schedule and the pertinent points of any permits or agreements concerning the Work of this Project.
- D. Detour routes will not be required or allowed.

1.02 SUBMITTALS

- A. Prior to mobilization, the CONTRACTOR shall submit to the OWNER for review his plan for traffic maintenance for each area of work.

1.03 QUALITY ASSURANCE

- A. Payment: No separate payment will be made for WORK performed under this Section. Include the entire cost for the requirements defined in this Specification in the pay items of which this WORK is a component.
- B. Performance: In the event of the CONTRACTOR's failure to comply with these provisions, the OWNER may cause the same to be done and will deduct the cost of such work from any moneys due to or become due the CONTRACTOR under this agreement, but the performance of such work by the OWNER or at its instance shall serve in no way to release the CONTRACTOR from his general or particular liability for the safety of the public or of the Work.

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1.04 DELIVERY, STORAGE AND HANDLING – NOT USED

1.05 PROJECT/SITE CONDITIONS – NOT USED

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 TRAFFIC FACILITIES AND TRAFFIC CONTROL - GENERAL

- A. Facilities for vehicular and pedestrian traffic as required for the project, including all detours, temporary walks, roads, bridges, culverts, and traffic control devices, shall be constructed and maintained by the CONTRACTOR.
- B. During the progress of the Work, the CONTRACTOR shall make ample provisions for both vehicular and foot traffic on any public road and shall indemnify and save harmless the OWNER from any expense whatsoever due to his operations over said roadways.
- C. The provisions of this Section shall not in any way relieve the CONTRACTOR of any of his legal responsibilities or liabilities for the safety of the public. The CONTRACTOR shall provide and maintain safeguards, safety devices, and protective equipment and take any other needed actions that may be necessary to protect the public and property in connection with the WORK. The CONTRACTOR shall restore all original pavement markings, signs, and traffic control devices.

3.02 LOCAL TRAFFIC

- A. For local traffic, the CONTRACTOR shall provide and maintain in a safe condition, including snow and ice removal, such drives, temporary roadways, bypasses, sidewalks, or temporary structures as may be necessary to provide vehicular and pedestrian ingress and egress for the residents and facilities adjacent to the improvements. Temporary approaches and crossings of intersecting highways shall also be provided and maintained in a safe condition.
- B. The CONTRACTOR shall also provide free access to all municipal, commercial, residential entrances, fire hydrants and water and gas valves located along the line of his work. The CONTRACTOR shall lay and maintain temporary driveways, bridges, and trench crossings which in the opinion of the OWNER are necessary to maintain access to driveways and to reasonably accommodate the public at no additional cost to the OWNER.

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3.03 THROUGH TRAFFIC

- A. The CONTRACTOR must make allowances for the safe and timely passage of emergency vehicles.
- B. When the street affected by Project construction is being used by traffic, including periods of suspension of the Work, the CONTRACTOR shall so maintain by the use of labor, equipment, and materials that portion of the street being used, such that it is smooth, free from holes, ruts, ridges, bumps, and dust. The street being used shall be provided with the necessary outlets to drain freely. Pipe trenches or other openings left in hard surface pavements shall be maintained with material as specified.
- C. The proper authorities shall have the right to enter upon that portion of the WORK where the CONTRACTOR is responsible for maintaining traffic to remove snow and ice and place abrasives at their own expense, as necessary. The CONTRACTOR shall be responsible for the removal of abrasives places, for which no claim for additional compensation shall be allowed nor shall the CONTRACTOR be relieved in any way of his obligation for maintenance of traffic.

3.04 TRAFFIC CONTROL

- A. The installation, maintenance, and operation of all traffic controls and traffic control devices shall conform to the requirements of the "Ohio Manual of Uniform Traffic Control Devices for Streets and Highways", hereinafter call The Ohio Manual. Traffic control devices shall be provided with suitable supports of sufficient strength and stability.
- B. Faces of construction signs, barricades, vertical panels and drum banks shall be suitably reflectorized with Type G sheeting complying with the defined detailed requirements of ODOT Item 730.19.
- C. Traffic cones shall be a highly visible orange color. Pavement markings for traffic maintenance shall conform to the ODOT standards.
- D. Barricades and channelizing devices such as cones, vertical panels, hazard markers, and drums shall be highly visible. They shall also be protected by adequate advance warning devices and by suitable lighting or reflectorization at night (between the hours of sunset to sunrise). All such devices shall be provided by the CONTRACTOR. Detour signs, traffic control signs, barricades, construction lighting, etc. shall be replaced whenever damaged, stolen or vandalized. Detour signs when not in use shall either be removed or covered to avoid motorist confusion.

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- E. Equipment and material stored at the project site shall be stored in staging areas or within orange barrier fence.

3.05 TRAFFIC MAINTAINED

- A. Where a street affected by Project construction is being used by traffic, including periods of suspension of the Work, the CONTRACTOR shall furnish and maintain pavement markings, lights, warning signs, road construction – traffic maintained signs and end construction signs, barricades, temporary guardrail, and such other traffic control devices, and watchmen and flaggers as may be necessary to maintain safe traffic conditions within the work limits.
- B. The CONTRACTOR shall furnish and erect regulatory signs and guide signs within the work limits on all traffic maintained projects. The responsibility for maintenance of these signs shall rest with the CONTRACTOR. The erection and removal of all regulatory signs shall be approved by the OWNER.
- C. Existing signs and traffic control devices within the work limits shall remain in use during the construction period. If the CONTRACTOR needs to relocate or modify existing signs or traffic control devices as a consequence of his Work, he shall provide suitable supports and may modify the devices with prior approval of the OWNER and the maintaining agency. Routine maintenance of existing traffic control devices will remain the responsibility of the maintaining agency. The function of existing Stop or Yield signs shall be retained at all times although their position may be adjusted. Existing signs that must be relocated laterally shall be placed in accordance with the Ohio Manual. The CONTRACTOR shall restore all relocated or modified signs to the position and condition which existed prior to construction.
- D. The CONTRACTOR shall obtain the approval of the OWNER and the proper authorities before closing a traffic lane. One way traffic will not be allowed.

3.06 PAVEMENT MARKING OPERATIONS

- A. Moving marking operations shall be performed by a truck equipped with necessary flashers and warning signs and shall be protected by a similarly equipped trailing vehicle or vehicles separated a sufficient distance to provide adequate advance warning to overtaking traffic. The marking operation should use the extreme left or right lane when possible.
- B. Stationary marking operations in intersections, school zones, gores and other areas shall be protected with traffic control devices such as advance warning signs and cones.

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3.07 FLAGGERS

- A. The CONTRACTOR shall maintain positive and quick means of communication between the flaggers.
- B. Flaggers shall be equipped according to the standards for flagging traffic contained in the Ohio Manual. The red flag or the Stop/Slow sign shall be used. At night, flaggers stations shall be adequately illuminated, and flaggers shall use the reflectorized Stop/Slow or a red light approved by the OWNER.
- C. The control and regulation of traffic by the flaggers and performance of their duties shall conform to the standards in the Ohio Manual. The CONTRACTOR may, in lieu of flagger, or supplementing them, furnish, install and operate a temporary traffic signal or signals, for the purpose of regulating traffic, in accordance with a written agreement approved by the OWNER and the proper authorities.

3.08 GENERAL MAINTENANCE OF TRAFFIC

- A. Unless otherwise permitted, directed, or ordered by the OWNER, traffic shall be specifically maintained as follows:
 - 1. A minimum of one lane for emergency vehicles is to be provided at all times on all streets affected by this Project. Provide temporary access for emergency vehicles through the site during the full road closure periods as specified below.
 - 2. The CONTRACTOR shall confer with the OWNER and all Municipalities, proper authority, local property owners and others who may be affected by the Project before starting any work at locations affecting said parties, and the carrying out of this Work with respect to traffic maintenance shall be covered by agreements reach at such conferences.
 - 3. The location, design, and construction of driveways, roads, and access and egress points for construction equipment vehicles to public streets which may be required by the CONTRACTOR for construction on easements and other locations shall be approved by the OWNER. All such points shall be provided with adequate warning signs.
 - 4. No parking or standing of vehicles on streets will be permitted.
 - 5. The CONTRACTOR shall provide dust control on all streets in this project as per ODOT Item 616 to the satisfaction of the OWNER.
 - 6. Stormwater drainage shall be maintained during Work, including at temporary access and egress points.

END OF SECTION

SECTION 01 57 13
SOURCE CONTROLS FOR EROSION AND SEDIMENTATION

PART 1 GENERAL

1.01 SUMMARY

- A. Description of erosion and sediment control and other control-related practices which shall be utilized during construction activities.
- B. This Section describes the required documentation to be prepared and signed by the CONTRACTOR before conducting construction operations, in accordance with the terms and conditions of the National Pollutant Discharge Elimination System (NPDES) Permit, as issued by the Ohio EPA.

1.02 SUBMITTALS

- A. Notice of Intent:
 - 1. A signed copy of the OWNER's Notice of Intent (NOI) shall be kept on file by the CONTRACTOR.
 - 2. The OWNER has completed the Notice of Intent and make submittals to the EPA.
 - 3. The contractor shall complete the Ohio EPA "Co-Permittee Notice of Intent for Coverage Under Ohio EPA Storm Water Construction General Permit" (Contractor NOI) and submit it to the OWNER for review prior to submitting it to the Ohio EPA.
 - 4. After obtaining concurrence from the OWNER, the contractor shall submit the Contractor NOI to the Ohio EPA and copy all parties specified by the OWNER.
 - 5. Contractor NOI Submittal to Ohio EPA shall be completed prior to commencement of mobilization.
- B. Stormwater Pollution Prevention Plan (SWP3): Contractor shall submit any proposed changes to the SWP3 to the OWNER for approval prior to implementing those changes.

1.03 QUALITY ASSURANCE

- A. Payment: No separate payment will be made for WORK performed under this Section. Include the entire cost for the requirements defined in this Specification in the pay items of which this WORK is a component.

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B. Storm Water Pollution Prevention Plan (SWP3)

1. The OWNER has prepared the SWP3 for this work pursuant to state and local requirements.
2. The SWP3 and the Ohio EPA Authorization for Storm Water Discharges Associated with Construction Activity Under the National Pollutant Discharge Elimination System (the Permit) are incorporated into this contract by reference.
3. The CONTRACTOR shall be responsible for implementing the SWP3.
4. The CONTRACTOR shall meet with the OWNER to discuss implementation of SWP3 prior to beginning field work.
5. The CONTRACTOR shall maintain records on site demonstrating that NPDES requirements are being met, including all logs and records specified in the Permit.
6. Per the requirements of the Permit, all controls will be inspected by the CONTRACTOR at least once every seven calendar days and within 24 hours of any storm event that produces more than 0.5 inches of rain over the preceding 24 hours.
7. The CONTRACTOR shall maintain all control practices as needed to ensure continued performance of their intended function. The CONTRACTOR shall provide the name, address, and telephone number for the CONTRACTOR; the names of persons or firms responsible for maintenance and inspection of erosion and sediment control measures and all Subcontractors.
8. The SWP3 will be amended whenever there is a change in project design, stormwater control design or construction operations which have a significant effect on the potential for discharge of pollutants, or if the SWP3 proves to be ineffective in achieving the general objectives of minimizing construction-associated pollutants in storm water discharge.
9. The CONTRACTOR shall keep a copy of the Storm Water Pollution Prevention Plan, as amended, at the construction site or at the CONTRACTOR's office from the date that it became effective to the date of project completion.
10. The following notices shall be posted from the date that the SWP3 goes into effect until the date of final site stabilization.
 - a. Copies of the Notices of Intent (NOI) submitted by the OWNER and the CONTRACTOR and a brief project description as given in Paragraph 1.1 of the SWP3 shall be posted at the construction site or at the CONTRACTOR's office in a prominent place for public viewing.

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- b. Notice to drivers of equipment and vehicles, instructing them to stop, check, and clean tires of debris and mud before driving onto traffic lanes. Post such notices at every stabilized construction exit area.
 - c. In an easily visible location on the site, post a notice of waste disposal procedures.
 - d. Notice of hazardous material handling and emergency procedures shall be posted with the NOI on site. Keep copies of Material Safety Data Sheets at a location on site that is known to all personnel.
 - e. Keep a copy of each signed certification at the construction site or at the CONTRACTOR's office.
- C. Demolition Areas: Demolition activities which create large amounts of dust with significant concentrations of heavy metals or other toxic pollutants shall use dust control techniques to limit transport of airborne pollutants. However, water or slurry used to control dust contaminated with heavy metals or toxic pollutants shall be retained on the site and shall not be allowed to run directly into watercourses or storm water conveyance systems. Methods of ultimate disposal of these materials shall be carried out in accordance with applicable local, state, and federal health and safety regulations.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Storage of Construction Materials and Chemicals:
 - 1. Isolate sites where chemicals, cements, solvents, paints, or other potential water pollutants are stored in areas where they will not cause runoff pollution.
 - 2. Store toxic chemicals and materials such as pesticides, paints, and acids in accordance with manufacturer's guidelines. Protect groundwater resources from leaching by placing a plastic mat, packed clay, tar paper, or other impervious materials on any areas where toxic liquids are to be opened and stored.

1.05 PROJECT/SITE CONDITIONS – NOT USED

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PREPARATION AND INSTALLATION

- A. No clearing and grubbing or rough cutting shall be permitted until erosion and sediment control systems are in place, other than site work specifically directed by the OWNER to allow soil testing and surveying.
- B. The CONTRACTOR shall be responsible for collecting, storing, hauling, and disposing of spoil, silt, and waste materials as specified in the SWP3 and in compliance with the applicable federal, state, and local rules and regulations.
- C. The CONTRACTOR shall conduct all construction operations under this Contract in conformance with the erosion control practices described in the SWP3. The CONTRACTOR shall conduct operations to minimize open cut areas that are not stabilized and shall stabilize areas immediately after final grading and backfill is complete. The CONTRACTOR shall make every effort to install and maintain temporary erosion control and stabilization measures to prevent flow events from scouring the site during construction. The CONTRACTOR is responsible for site restoration during construction activities for flow events that result in the creek at no cost to the OWNER.
- D. All trash cans, roll off containers, etc. shall be equipped with an impervious cover (lid, tarp, etc.) arranged to prevent the collection of rainwater and secured to prevent blowing away.

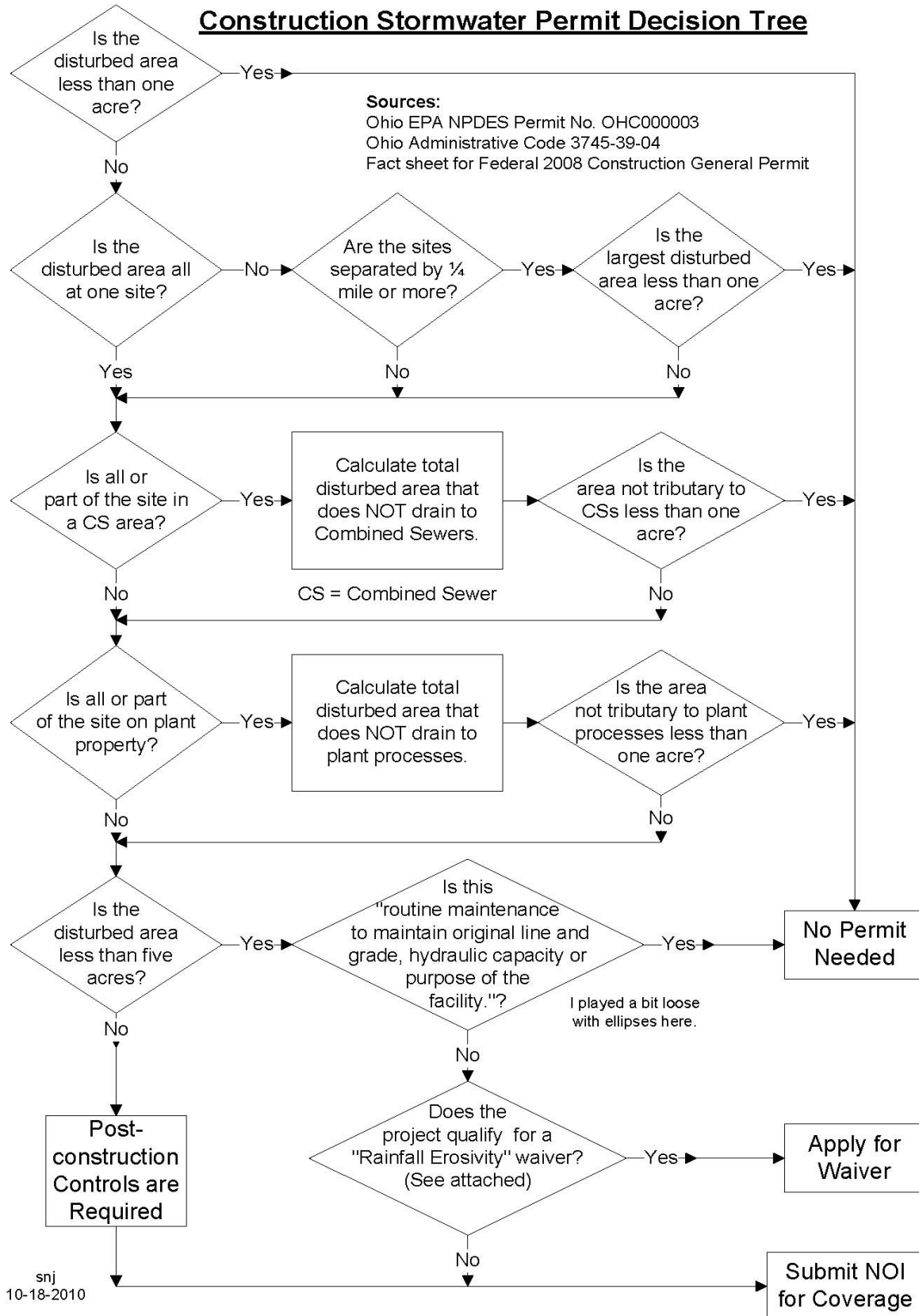
3.02 SUPPLEMENTS

- A. The supplements listed below, following “End of Section”, are part of this specification.
 - 1. Construction Stormwater Permit Decision Tree.
 - 2. Chart 1 – Rainfall Erosivity Waiver Dates for Cayahoga, County, Ohio.
 - 3. Table 1 – Rainfall Erosivity Waiver Dates Calculated for Cayahoga, County, Ohio.

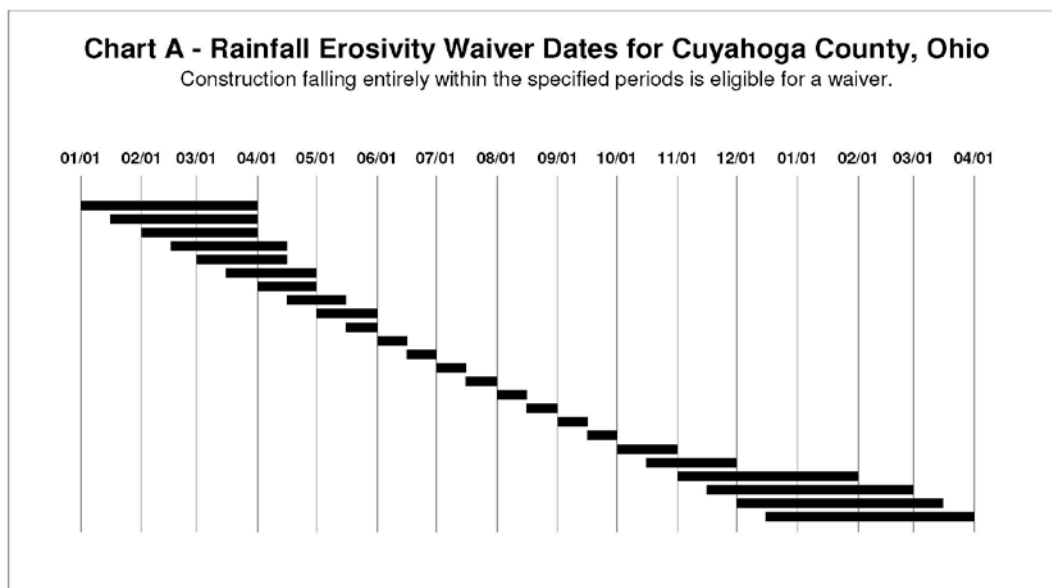
END OF SECTION

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Construction Stormwater Permit Decision Tree



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EXAMPLE: A construction project starting on January 3 and lasting until March 30 is eligible for a waiver from the general construction storm water permit requirement. However, a permit is required for a project commencing on January 7 and completed on April Fool's Day.

Completion includes "at least a 70 percent vegetative cover or other permanent, non-erosive cover."

Source: U.S. EPA Fact Sheet 3.1 - Storm Water Phase II Final Rule Construction Rainfall Erosivity Waiver

Calculations: snj

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**Table 1 - Rainfall Erosivity Waiver Dates
Calculated for Cuyahoga County, Ohio**

If Disturbance Start Date Is Between	Final Cover Must Be In Place By	If Disturbance Start Date Is Between	Final Cover Must Be In Place By
Jan 1 & 15	Mar 31	Jul 1 & 15	Jul 15
Jan 16 & 31	Mar 31	Jul 16 & 31	Jul 31
Feb 1 & 15	Mar 31	Aug 1 & 15	Aug 15
Feb 16 & 29	Apr 15	Aug 16 & 31	Aug 31
Mar 1 & 15	Apr 15	Sep 1 & 15	Sep 15
Mar 16 & 31	Apr 30	Sep 16 & 31	Sep 31
Apr 1 & 15	Apr 30	Oct 1 & 15	Oct 31
Apr 16 & 30	May 15	Oct 16 & 31	Nov 31
May 1 & 15	May 31	Nov 1 & 15	Jan 31
May 16 & 31	May 31	Nov 16 & 31	Feb 29
Jun 1 & 15	Jun 15	Dec 1 & 15	Mar 15
Jun 16 & 30	Jun 30	Dec 16 & 31	Mar 31

Source: U.S. EPA Fact Sheet 3.1 - Storm Water Phase II Final Rule Construction Rainfall Erosivity Waiver

Calculations: snj

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SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. The word "Products," as used in the Contract Documents, is defined to include purchased items for incorporation into the WORK, regardless of whether specifically purchased for the project or taken from CONTRACTOR's stock of previously purchased products. The word "Materials," is defined as products which must be substantially cut, shaped, worked, mixed, finished, refined, or otherwise fabricated, processed, installed, or applied to form WORK. The word "Equipment" is defined as products with operational parts, regardless of whether motorized or manually operated, and particularly including products with service connections (wiring, piping, and other like items). Definitions in this paragraph are not intended to negate the meaning of other terms used in the Contract Documents, including "specialties," "systems," "structure," "finishes," "accessories," "furnishings," special construction," and similar terms, which are self-explanatory and have recognized meanings in the construction industry.
- B. Neither "Products" nor "Materials" nor "Equipment" includes machinery and equipment used for preparation, fabrication, conveying, and erection of the WORK.

1.02 SUBMITTALS

- A. All products, materials and equipment to be incorporated in the Work shall be submitted as a shop drawing and/or product data as specified in specification Section 01 33 00, Submittals.

1.03 QUALITY ASSURANCE

- A. Source Limitations: To the greatest extent possible for each unit of WORK, the CONTRACTOR shall provide products, materials, and equipment of a singular generic kind from a single source.
- B. Compatibility of Options: Where more than one choice is available as options for CONTRACTOR's selection of a product, material, or equipment, the CONTRACTOR shall select an option which is compatible with other products, materials, or equipment. Compatibility is a basic general requirement of product, material and equipment selections.

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1.04 DELIVERY AND STORAGE AND HANDLING

- A. The CONTRACTOR shall deliver and store the WORK in accordance with manufacturer's written recommendations and by methods and means which will prevent damage, deterioration, and loss including theft. Delivery schedules shall be controlled to minimize long-term storage of products at the Site and overcrowding of construction spaces. In particular, the CONTRACTOR shall ensure coordination to ensure minimum holding or storage times for flammable, hazardous, easily damaged, or sensitive materials to deterioration, theft, and other sources of loss.
- B. Products shall be transported by methods to avoid damage and shall be delivered in undamaged condition in manufacturer's unopened containers and packaging.
- C. The CONTRACTOR shall provide equipment and personnel to handle products, materials, and equipment by methods to prevent soiling and damage. The OWNER WILL NOT unload, accept or otherwise handle deliveries to the project site.
- D. The CONTRACTOR shall provide additional protection during handling to prevent marring and otherwise damaging products, packaging, and surrounding surfaces.
- E. Sensitive products shall be stored in weather-tight climate controlled enclosures and temperature and humidity ranges shall be maintained within tolerances required by manufacturer's recommendations.
- F. For exterior storage of fabricated products, products shall be placed on sloped supports above ground. Products subject to deterioration shall be covered with impervious sheet covering and ventilation shall be provided to avoid condensation.
- G. Loose granular materials shall be stored on solid flat surfaces in a well-drained area and shall be prevented from mixing with foreign matter.
- H. Storage shall be arranged to provide access for inspection. The CONTRACTOR shall periodically inspect to assure products are undamaged and are maintained under required conditions.
- I. Products shall be maintained (rotated, lubricated etc) as recommended by the manufacturer, and a log of services shall be maintained and submitted as a record document prior to final acceptance by the OWNER.

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PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 71 13
MOBILIZATION

PART 1 GENERAL

1.01 SUMMARY

- A. Mobilization shall include the obtaining of all permits; moving onto the site all equipment; furnishing construction facilities; and implementing security requirements; all as required for the proper performance and completion of the WORK. Mobilization shall include items included in specification 01 20 00, Measurements and Payments, and the following principal items:
1. Moving on to the construction site all CONTRACTOR's facilities and equipment, including CONTRACTOR's and OWNER's field offices;
 2. Installing temporary construction power distribution wiring, and lighting facilities;
 3. Providing all on-site communication facilities, including internet connection;
 4. Providing on-site sanitary and potable water facilities;
 5. Arranging for and erecting CONTRACTOR's work and storage yard;
 6. Constructing and implementing security features and requirements complying with the General Conditions and the Division 1 Specification, Security;
 7. Obtaining all required permits other than the State of Ohio PTI permit, ACOE Nationwide Permit, and NPDES Storm Water Permit, when necessary for the project;
 8. Having all OSHA required notices and the establishment of safety programs;
 9. Having the CONTRACTOR's Superintendent at the job site full time;
 10. Submitting initial submittals, including location of and plans for topsoil stockpiling, stockpile of general excavation and backfill, stockpile of reclaimed channel rock and bank blocks, staging area layout, haul road access roads, construction staging and phasing, Plug and Container Procurement Plan, Sandstone and Limestone Block Procurement Plans and any submittals required by any authority under the Storm Water Pollution Prevention Plan;
 11. Constructing and implementing security features, paving and fencing;
 12. The CONTRACTOR shall obtain all the necessary hydrant permits, meters and any other appurtenance necessary for all water connections in each affected communities. All connections shall be performed and

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paid for in accordance with the requirements set forth by the local municipalities;

13. Includes preconstruction survey, utility locating, removing and storing park infrastructure such as park benches, garbage cans, signs, and light poles as shown on the drawing or as needed within the construction limits;
14. Provide the OWNER with a Traffic Plan that is acceptable to the local municipalities, and meets the requirements of the Ohio Manual of Uniform Traffic Control Devices and Specification Section 01 15 70, Traffic Maintenance or other requirements of the local municipalities.

1.02 SUBMITTALS

A. As noted in Summary.

1.03 QUALITY ASSURANCE – NOT USED

1.04 DELIVERY, STORAGE AND HANDLING- NOT USED

1.05 PROJECT/SITE CONDITIONS – NOT USED

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 71 23
FIELD ENGINEERING

PART 1 GENERAL

1.01 SUMMARY

A. CONTRACTOR shall:

1. Provide civil, structural and other professional engineering services specified or required to execute CONTRACTOR's construction methods.
2. Develop and make all detail surveys and measurements required for construction; including slope stakes, batter boards, and all other working lines, elevations, and cut sheets.
3. Provide material required for benchmarks, control points, batter boards, grade stakes, structure and pipeline elevation stakes, and other items.
4. Keep a transit or theodolite and leveling instrument at the Site at all times, and skilled instrument man available when necessary for laying out the Work.
5. Be solely responsible for all locations, dimensions and levels. No data other than Change Order or Field Order shall justify departure from dimensions and levels required by the Contract Documents.
6. Rectify all Work improperly installed because of not maintaining, not protecting, or removing without authorization established reference points, stakes, marks, and monuments.
7. Provide such facilities and assistance necessary for OWNER to check line and grade points placed by CONTRACTOR. CONTRACTOR shall not perform excavation or embankment work until all cross-sectioning necessary for determining pay quantities have been completed and accepted by OWNER.

- B. Reference Points:** OWNER shall provide engineering surveys to establish reference points for construction which in OWNER's judgment are necessary to enable CONTRACTOR to proceed with the Work. CONTRACTOR shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of OWNER. CONTRACTOR shall report to OWNER whenever a reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the

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accurate replacement or relocation of such reference points or property
monuments by professionally qualified personnel

1.02 SUBMITTALS

A. Informational Submittals: Submit the following:

1. Field Engineering: When requested by OWNER, submit documentation verifying accuracy of field engineering.
2. Qualifications Statements:
 - a. Field Engineer: Name and address. When requested by OWNER, submit qualifications.

1.03 QUALITY ASSURANCE -- NOT USED

1.04 DELIVERY, STORAGE AND HANDLING – NOT USED

1.05 PROJECT/SITE CONDITIONS

A. Field Engineer: Employ and retain at the Site a field engineer with experience and capability of performing all field engineering tasks required of CONTRACTOR, including:

1. Providing daily reports of activity on the Work both by the CONTRACTOR and by the Subcontractors, and submitting same in accordance with Section 01 31 13, Project Coordination.
2. Check all formwork, reinforcing, inserts, structural steel, bolts, sleeves, piping, other materials and equipment for conformance with the Contract Documents.
3. Maintain field office files and drawings, record documents, and coordinate engineering services with Subcontractors. Prepare layout and coordination drawings for construction operations.
4. Check and coordinate Work for conflicts and interferences and immediately advise OWNER, if any, of all discrepancies noted.
5. Cooperate as required with OWNER, if any, in observing the Work and field inspections.
6. Review and coordinate the Work with Shop Drawings and other submittals.

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- B. Project Surveyor: Employ and retain, as needed, at the Site a surveyor with experience and capability of performing surveying and layout tasks required in the Contract Documents and as required for the Work. Tasks included are:
1. Provide modern surveying equipment, including stakes, monuments and other required markers, and accessories required for performance of the Work.
 2. Establish required lines and grades for constructing all facilities, structures, pipelines, and site improvements.
 3. Keep professional, accurate, well organized, and legible notes of all measurements and calculations made while surveying and laying out the Work.
 4. Prior to backfilling operations, survey, locate, and record on a copy of the Drawings accurate representation of buried Work and Underground Facilities encountered.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 SURVEYING

- A. Reference Points:
1. OWNER's established reference points damaged or destroyed by CONTRACTOR will be re-established by OWNER at CONTRACTOR's expense.
 2. From OWNER-established reference points, establish all lines, grades, and elevations necessary to control the Work. Obtain measurements required for executing the Work to tolerances specified in the Contract Documents.
 3. Establish, place, and replace as required, such additional stakes, markers, and other reference points necessary for control, intermediate checks, and guidance of construction operations.

3.02 RECORDS

- A. Maintain at the Site a complete and accurate log of control and survey Work as it progresses.
1. Survey data shall be in accordance with recognized professional surveying standards and prevailing standards of practice in the locality where the Site is located. Original field notes, computations, and other

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surveying data shall be recorded by CONTRACTOR's surveyor in CONTRACTOR-furnished hard-bound field books, and shall be signed by CONTRACTOR's surveyor. Completeness and accuracy of survey Work, and completeness and accuracy of survey records, including field books, shall be responsibility of CONTRACTOR. Failure to organize and maintain survey records in a professional manner that allows reasonable and independent verification of calculations, and to allow identification of elevations, dimensions, and grades of the Work, shall be cause for rejecting the survey records, including field books.

2. Illegible notes or data, and erasures on any page of field books, are unacceptable. Do not submit copied notes or data. Corrections by ruling or lining out errors will be satisfactory if initialed by the surveyor. Violation of these requirements may require re-surveying the data in question.

END OF SECTION

SECTION 01 77 00
CONTRACT CLOSEOUT PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. This Section specifies the administrative and procedural requirements for contract closeout.
- B. Contract closeout is to verify that construction work is complete and in conformance with the plans and specifications, and to provide formal contract documentation that will satisfactorily record final conditions and results of the project construction.

1.02 SUBMITTALS

- A. Contract Closeout Submittals: Submit all documentation prior to application for final payment.
 - 1. Record Documents: As required in the Division 1 Specification, Record Documents, individual specification sections, and as described herein.
 - 2. Approved Shop Drawings and Samples: As required in the General Terms and Conditions Articles, individual specification sections, and the Division 1 Specification, Submittals.
 - 3. Special Bonds, Special Warranties, and Service Agreements: As required in the General Terms and Conditions Articles and individual Specification Sections.
 - 4. Consent of Surety to Final Payment: As required in the General Terms and Conditions Articles.
 - 5. Releases or Waivers of Liens and Claims: As required in the General Terms and Conditions Articles.
 - 6. Releases from Agreements:
 - a. Furnish to the OWNER written releases from property owners or public agencies where side agreements or special easements were established and kept within the OWNER's construction right-of-way.
 - b. In the event the CONTRACTOR is unable to secure written releases, the CONTRACTOR shall inform the OWNER by the following procedure:
 - 1) The OWNER or its representatives will examine the site, and the OWNER will direct the CONTRACTOR to complete the

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WORK that may be necessary to satisfy terms of side agreement or special easement conditions.

7. Should the CONTRACTOR refuse to perform this WORK, the OWNER reserves the right to have it done by separate contract and deduct the cost of same from the Contract Price, or require the CONTRACTOR to furnish a satisfactory Bond in a sum to cover legal claims for damages.
8. When the OWNER is satisfied that the WORK has been completed in agreement with the Contract Documents and terms of side agreement or special easement, the right is reserved to waive the requirement for written release if:
 - a. CONTRACTOR's failure to obtain such statement is due to the grantor's refusal to sign, and this refusal is not based upon any legitimate claims that the CONTRACTOR has failed to fulfill the terms of the side agreement or special easement, or
 - b. CONTRACTOR is unable to contact or has had undue hardship in contacting the grantor.
9. Final Application for Payment: Submit in accordance with procedures and requirements stated in the General Terms and Conditions Articles and Specification Section 01 10 25, Measurement and Payment.

1.03 QUALITY ASSURANCE

- A. The CONTRACTOR shall provide a qualified and experienced person whose duty and responsibility shall be to maintain record documents.
- B. The CONTRACTOR shall maintain one complete set of the Contract Documents at the trailer (or construction field office) that shall be available to the OWNER at all times and upon which the CONTRACTOR shall record all changes and field adjustments. The Documents shall include the plans, Shop Drawings, and supplemental drawings, maintained in good order and condition. Such drawings shall not be removed from the CONTRACTOR's field office.
- C. The CONTRACTOR shall make entries within 24 hours after receipt of information that a change in Work has occurred.
- D. Prior to submitting each request for progress payment, the CONTRACTOR should request the OWNER's review and approval of current status of record documents. Failure to properly maintain, update, and submit record documents may result in a deferral by the OWNER to recommend the whole or any part of the CONTRACTOR's Application for Payment, either partial or final.

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E. Record Documents

1. Upon Substantial Completion of the WORK and prior to submission of the final application for payment, the annotated set of drawings showing as-built conditions shall be submitted to the OWNER. The CONTRACTOR shall also submit any record drawing information files or sketches that were necessary for the project in a compatible and clear AutoCAD drawing fashion to ease future information usage by the OWNER.
2. Submittal of the record documents shall be made with a transmittal letter containing:
 - a. Date.
 - b. Project Title and Number.
 - c. CONTRACTOR's Name and Address.
 - d. Title and Number of each Record Document.
 - e. Certification that each Document as submitted is complete and accurate.

1.04 DELIVERY, STORAGE, & HANDLING – NOT USED

1.05 PROJECT/SITE CONDITIONS – NOT USED

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 FINAL CLEANING

- A. At completion of Work or of a part thereof and immediately prior to CONTRACTOR'S request for certificate of Substantial Completion; or if no certificate is issued, immediately prior to CONTRACTOR's notice of completion, clean entire site or parts thereof, as applicable.
 1. Leave the Work and adjacent areas affected in a cleaned condition satisfactory to the OWNER.
 2. Broom clean exterior paved driveways and parking areas.
 3. Rake clean all other surfaces.
 4. Leave water courses and ditches open and clean.
 5. Clean all adjacent streets and sidewalks impacted by construction.
- B. Use only cleaning materials recommended by manufacturer of surfaces to be cleaned.

END OF SECTION

SECTION 01 78 39
RECORD DOCUMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. CONTRACTOR shall maintain and provide OWNER with record documents as specified below, except where otherwise specified.
- B. Maintenance of Documents:
 - 1. Furnish qualified and experienced person, whose duty and responsibility shall be to maintain record documents.
 - 2. Accuracy of Records:
 - a. Coordinate changes within record documents, making legible and accurate entries on each sheet of Drawings and other documents where such entry is required to show change.
 - b. Purpose of Project record documents is to document factual information regarding aspects of WORK, both concealed and visible, to enable future modification of WORK to proceed without lengthy and expensive site measurement, investigation, and examination.
 - 3. Make entries within 24 hours after receipt of information that a change in WORK has occurred.
 - 4. Maintain in CONTRACTOR'S field office in clean, dry, legible condition complete sets of the following: Contract Drawings, Specifications, Addenda, approved Shop Drawings, Samples, Photographs, Change Orders, other Modifications of Contract, Test Records, Survey Data, Field Orders, and all other documents pertinent to CONTRACTOR'S WORK.
 - 5. Provide files and racks for proper storage and easy access. File in accordance with filing format of Construction Specification Institute (CSI), unless otherwise approved by the OWNER.
 - 6. Documents will be made available at all times for inspection by the OWNER.
 - 7. Record documents shall not be used for any other purpose and shall not be removed from the office without the OWNER'S approval.
- C. Mark all changes, revisions, additions and deletions, to the record set of Drawings in red color pencil or felt tip pen.

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D. Recording:

1. Label each document "PROJECT RECORD" in 2-inch high printed letters.
2. Keep record documents current.
3. Do not permanently conceal any WORK until required information has been recorded.
4. Drawings: Legibly mark to record actual construction including:
 - a. Depths of various elements of foundation in relation to datum.
 - b. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
 - c. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
 - d. Field changes of dimensions and details.
 - e. Changes made by Change Order or Field Order.
 - f. Details not on original Drawings.
5. Specifications and Addenda: Legibly mark up 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 Change Order or Field Order.
 - c. Other matters not originally specified.

1.02 SUBMITTALS

- A. Upon Substantial Completion of the WORK, deliver record documents to the OWNER. Final payment will not be made until satisfactory record documents are received by the OWNER. The CONTRACTOR shall be available for a period of not more than two (2) months after Substantial Completion to answer questions from the OWNER regarding the marked-up record drawings.
- B. Accompany submittal with transmittal letter containing:
1. Date.
 2. Project title and number.
 3. CONTRACTOR'S name and address.
 4. Title and number of each record document.
 5. Certification that each document as submitted is complete and accurate.
 6. Signature of CONTRACTOR, or the CONTRACTOR's authorized representative.

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1.03 QUALITY ASSURANCE –NOT USED

1.04 DELIVERY, STORAGE AND HANDLING -- NOT USED

1.05 PROJECT/SITE CONDITIONS

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 MAINTENANCE OF RECORD DOCUMENTS

A. General:

1. Promptly following commencement of Contract Times, secure from the OWNER at no cost to CONTRACTOR, one complete set of Contract Documents. Drawings will be full size.
2. Delete ENGINEER title block and seal from all documents.

B. Preservation:

1. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
2. Make documents and Samples available at all times for observation by the OWNER.

C. Making Entries on the Drawings:

1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe change by graphic line and note as required.
 - a. Color Coding:
 - 1) Green when showing information deleted from Drawings.
 - 2) Red when showing information added to Drawings.
 - 3) Blue and circled in blue to show notes.
2. Date entries.
3. Call attention to entry by “cloud” drawn around area or areas affected.
4. Legibly mark to record actual changes made during construction, including, but not limited to:
 - a. Horizontal and vertical locations of existing and new Underground structures, equipment, or WORK. Reference to at least two measurements to permanent surface improvements.
 - b. Locate existing facilities, piping, equipment, and items critical to the interface between existing physical conditions or construction and new construction.

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- c. Changes made by Addenda and Field Orders, Work Change Directive, Change Order, Written Amendment, and the OWNER's written interpretation and clarification using consistent symbols for each and showing appropriate document tracking number.
- D. Final payment will not be acted upon until the record drawings have been prepared and delivered to the OWNER. Said up-to-date record drawings shall be in the form of a set of prints with carefully plotted information overlaid in red. AutoCAD files for the Contract Drawings can be provided to the Contractor at the Pre-Construction Meeting for use during the project contingent upon the CONTRACTOR's updating of the AutoCAD files with the as-built information.

END OF SECTION

SECTION 02 41 00
DEMOLITION

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this Section:
1. American National Standards Institute (ANSI): A10.6, Safety Requirements for Demolition Operations.
 2. Occupational Safety and Health Administration (OSHA), U.S. Code of Federal Regulations (CFR) Title 29 Part 1926—Occupational Safety and Health Regulations for Construction.
 3. Environmental Protection Agency (EPA), U.S. Code of Federal Regulations (CFR), Title 40:
 - a. Part 61—National Emission Standards for Hazardous Air Pollutants.
 - b. Part 82—Protection of Stratospheric Ozone.
 - c. Part 273—Standards for Universal Waste Management.

1.02 DEFINITIONS

- A. Demolition: Dismantling, razing, destroying, or wrecking of any fixed building or structure or any part thereof.
- B. Modify: Provide all necessary material and labor to modify an existing item to the condition indicated or specified.
- C. Relocate: Remove, protect, clean and reinstall equipment, including electrical, instrumentation, and all ancillary components required to make the equipment fully functional, to the new location identified on the Drawings.
- D. Renovation: Altering a facility or one or more facility components in any way.
- E. Salvage/Salvageable: Remove and deliver, to the specified location(s), the equipment, building materials, or other items so identified to be saved from destruction, damage, or waste; such property to remain that of Owner. Unless otherwise specified, title to items identified for demolition shall revert to Contractor.

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1.03 SUBMITTALS

A. Informational Submittals:

1. Submit proposed Demolition/Renovation Plan, in accordance with requirements specified herein, for approval before such Work is started.
2. Submit copies of any notifications, authorizations and permits required to perform the Work.

1.04 REGULATORY AND SAFETY REQUIREMENTS

- A. When applicable, demolition Work shall be accomplished in strict accordance with 29 CFR 1926-Subpart T.
- B. Comply with federal, state, and local hauling and disposal regulations. In addition to the requirements of the General Conditions, Contractor's safety requirements shall conform to ANSI A10.6.
- C. Furnish timely notification of this project to applicable federal, state, regional, and local authorities in accordance with 40 CFR 61-Subpart M.

1.05 DEMOLITION/RENOVATION PLAN

- A. Demolition/Renovation Plan shall provide for safe conduct of the Work and shall include:
 1. Detailed description of methods and equipment to be used for each operation;
 2. The Contractor's planned sequence of operations, including coordination with other work in progress;
 3. Procedures for removal and disposition of materials specified to be salvaged.

1.06 SEQUENCING AND SCHEDULING

- A. The Work of this Specification shall not commence until Contractor's Demolition/Renovation Plan has been approved by Engineer.
- B. Include the Work of this Specification in the progress schedule, as specified in Section 01 32 16, Project Schedule.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 EXISTING FACILITIES TO BE DEMOLISHED OR RENOVATED

A. Structures:

1. Existing structures indicated shall be removed as specified on the drawings. Sandstone block from existing walls shall be stockpile onsite in a dedicated stockpile for use elsewhere onsite.
2. Sidewalks, curbs, gutters and street light bases shall be removed as indicated.

B. Utilities and Related Equipment:

1. Notify Engineer or appropriate utilities to turn off affected services at least 48 hours before starting demolition activities.
2. Remove existing utilities as indicated and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by Engineer.
3. When utility lines are encountered that are not indicated on the Drawings, notify Engineer prior to further work in that area.

C. Paving and Slabs:

1. Remove, Grind and Sawcut concrete and asphaltic concrete paving and slabs as shown on the Drawings.
2. Provide neat sawcuts at limits of pavement removal as indicated.

D. Masonry: Sawcut and remove masonry so as to prevent damage to surfaces to remain and to facilitate the installation of new Work. Where new masonry adjoins existing, the new Work shall abut or tie into the existing construction as indicated specified.

E. Concrete: Saw concrete along straight lines to a depth of not less than 2 inches. Make each cut in walls perpendicular to the face and in alignment with the cut in the opposite face. Break out the remainder of the concrete provided that the broken area is concealed in the finished Work, and the remaining concrete is sound. At locations where the broken face cannot be concealed, grind smooth or saw cut entirely through the concrete. Where new concrete adjoins existing, the new Work shall abut or tie into the existing construction as indicated on the drawings or as specified.

3.02 PROTECTION

A. Dust Control:

1. Prevent the spread of dust to avoid the creation of a nuisance in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution.
2. Vacuum and dust the Work area and surrounding sidewalks and street as often as necessary when dust is observed to have been generated from the construction site.

B. Traffic Control Signs: Where pedestrian and driver safety is endangered in the area of removal Work, use traffic barricades with flashing lights.

C. Existing Work:

1. Survey the site and examine the Drawings and Specifications to determine the extent of the Work before beginning any demolition or renovation.
2. Take necessary precautions to avoid damage to existing items scheduled to remain in place, to be reused, or to remain the property of Owner; any Contractor-damaged items shall be repaired or replaced as directed by Engineer.
3. Provide temporary weather protection during interval between removal of existing exterior surfaces and installation of new to ensure that no water leakage or damage occurs to structure or interior areas of existing building.
4. Ensure that structural elements are not overloaded as a result of or during performance of the Work. Responsibility for additional structural elements or increasing the strength of existing structural elements as may be required as a result of any Work performed under this Contract shall be that of the Contractor. Repairs, reinforcement, or structural replacement must have Engineer approval.
5. Do not overload pavements to remain.

D. Trees: Protect trees as specified.

E. Facilities:

1. Protect electrical and mechanical services and utilities. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities.
2. Protect all facility elements not scheduled for demolition.

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F. Protection of Personnel:

1. During demolition, continuously evaluate the condition of the structure being demolished and take immediate action to protect all personnel working in and around the demolition site.
2. Provide temporary barricades and other forms of protection to protect Owner's personnel and the general public from injury due to demolition Work.
3. Provide protective measures as required to provide free and safe passage of Owner's personnel and the general public to occupied portions of the structure.

3.03 BURNING

- A. The use of burning at the Site for the disposal of refuse and debris will not be permitted.

3.04 RELOCATIONS

- A. Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Clean all items to be relocated prior to reinstallation, to the satisfaction of Engineer. Repair items to be relocated which are damaged or replace damaged items with new undamaged items as approved by Engineer.

3.05 BACKFILL

- A. Do not use demolition debris as backfill material.

3.06 TITLE TO MATERIALS

- A. All salvaged sandstone block materials will remain the property of Owner. Contractor will take title to materials only after Owner provides written documentation that Contractor may take ownership.
1. With the exception of the following salvaged materials, all items designated to be removed shall become the property of the Contractor: Sandstone blocks.
- B. Title to materials resulting from demolition is vested in the Contractor upon approval by Engineer of Contractor's Demolition/Renovation Plan, and the resulting authorization by Engineer to begin demolition.

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3.07 DISPOSITION OF MATERIAL

- A. Do not remove equipment and materials from the site without approval of Contractor's Demolition/Renovation Plan by Engineer.
- B. Salvage equipment and material to the maximum extent possible.
- C. Store salvaged items as approved by Engineer and remove them from Owner's property before completion of the Contract. Materials and equipment shall not be either viewed by prospective purchasers or sold on the Site.

3.08 REUSE OF MATERIALS AND EQUIPMENT

- A. Remove and store materials and equipment listed in Article Title To Materials to be reused or relocated to prevent damage, and reinstall as the Work progresses.
- B. Properly store and maintain equipment and materials in same condition as when removed.
- C. Store equipment and material designated to be reused in a location designated by Engineer.
- D. Equipment and material designated to be reused shall be cleaned before being put back into service.
- E. Engineer will determine condition of equipment and materials prior to removal.

3.09 SPECIALIZED SALVAGE

- A. Historical Items:
 - 1. Remove in a manner to prevent damage.
 - 2. The following historical items shall be delivered to Owner for disposition: Sandstone blocks.

3.10 UNSALVAGEABLE MATERIAL

- A. Concrete, masonry, and other noncombustible material, except concrete permitted to remain in place, shall be disposed of off-site by the Contractor.

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards that may be referenced in this section:
1. American Concrete Institute (ACI):
 - a. 117, Specification for Tolerances for Concrete Construction and Materials.
 - b. 301, Specifications for Structural Concrete.
 - c. 305.1, Specification for Hot Weather Concreting.
 - d. 306.1, Standard Specification for Cold Weather Concreting.
 - e. 350.1, Specification for Tightness Testing of Environmental Engineering Concrete Containment Structures.
 - f. CP-1, Technical Workbook for ACI Certification of Concrete Field Testing Technician – Grade 1.
 2. ASTM International (ASTM):
 - a. C31/C31M, Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - b. C33/C33M, Standard Specification for Concrete Aggregates.
 - c. C39/C39M, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - d. C94/C94M, Standard Specification for Ready-Mixed Concrete.
 - e. C109/C109M, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
 - f. C143/C143M, Standard Test Method for Slump of Hydraulic-Cement Concrete.
 - g. C150/C150M, Standard Specification for Portland Cement.
 - h. C157/C157M, Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.
 - i. C227, Standard Test Method for Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method).
 - j. C231/C231M, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 - k. C260/C260M, Standard Specification for Air-Entraining Admixtures for Concrete.
 - l. C494/C494M, Standard Specification for Chemical Admixtures for Concrete.

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- m. C595/C595M, Standard Specification for Blended Hydraulic Cements.
 - n. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
 - o. C989, Standard Specification for Slag Cement for Use in Concrete and Mortars.
 - p. C1012/C1012M, Standard Test Method for Length Change of Hydraulic-Cement Mortars Exposed to a Sulfate Solution.
 - q. C1017/C1017M, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
 - r. C1074, Standard Practice for Estimating Concrete Strength by the Maturity Method.
 - s. C1077, Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation.
 - t. C1218/C1218M, Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
 - u. C1240, Standard Specification for Silica Fume Used in Cementitious Mixtures.
 - v. C1260, Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method).
 - w. C1293, Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction.
 - x. C1567, Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method).
 - y. C1582/C1582M, Standard Specification for Admixtures to Inhibit Chloride-Induced Corrosion of Reinforcing Steel in Concrete.
 - z. C1602/C1602M, Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.
 - aa. E329, Standard Specification for Agencies Engaged in Construction Inspection, Special Inspection, or Testing Materials Used in Construction.
 - bb. E1155, Standard Test Method for Determining F_F Floor Flatness and F_L Floor Levelness Numbers.
3. National Ready Mixed Concrete Association (NRMCA).

1.02 DEFINITIONS

- A. Cold Weather: When ambient temperature is below 40 degrees F or is approaching 40 degrees F and falling.

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- B. Contractor's Licensed Design Engineer: Individual representing Contractor who is licensed to practice engineering as defined by statutory requirements of professional licensing laws in state or jurisdiction in which Project is to be constructed.
- C. Defective Area: Surface defects that include honeycomb, rock pockets, indentations, and surface voids greater than 3/16-inch deep, surface voids greater than 3/4 inch in diameter, cracks in liquid containment structures and below grade habitable spaces that are 0.005-inch wide and wider, and cracks in other structures that are 0.010-inch wide and wider, spalls, chips, embedded debris, sand streaks, mortar leakage from form joints, deviations in formed surface that exceed specified tolerances and include but are not limited to fins, form pop-outs, and other projections. At exposed concrete, defective areas also include texture irregularities, stains, and other color variations that cannot be removed by cleaning.
- D. Exposed Concrete: Concrete surface that can be seen inside or outside of structure regardless of whether concrete is above water, dry at all times, or can be seen when structure is drained.
- E. Hot Weather: As defined in ACI 305.1.
- F. Hydraulic Structure: Liquid containment structure.
- G. New Concrete: Less than 60 days old.
- H. Slurry Mixture: Mixture of sand, 3/8-inch maximum nominal aggregate size, cement, and water for wall construction joints with waterstop.

1.03 SUBMITTALS

- A. Action Submittals:
 - 1. Mix Designs:
 - a. Contain proportions of materials and admixtures to be used on Project, signed by mix designer.
 - b. Documentation of average strength for each proposed mix design in accordance with ACI 301.
 - c. Manufacturer's Certificate of Compliance for the following:
 - 1) Portland cement.
 - 2) Fly ash.
 - 3) Slag cement.
 - 4) Silica Fume.
 - 5) Aggregates, including specified class designation for coarse aggregate.

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- 6) Admixtures.
 - 7) Concrete producer has verified compatibility of constituent materials in design mix.
 - d. Test Reports: Water-Soluble Chloride-Ion Content in Hardened Concrete: Unless otherwise permitted, in accordance with ASTM C1218/C1218M at an age between 28 days and 42 days.
 - e. Aggregates:
 - 1) Coarse Aggregate Gradation: List gradings and percent passing through each sieve.
 - 2) Fine Aggregate Gradation: List gradings and percent passing through each sieve.
 - 3) Percent of fine aggregate weight to total aggregate weight.
 - 4) Deleterious substances in fine aggregate per ASTM C33/C33M, Table 2.
 - 5) Deleterious substances in coarse aggregate per ASTM C33/C33M, Table 4.
 - 6) Test Reports:
 - a) Alkali Aggregate Reactivity: Aggregate shall be classified as non-potentially reactive in accordance with Article Concrete Mix Design. Include documentation of test results per applicable standards.
 - f. Admixtures: Manufacturer's catalog cut sheets and product data sheets for each admixture used in proposed mix designs.
- 2. Product Data: Specified ancillary materials.
- 3. Detailed plan for curing and protection of concrete placed and cured in cold weather. Details shall include, but not be limited to, the following:
 - a. Procedures for protecting subgrade from frost and accumulation of ice or snow on reinforcement, other metallic embeds, and forms prior to placement.
 - b. Procedures for measuring and recording temperatures of reinforcement and other embedded items prior to concrete placement.
 - c. Methods for temperature protection during placement.
 - d. Types of covering, insulation, housing, or heating to be provided.
 - e. Curing methods to be used during and following protection period.
 - f. Use of strength accelerating admixtures.
 - g. Methods for verification of in-place strength.
 - h. Procedures for measuring and recording concrete temperatures.
 - i. Procedures for preventing drying during dry, windy conditions.

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4. Detailed plan for hot weather placements including curing and protection for concrete placed in ambient temperatures over 80 degrees F. Plan shall include, but not be limited to, the following:
 - a. Procedures for measuring, and recording temperatures of reinforcement and other embedded items prior to concrete placement.
 - b. Use of retarding admixture.
 - c. Methods for controlling temperature of reinforcement and other embedded items and concrete materials before and during placement.
 - d. Types of shading and wind protection to be provided.
 - e. Curing methods, including use of evaporation retardant.
 - f. Procedures for measuring and recording concrete temperatures.
 - g. Procedures for preventing drying during dry, windy conditions.
5. Concrete repair techniques.

B. Informational Submittals:

1. Manufacturer's application instructions for bonding agent and bond breaker.
2. Manufacturer's Certificate of Compliance to specified standards:
 - a. Bonding agent.
 - b. Bond breaker.
 - c. Repair materials.
3. Statement of Qualification:
 - a. Batch Plant: Certification as specified herein.
 - b. Mix designer.
 - c. Installer.
 - d. Testing agency.
4. Field test reports.
5. Concrete Delivery Tickets:
 - a. For each batch of concrete before unloading at Site.
 - b. In accordance with ASTM C94/C94M, including requirements 14.2.1. through 14.2.10.
 - c. Indicate amount of mixing water withheld and maximum amount that may be permitted to be added at Site.

1.04 QUALITY ASSURANCE

- A. Concrete construction shall conform to requirements of ACI 117 and ACI 301, except as modified herein.

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B. Qualifications:

1. Batch Plant: NRMCA Program for Certification of Ready-Mixed Concrete Production Facilities or approved equivalent program.
2. Mix Designer: Person responsible for developing concrete mixture proportions certified as NRMCA Concrete Technologist Level 2 or DOT certified mix designer in jurisdiction of the Work. Requirement may be waived if individual is Contractor's Licensed Design Engineer.
3. Testing Agency: Unless otherwise permitted, an independent agency, qualified according to ASTM C1077 and ASTM E329 for testing indicated.
 - a. Where field testing is required of Contractor, personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
 - b. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cementitious Materials:

1. Cement:
 - a. Portland Cement: Unless otherwise specified, conform to requirements of ASTM C150/C150M.
 - b. Blended Hydraulic Cement:
 - 1) Unless otherwise specified, conform to requirements of ASTM C595/C595M.
 - 2) Portland cement used in blended hydraulic cement, conform to requirements of ASTM C150/C150M.
 - c. Furnish from one source.
2. Supplementary Cementitious Materials (SCM):
 - a. Fly Ash (Pozzolan): Class F fly ash in accordance with ASTM C618, except as modified herein:
 - 1) ASTM C618, Table 1, Loss on Ignition: Unless permitted otherwise, maximum 3 percent.
 - b. Slag Cement: In accordance with ASTM C989, Grade 100 or Grade 120.
 - c. Silica Fume: ASTM C1240.

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- B. Aggregates: Furnish from one source for each aggregate type used in a mix design.
1. Normal-Weight Aggregates:
 - a. In accordance with ASTM C33/C33M, except as modified herein.
 - 1) Class Designation: 4S unless otherwise specified.
 - b. Free of materials and aggregate types causing pop-outs, discoloration, staining, or other defects on surface of concrete.
 - c. Alkali Silica Reactivity: See Article Concrete Mix Design.
 2. Fine Aggregates:
 - a. Clean, sharp, natural sand.
 - b. ASTM C33/C33M.
 - c. Limit deleterious substances in accordance with ASTM C33/C33M, Table 2 and as follows:
 - 1) Limit material finer than 75- μ m (No. 200) sieve to 5 percent mass of total sample.
 - 2) Limit coal and lignite to 1.0 percent.
 3. Coarse Aggregate:
 - a. Natural gravels, combination of gravels and crushed gravels, crushed stone, or combination of these materials containing no more than 15 percent flat or elongated particles (long dimension more than five times the short dimension).
 - b. Limit deleterious substances in accordance with ASTM C33/C33M, Table 4 for specified class designation.
- C. Admixtures: Unless otherwise permitted, furnish from one manufacturer.
1. Characteristics:
 - a. Compatible with other constituents in mix.
 - b. Contain at most, only trace amount chlorides in solution.
 - c. Furnish type of admixture as recommended by manufacturer for anticipated temperature ranges.
 2. Air-Entraining Admixture: ASTM C260/C260M.
 3. Water-Reducing Admixture: ASTM C494/C494M, Type A or Type D.
 - a. Manufacturers and Products:
 - 1) BASF Admixtures Inc., Shakopee, MN; Pozzolith Series or PolyHeed Series.
 - 2) Euclid Chemical Co., Cleveland, OH; Eucon Series.
 - 3) W. R. Grace & Co., Cambridge, MA; Daracem Series or Mira Series.
 4. Retarding Admixture: ASTM C 494/C 494M, Type B.
 5. Accelerating Admixture: ASTM C 494/C 494M, Type C.
 6. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F or Type G.

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- a. Manufacturers and Products:
 - 1) BASF Admixtures Inc., Shakopee, MN; Glenium Series, PS 1460, or Rheobuild 1000.
 - 2) Euclid Chemical Co., Cleveland, OH; Eucon Series or Plastol Series.
 - 3) W. R. Grace & Co., Cambridge, MA; ADVA Series, Daracem Series, or EXP 950.
 - 7. Plasticizing Admixture: ASTM C1017/C1017M, Type I or Type II.
 - 8. Shrinkage Reducing Admixture:
 - a. Manufacturers and Products:
 - 1) BASF Admixtures Inc., Shakopee, MN; Tetraguard AS20.
 - 2) Euclid Chemical Co., Cleveland, OH; Eucon SRA Series.
 - 3) W. R. Grace & Co., Cambridge, MA; Eclipse Series.
 - 9. Corrosion Protection Additive: Protects against mold and algae.
 - a. Manufacturers and Products: ConShield Technologies, ConShield.
- D. Water and Ice: Mixing water for concrete and water used to make ice shall be potable water, unless alternative sources of water are permitted.
- 1. Water from alternative sources shall comply with requirements of ASTM C1602/C1602M, and concentration of chemicals in combined mixing water shall be less than:
 - a. Chloride Content: 1,000 ppm.
 - b. Sulfate Content as SO_4 : 3,000 ppm.
 - c. Alkalis as $(\text{Na}_2\text{O} + 0.658 \text{ K}_2\text{O})$: 600 ppm.
 - d. Total Solids by Mass: Less than 50,000 ppm.

2.02 ANCILLARY MATERIALS

- A. Bonding Agent: Unless otherwise specified, in accordance with the following:
- 1. ASTM C881/C881M, Type V.
 - 2. Two-component, moisture insensitive, 100 percent solids epoxy.
 - 3. Consult manufacturer for surface finish, pot life, set time, vertical or horizontal application, and forming restrictions.
 - 4. Manufacturers and Products:
 - a. BASF Building Systems Inc., Shakopee, MN; Concretive Standard LVI.
 - b. Euclid Chemical Co., Cleveland, OH; Euco # 352 Epoxy System LV.
 - c. Prime Resins, Conyers, GA; Prime Bond 3000 to 3900 Series.
 - d. Sika Chemical Corp., Lyndhurst, NJ; Sikadur 32 Hi-Mod.

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B. Bond Breaker:

1. Nonstaining type, providing positive bond prevention.
2. Manufacturers and Products:
 - a. Dayton Superior Corporation, Kansas City, KS; EDOCO Clean Lift Bond Breaker.
 - b. Nox-Crete Products Group, Omaha, NE; Silcoseal Select.

2.03 CONCRETE MIX DESIGN

A. General:

1. See Supplement at the end of this section for mix design requirements for each class of concrete used on Project.
2. Prepare design mixtures for each type and strength of concrete, selecting and proportioning ingredients in accordance with requirements of ACI 301, unless otherwise specified.
3. Selection of constituent materials and products in mix design are optional, unless specified otherwise.
4. Unless otherwise permitted, use water-reducing admixture or water-reducing admixture and high-range, water-reducing admixture, or plasticizing admixture in pumped concrete, in concrete with a water-cementitious materials ratio below 0.50, and in concrete that is part of a liquid-containment structure.
5. Unless otherwise permitted, use water-reducing admixture and high-range, water-reducing admixture, or plasticizing admixture in piers, pilasters, and walls.
6. Use water-reducing admixture or high-range, water-reducing admixture, or plasticizing admixture to achieve fresh properties that facilitate handling, placing, and consolidating of concrete, and specified hardened properties.
7. Use water-reducing and retarding admixture when anticipated high temperatures, low humidity, or other adverse placement conditions can adversely affect fresh properties of concrete.
8. Unless otherwise specified, desired fresh properties of concrete shall be determined by Contractor, and coordinated with concrete producer. Fresh properties of concrete shall remain stable to satisfaction of Contractor, for duration of placement and consolidation, and shall remain in conformance with requirements of Contract Documents.
9. Contractor is encouraged to consider using environmentally sustainable concrete mix design technologies such as use of supplementary cementitious materials and aggregate packing supplementary cementitious materials, aggregate packing, and self-consolidating concrete.

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B. Potential alkali-aggregate reactivity of concrete:

1. Do not use aggregates known to be susceptible to alkali-carbonate reaction (ACR).
2. Aggregates shall have been tested to determine potential alkali-aggregate reactivity in concrete in accordance with ASTM C1260 or ASTM C1567.
 - a. Aggregates that indicate expansion greater than 0.10 percent at 16 days after casting shall not be used unless they have been shown to be non-deleteriously reactive in accordance with ASTM C227 or ASTM C1293, with less than 0.04 percent expansion at 1 year for cement-aggregate combinations or less than 0.04 percent expansion at 2 years for combinations with pozzolan or slag.
 - b. Alkali content of cement used in proposed concrete mixture shall not be greater than alkali content of cement used in test for potential alkali-aggregate reactivity.
 - c. Use low-alkali cement or incorporate pozzolans into concrete mixture as necessary to satisfy testing for potential alkali reactivity. Alternately, a chemical inhibitor such as a lithium based admixture may be proposed.

C. Proportions:

1. Design mix to meet aesthetic, durability, and strength requirements.
2. Where fly ash is included in mix, minimum fly ash content shall be a minimum of 15 percent of weight of total cementitious materials.

D. Concrete Shrinkage Limits: Where shrinkage limits are specified, design mix for following shrinkage limits and test in accordance with ASTM C157/C157M, with the following modifications:

1. Prisms shall be moist cured for 7 days prior to 28-day drying period.
2. Comparator reading at end of 7-day moist cure shall be used as initial length in length change calculation.
3. Reported results shall be average of three prisms.
4. If shrinkage of a specimen departs from average of that test age by more than 0.004 percent, disregard results obtained from that specimen.

E. Unless otherwise specified, results at end of 28-day drying period shall not exceed 0.040 percent if 3-inch prisms are used, or exceed 0.038 percent if 4-inch prisms are used. Aggregate will be rejected if test values exceed these limits.

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F. Slump Range at Site:

1. Prior to submitting mix design, consult with concrete producer and select a target slump value at point of delivery, for each application of each design mix. Unless otherwise permitted, target slump value will then be enforced for duration of Project.
2. Design mixes that include a high-range, water-reducing or a plasticizing admixture shall have a minimum slump of 2 inches prior to addition of admixture. Unless otherwise permitted, slump shall be 8 inches maximum at point of delivery, for concrete with a high-range, water-reducing admixture.
3. Slump tolerance shall meet requirements of ACI 117.

2.04 CONCRETE MIXING

A. General: In accordance with ACI 301, except as modified herein.

B. Truck Mixers:

1. For every truck, test slump of samples taken per ASTM C94/C94M, paragraph 12.5.1.
2. Where specified slump is more than 4 inches, and if slump tests differ by more than 2 inches, discontinue use of truck mixer, unless causing condition is corrected and satisfactory performance is verified by additional slump tests.
3. Provide documentation that maximum concrete temperature in structure will not exceed 158 degrees Fahrenheit, and maximum temperature differential between center of section and external surfaces of concrete will not exceed 35 degrees Fahrenheit.

2.05 TEMPERATURE LIMITS

- A. For concrete sections with a minimum specified dimension that is greater than 1 foot 6 inches, and unless otherwise permitted.
- B. Provide documentation that maximum concrete temperature in structure will not exceed 158 degrees Fahrenheit, and maximum temperature differential between center of section and external surfaces of concrete will not exceed 35 degrees Fahrenheit.

2.06 SOURCE QUALITY CONTROL

- A. Source Quality Control Inspection: Engineer shall have access to and have right to inspect batch plants, cement mills, and supply facilities of suppliers, manufacturers, and Subcontractors, providing products included in this section.

PART 3 EXECUTION

3.01 PLACING CONCRETE

- A. Preparation: Meet requirements ACI 301, except as modified herein.
- B. Inspection: Notify Engineer and Special Inspector at least 1 full working day in advance before starting to place concrete.
- C. Placement into Formwork:
 - 1. Where vapor retarder or barrier is required, coordinate subgrade preparation with requirements in Division 07 of Specifications.
 - 2. Reinforcement: Secure in position before placing concrete.
 - 3. Place concrete as soon as possible after leaving mixer, without segregation or loss of ingredients, without splashing forms or steel above, and in layers not over 1.5 feet deep, except for slabs which shall be placed full depth. Place and consolidate successive layers prior to initial set of first layer to prevent cold joints.
 - 4. Placement frequency shall be such that lift lines will not be visible in exposed concrete finishes.
 - 5. Use placement devices, for example chutes, pouring spouts, and pumps as required to prevent segregation.
 - 6. Vertical Free Fall Drop to Final Placement:
 - a. Forms 8 Inches or Less Wide: 5 feet.
 - b. Forms Wider than 8 Inches: 8 feet, except as specified.
 - 7. For placements where drops are greater than specified, use placement device such that free fall below placement device conforms to required value.
 - a. Limit free fall to prevent segregation caused by aggregates hitting steel reinforcement.
 - 8. Do not use aluminum conveying devices.
 - 9. Provide sufficient illumination in the interior of forms so concrete deposition is visible, permitting confirmation of consolidation quality.
 - 10. Joints in Footings and Slabs:
 - a. Ensure space beneath plastic waterstop completely fills with concrete.

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- b. During concrete placement, make visual inspection of entire waterstop area.
 - c. Limit concrete placement to elevation of waterstop in first pass, vibrate concrete under waterstop, lift waterstop to confirm full consolidation without voids, and place remaining concrete to full height of slab.
 - d. Apply procedure to full length of waterstop.
- 11. Trowel and round off top exposed edges of walls with 1/4-inch radius steel edging tool.
- D. Conveyor Belts and Chutes:
 - 1. Design and arrange ends of chutes, hopper gates, and other points of concrete discharge throughout conveying, hoisting, and placing system for concrete to pass without becoming segregated.
 - 2. Do not use chutes longer than 50 feet.
 - 3. Minimum Slopes of Chutes: Angled to allow concrete to readily flow without segregation.
 - 4. Conveyor Belts:
 - a. Approved by Engineer.
 - b. Wipe clean with device that does not allow mortar to adhere to belt.
 - c. Cover conveyor belts and chutes.
- E. Re-tempering: Not permitted for concrete where cement has partially hydrated.
- F. Pumping of Concrete:
 - 1. Provide standby pump, conveyor system, crane and concrete bucket, or other system onsite during pumping, for adequate redundancy to ensure completion of concrete placement without cold joints in case of primary placing equipment breakdown.
 - 2. Minimum Pump Hose (Conduit) Diameter: 4 inches.
 - 3. Replace pumping equipment and hoses (conduits) that are not functioning properly.
- G. Minimum Time between Adjacent Placements:
 - 1. Construction or Control Joints: 7 days unless otherwise specified.
 - 2. Construction joint between top of footing or slab, as soon as can safely be done without damaging previously cast concrete or interrupting curing thereof, but not less than 24 hours.
 - 3. Expansion or Contraction Joints: 1 day.

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4. For walls with a height in excess of 10 feet, wait at least 2 hours before depositing concrete in beams, girders, or slabs supported thereon.
5. For walls 10 feet in height or less, wait at least 1 hour prior to depositing concrete in beams, girders, brackets, or slabs supported thereon.

H. Consolidation and Visual Observation:

1. Consolidation Equipment and Methods: ACI 301.
2. Provide at least one standby vibrator in operable condition at Site prior to placing concrete.
3. Provide sufficient windows in forms or limit form height to allow for concrete placement through windows and for visual observation of concrete.
4. Vibrate concrete in vicinity of joints to obtain impervious concrete.

I. Hot Weather:

1. Prepare ingredients, mix, place, cure, and protect in accordance with ACI 301, ACI 305.1, and as follows:
 - a. Maintain concrete temperature below 90 degrees F at time of placement, or furnish test data or other proof that admixtures and mix ingredients do not produce flash set plastic shrinkage, or cracking as a result of heat of hydration. Cool ingredients before mixing to maintain fresh concrete temperatures as specified or less.
 - b. Provide for windbreaks, shading, fog spraying, sprinkling, ice, wet cover, or other means as necessary to maintain concrete at or below specified temperature.

J. Cold Weather Placement:

1. Unless otherwise permitted, shall be in accordance with requirements of ACI 306.1 and as follows:
 - a. Cold weather requirements shall apply when ambient temperature is below 40 degrees F or approaching 40 degrees F and falling.
 - b. Do not place concrete over frozen earth or against surfaces with frost or ice present. Frozen earth shall be thawed to acceptance of Engineer.
 - c. Unless otherwise permitted, do not place concrete in contact with surfaces less than 35 degrees F; requirement is applicable to all surfaces including reinforcement and other embedded items.

- d. Provide supplemental external heat as needed when other means of thermal protection are unable to maintain minimum surface temperature of concrete as specified in ACI 306.1.
 - e. Maintain minimum surface temperature of concrete as specified in ACI 306.1 for no less than 3 days during cold weather conditions.
 - f. Protect concrete from freezing until end of curing period and until concrete has attained a compressive strength of 3,500 psi or design compressive strength if less than 3,500 psi.
2. Provide maximum and minimum temperature sensors placed on concrete surfaces spaced throughout Work to allow monitoring of concrete surface temperatures representative of Work. Unless otherwise permitted, record surface temperature of concrete at least once every 12 hours during specified curing period.
 3. External Heating Units: Do not exhaust heater flue gases directly into enclosed area as it causes concrete carbonation as a result of concentrated carbon dioxide.

3.02 REPAIRING CONCRETE

A. General:

1. Repair defective areas of concrete.
2. Develop repair techniques with material manufacturer on surface that will not be visible in final construction prior to starting actual repair work and show how finish color will blend with adjacent surfaces. Obtain approval from Engineer.
3. Obtain quantities of repair material and manufacturer's detailed instructions for use to provide repair with finish to match adjacent surface or apply sufficient repair material adjacent to repair to blend finish appearance.
4. Repair of concrete shall provide structurally sound surface finish, uniform in appearance or upgrade finish by other means until acceptable to Engineer.

3.03 CONCRETE WALL FINISHES

A. Type W-1 (Ordinary Wall Finish):

1. Patch tie holes.
2. Knock off projections.
3. Repair defective areas.

3.04 CONCRETE SLAB FINISHES

A. General:

1. Use manual screeds, vibrating screeds, or roller compacting screeds to place concrete level and smooth.
2. Do not use “jitterbugs” or other special tools designed for purpose of forcing coarse aggregate away from surface and allowing layer of mortar, which will be weak and cause surface cracks or delamination, to accumulate.
3. Finish slab in accordance with specified slab finish.
4. Do not dust surfaces with dry materials nor add water to surfaces.
5. Cure concrete as required.

B. Type S-5 (Broomed Finish):

1. Finish as specified for Type S-1 floor finish, except use only a light-steel troweled finish, and then finish surface by drawing fine-hair broom lightly across surface.
2. Broom in same direction and parallel to expansion joints, or, in case of inclined slabs, perpendicular to slope, except for round roof slab, broom surface in radial direction.

C. Type S-6 (Sidewalk Finish):

1. Slope walks down 1/4 inch per foot away from structures, unless otherwise shown.
2. Strike off surface by means of strike board and float with wood or cork float to true plane, then flat steel trowel before brooming.
3. Broom surface at right angles to direction of traffic or as shown.
4. Lay out sidewalk surfaces in blocks, as shown or as directed by Engineer, with grooving tool.

D. Concrete Curbs:

1. Float top surface of curb smooth, and finish all discontinuous edges with steel edger.
2. After concrete has taken its initial set, remove front form and give exposed vertical surface an ordinary wall finish, Type W-1.

3.05 CONCRETE SLAB TOLERANCES

A. Slab Elevation and Thickness:

1. Finish Slab Elevation: Slope slabs to drains, gutter of end of slab. Slabs shall adequately drain regardless of tolerances.
2. Thickness: Maximum 1/4 inch minus or 1/2 inch plus from thickness shown. Where thickness tolerance will not affect slope, drainage, or slab elevation, thickness tolerance may exceed 1/2 inch plus.

3.06 FIELD QUALITY CONTROL

A. General:

1. Provide adequate facilities for safe storage and proper curing of concrete test specimens onsite for first 24 hours, and for additional time as may be required before transporting to test lab.
2. Unless otherwise specified, sample concrete for testing for making test specimens, from point of delivery.
3. When concrete is pumped, sample and test air content at point of delivery and at point of placement.
4. Evaluation will be in accordance with ACI 301 and Specifications.
5. Test specimens shall be made, cured, and tested in accordance with ASTM C31/C31M and ASTM C39/C39M.
6. Frequency of testing may be changed at discretion of Engineer.
7. Pumped Concrete: Take concrete samples for slump, ASTM C143/C143M, and test specimens, ASTM C31/C31M and ASTM C39/C39M.
8. If measured air content at delivery is greater than specified limit, check test of air content will be performed immediately on a new sample from delivery unit. If check test fails, concrete has failed to meet requirements of Contract Documents. If measured air content is less than lower specified limit, adjustments will be permitted in accordance with ASTM C94/C94M, unless otherwise specified. If check test of adjusted mixture fails, concrete has failed to meet requirements of Contract Documents. Concrete that has failed to meet requirements of Contract Documents shall be rejected.

B. Concrete Strength Test:

1. Unless otherwise specified, one specimen at age of 7 days for information, and two 6-inch diameter or when permitted three 4-inch diameter test specimens at age of 28 days for acceptance.

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2. If result of 7-day concrete strength test is less than 50 percent of specified 28-day strength.
 3. Provide a minimum of one spare test specimen per sample. Test spare cylinder as directed by Engineer.
- C. High-Range, Water-Reducer (Superplasticizer) Admixture Segregation Test: Test each truck prior to use on Project.
1. Segregation Test Objective: Concrete with 4-inch to 8-inch slump shall stay together when slumped. Segregation is assumed to cause mortar to flow out of mix even though aggregate may stay piled enough to meet slump test.
 2. Test Procedure: Make slump test and check for excessive slump and observe to see if mortar or moisture flows from slumped concrete.
 3. Reject concrete if mortar or moisture separates and flows out of mix.
- D. Cold Weather Placement Tests:
1. During cold weather concreting, cast cylinders for field curing as follows. Use method that will produce greater number of specimens:
 - a. Six extra test cylinders from last 100 cubic yards of concrete.
 - b. Minimum three specimens for each 2 hours of placing time or for each 100 cubic yards.
 2. These specimens shall be in addition to those cast for lab testing.
 3. Protect test cylinders from weather until they can be placed under same protection provided for concrete of structure that they represent.
 4. Keep field test cylinders in same protective environment as parts of structure they represent to determine if specified strength has been obtained.
 5. Test cylinders in accordance with applicable sections of ASTM C31/C31M and ASTM C39/C39M.
- E. Tolerances:
1. Slab Finish Tolerances and Slope Tolerances:
 - a. Slab Flatness and Levelness: Make measurements within 72 hours of concrete placement.
 - 1) Flatness measurements are not applicable to unshored form surfaces.
 - 2) Levelness measurements are not applicable to cambered or sloped surfaces.
 - b. Slab flatness and levelness shall be determined in accordance with ASTM E1155.

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3.07 PROTECTION OF INSTALLED WORK

- A. After curing and after applying final finish, cover slabs with plywood or particle board or plastic sheeting or other material to keep floor clean and protect it from material and damage as a result of other construction work.
- B. Repair areas damaged by construction, using specified repair materials and approved repair methods.

3.08 SCHEDULE OF CONCRETE FINISHES

- A. Provide concrete finishes as scheduled:

Area	Type of Finish
Exterior Slabs	
Play Structures	S-5
Sidewalks	S-6
Other exterior slabs	S-5

3.09 SUPPLEMENTS

- A. Requirements of concrete mix designs following “End of Section,” are a part of this Specification and supplement requirements of Part 1 through Part 3 of this section:
 - 1. Concrete Mix Design, Class 4500F1S1P0C1.

END OF SECTION

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CONCRETE MIX DESIGN, CLASS 4500F1S1P0C1

A. Mix Locations:

1. Curbs and Gutters.
2. Sidewalks.
3. Play Structures.
4. Where specified in Contract Documents.

B. Exposure Categories and Classifications: F1S1P0C1.

C. Mix Properties:

1. Limit water to cementitious materials ratio (W/Cm) in mix design to maximum value of 0.45.
2. Minimum concrete compressive strength (f'c) shall be 3,500 psi at 28 days and 4,500 psi at 56 days.
3. Unless otherwise specified, provide air content based on nominal maximum size of aggregate as follows:

Nominal Maximum Aggregate Size in inches	Air Content (%)*
3/8	6.0
1/2	5.5
3/4	5.0
1	4.5
1-1/2	4.5
2§	4.0
3§	3.5

‡See ASTM C33/C33M for tolerance on oversize for various nominal maximum size designations.

*Tolerance of air content is +1-1/2 percent.

§Air contents apply to total mixture. When testing concretes, however, aggregate particles larger than 1-1/2 inches are to be removed by sieving and air content will be measured on the sieved fraction (tolerance on air content as delivered applies to this value). Air content of total mixture is computed from value measured on the sieved fraction passing the 1-1/2-inch sieve in accordance with ASTM C231/C231M.

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4. Provide cementitious materials in accordance with one of the following:
 - a. ASTM C150/C150M Type II; inclusion of supplementary cementitious materials in design mix is optional.
 - b. ASTM C150/C150M types other than Type II, plus supplementary cementitious materials in accordance with one of the following:
 - 1) Tricalcium Aluminate Content of Total Cementitious Materials: Maximum 8 percent by weight.
 - 2) Provide documentation of test results in accordance with ASTM C1012/C1012M, for combinations of cementitious materials providing sulfate resistance with expansion less than 0.10 percent at 6 months.
 - 3) ASTM C595/C595M Type IP or Type IS (less than 70), tested to comply with moderate sulfate resistance option (MS).
 - a) Provide documentation of test results in accordance with ASTM C1012/C1012M, for combinations of cementitious materials providing sulfate resistance with expansion less than 0.10 percent at 6 months.
 5. Limit water-soluble, chloride-ion content in hardened concrete to 0.10 percent, unless otherwise specified.
 - a. Limits are stated in terms of chloride ions in percent by weight of cement.
 - b. Unless otherwise permitted, provide documentation from concrete tested in accordance with ASTM C1218/C1218M at an age between 28 days and 42 days.
- D. Refer to PART 1 through PART 3 of this section for additional requirements.

SECTION 03 62 00
NONSHRINK GROUTING

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. ASTM International (ASTM):
 - a. C230, Standard Specification for Flow Table for Use in Tests of Hydraulic Cement.
 - b. C621, Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrinkable).
 - c. C939, Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method).
 - d. C1107/C1107M, Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).

1.02 SUBMITTALS

A. Action Submittals:

1. Product data of grouts.
2. Proposed method for keeping existing block surfaces wet prior to placing grout.
3. Forming method for fluid grout placements.
4. Curing method for grout.

B. Informational Submittals:

1. Manufacturer's Written Instructions:
 - a. Cement-water ratio of grout topping.
 - b. Mixing of grout.
2. Manufacturer's Certificate of Compliance:
 - a. Grout free from chlorides and other corrosion-causing chemicals.
 - b. Nonshrink grout properties of Category II and Category III, verifying expansion at 3 days or 14 days will not exceed the 28-day expansion and nonshrink properties are not based on gas or gypsum expansion.
3. Test Reports:
 - a. Field test reports and laboratory test results for field-drawn Samples.

1.03 **GUARANTEE**

- A. Manufacturer's guarantee shall not contain disclaimer on the product data sheet, grout bag, or container limiting responsibility to only the purchase price of products and materials furnished.
- B. Manufacturer guarantees participation with Contractor in replacing or repairing grout found defective as a result of faulty materials, as determined by industry standard test methods.

PART 2 PRODUCTS

2.01 **NONSHRINK GROUT**

- A. Repurposed Sandstone Block Joints:
 - 1. Nonmetallic and nongas-liberating.
 - 2. Prepackaged natural aggregate grout requiring only the addition of water.
 - 3. Test in accordance with ASTM C1107/C1107M:
 - a. Grout shall have flowable consistency.
 - b. Flowable for 15 minutes.
 - 4. Grout shall not bleed at maximum allowed water.
 - 5. Minimum strength of flowable grout, 3,000 psi at 3 days, 5,000 psi at 7 days, and 7,000 psi at 28 days.
 - 6. Manufacturers and Products:
 - a. BASF Building Systems, Inc., Shakopee, MN; Construction Grout.
 - b. Euclid Chemical Co., Cleveland, OH; NS Grout.
 - c. Dayton Superior Corp., Kansas City, KS; 1107 Advantage Grout.
 - d. US MIX Co., Denver, CO; US Spec MP Grout.
 - e. L & M Construction Chemicals, Inc., Omaha, NE; Duragrout.

PART 3 EXECUTION

3.01 **NONSHRINK GROUT**

- A. General: Mix, place, and cure nonshrink grout in accordance with grout manufacturer's recommendations.

3.02 FIELD QUALITY CONTROL

A. Evaluation and Acceptance of Nonshrink Grout:

1. Consistency: As specified in Article Nonshrink Grout. Grout with consistencies outside range requirements shall be rejected.
2. Segregation: As specified in Article Nonshrink Grout. Grout when aggregate separates shall be rejected.
3. Nonshrink grout cubes shall test equal to or greater than minimum strength specified.
4. Strength Test Failures: Nonshrink grout work failing strength tests shall be removed and replaced.
5. Store cubes at 70 degrees F.
6. Independent testing laboratory shall prepare, store, cure, and test cubes in accordance with ASTM C1107/C1107M.

END OF SECTION

SECTION 31 10 00
SITE CLEARING

PART 1 GENERAL

1.01 DEFINITIONS

- A. Interfering or Objectionable Material: Trash, rubbish, and junk; vegetation and other organic matter, whether alive, dead, or decaying; topsoil.
- B. Clearing: Removal of interfering or objectionable material lying on or protruding above ground surface.
- C. Grubbing: Removal of vegetation and other organic matter including stumps, buried logs, and roots greater than 2-inch caliper to a depth of 6 inches below subgrade.
- D. Scalping: Removal of sod without removing more than upper 3 inches of topsoil.
- E. Stripping: Removal of topsoil remaining after applicable scalping is completed.
- F. Project Limits: Areas, as shown or specified, within which Work is to be performed.

1.02 SUBMITTALS

- A. Action Submittals: Drawings clearly showing clearing, grubbing, and stripping limits.

1.03 QUALITY ASSURANCE

- A. Obtain Engineer's approval of staked clearing, grubbing, and stripping limits, prior to commencing clearing, grubbing, and stripping.

1.04 SCHEDULING AND SEQUENCING

- A. Clearing required to install temporary erosion and sediment controls (controls) shall extend no more than 1 acre at a time, prior to controls being installed.
- B. To protect the Kirtland Warbler habitat, no trees or shrubs shall be cut during the following times:
 - 1. April 15th to June 1st

2. August 15th to October 15th

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. Clear, grub, and strip areas actually needed for waste disposal, borrow, or Site improvements within limits shown or specified.
- B. Do not injure or deface vegetation that is not designated for removal.

3.02 LIMITS

- A. As shown on the Drawings or as follows, but not to extend beyond Project (Construction) Limits.
 - 1. Excavation Excluding Trenches: 5 feet beyond top of cut slopes.
 - 2. Trench Excavation: 4 feet from trench centerline, regardless of actual trench width.
 - 3. Fill:
 - a. Clearing and Grubbing: 5 feet beyond toe of permanent fill.
 - b. Stripping and Scalping: 2 feet beyond toe of permanent fill.
 - 4. Waste Disposal:
 - a. Clearing: 5 feet beyond perimeter.
 - b. Scalping and Stripping: Not required.
 - c. Grubbing: Around perimeter as necessary for neat finished appearance.
 - 5. Structures: 15 feet outside of new structures.
 - 6. Roadways: Clearing , grubbing, scalping, and stripping 5 feet from centerline.
 - 7. Overhead Utilities:
 - a. Clearing and Grubbing: Entire width of easements and right-of-ways.
 - b. Scalping and Stripping: Wherever grading is required.
 - 8. Other Areas: As shown on the Drawings.
- B. Remove rubbish, trash, and junk from entire area within Project limits.

3.03 CLEARING

- A. Clear areas within limits shown or specified.

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- B. A list of contributing trees within the construction limits are included in Supplement A located at the end of this section. Any tree not on the list, greater than or equal to 8-inch diameter, shall be valued by the City of Cleveland by "Certified Arborist" valuation tool with a multiplier equal to 3.0.
- C. Fell trees so that they fall away from facilities and vegetation not designated for removal.
- D. Cut stumps not designated for grubbing to within 6 inches of ground surface.
- E. Cut off shrubs, brush, weeds, and grasses to within 2 inches of ground surface.

3.04 GRUBBING

- A. Grub areas within limits shown or specified.

3.05 SCALPING

- A. Do not remove sod until after clearing and grubbing is completed and resulting debris is removed.
- B. Scalp areas within limits shown or specified.

3.06 STRIPPING

- A. Do not remove topsoil until after scalping is completed.
- B. Strip areas within limits to minimum depths shown or specified. Do not remove subsoil with topsoil.
- C. Stockpile strippings, meeting requirements of Section 32 91 13, Soil Preparation, for topsoil, separately from other excavated material.

3.07 TREE REMOVAL OUTSIDE CLEARING LIMITS

- A. Remove Within Project Limits:
 - 1. Dead, dying, leaning, or otherwise unsound trees that may strike and damage Project facilities in falling.
 - 2. Trees designated on the Drawings.
- B. Cut stumps off flush with ground, remove debris, and if disturbed, restore surrounding area to its original condition.

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3.08 SALVAGE

- A. Saleable log timber may be sold to Contractor's benefit. Promptly remove from Project Site.
- B. Sod with commercial value may be sold to Contractor's benefit. Promptly remove from Project Site.

3.09 DISPOSAL

- A. Clearing and Grubbing Debris:
 - 1. Dispose of debris offsite.
 - 2. Debris may be buried in designated onsite disposal areas to minimum depth of 3 feet below final grade. In lieu of onsite burial, dispose of debris offsite.
 - 3. Burning of debris onsite will not be allowed.
 - 4. Woody debris may be chipped. Chips may be sold to Contractor's benefit or used for landscaping onsite as mulch or uniformly mixed with topsoil, provided that resulting mix will be fertile and not support combustion. Maximum dimensions of chipped material used onsite shall be 1/4 inch by 2 inches. Dispose of chips that are un-saleable or unsuitable for landscaping or other uses with unchipped debris.
 - 5. Limit offsite disposal of clearing and grubbing debris to locations that are approved by federal, state, and local authorities, and that will not be visible from Project.
- B. Scalpings: As specified for clearing and grubbing debris.
- C. Strippings:
 - 1. Dispose of strippings that are unsuitable for topsoil or that exceed quantity required for topsoil offsite. Contractor shall be responsible for soil testing and any requirements to dispose of strippings at an offsite disposal facility.
 - 2. Stockpile topsoil in sufficient quantity to meet Project needs. Dispose of excess strippings as specified for clearing and grubbing.

3.10 SUPPLEMENTS

- A. See the Contributing Tree Inventory in Supplement A for evaluation of existing contributing trees within the work limits.

END OF SECTION

31 10 00 SITE CLEARING - SUPPLEMENT A

CONTRIBUTING TREE VALUATION AND PENALTY SUMMARY

TAG NO.	TREE TYPE	DBH	CONTRACTOR PENALTY IF IMPACTED AND DRAWINGS SHOW THE TREE IS TO BE PROTECTED OR SAVED	
1744	english oak	11.5	\$	5,360
1745	elm	13	\$	6,083
1746	english oak	25.5	\$	15,342
1747	scarlet oak	18	\$	9,065
1750	scarlet oak	22	\$	12,143
1751	scarlet oak	21.5	\$	11,725
1753	black willow	25	\$	14,858
1754	black willow	24	\$	13,914
1755	red oak	23	\$	13,010
1757	black willow	36	\$	26,686
1758	black willow	20	\$	10,528
1759	American elm	20	\$	10,528
1761	silver maple	11	\$	5,089
1762	pin oak	27	\$	16,858
1763	cottonwood	14	\$	6,603
1764	scarlet oak	38.5	\$	29,402
1765	shingle oak	35	\$	25,569
1766	scarlet oak	32.5	\$	22,710
1768	pin oak	25.5	\$	15,342
1769	scarlet oak	29.5	\$	19,577
1770	english oak	22	\$	12,143
1771	english oak	16	\$	7,756
1772	willow oak	14.5	\$	6,876
1773	tulip poplar	19	\$	9,777
1774	American elm	13	\$	6,083
1775	tulip poplar	18	\$	9,065
1776	American elm	10.5	\$	4,793
1777	cottonwood	21	\$	11,317
1778	english oak	20	\$	10,528
1780	American elm	10	\$	4,477
1781	shingle oak	42	\$	33,031
1783	silver maple	10	\$	-
1784	silver maple	14	\$	-
1786	silver maple	21	\$	-
1788	American elm	8.5	\$	3,432
1789	American elm	14	\$	6,603
1791	eastern sycamore	26.5	\$	16,343
1792	black willow	28.5	\$	18,461
1796	bald cypress	20	\$	10,528
1797	bald cypress	19	\$	9,777
1799	northern red oak	16.5	\$	8,069
1901	red mulberry	17	\$	8,391
1904	shingle oak	29	\$	19,014
1905	shingle oak	23	\$	13,010
1906	shingle oak	23.5	\$	13,457
1907	American elm	9	\$	3,794
1908	white ash	10	\$	4,477

31 10 00 SITE CLEARING - SUPPLEMENT A

CONTRIBUTING TREE VALUATION AND PENALTY SUMMARY

TAG NO.	TREE TYPE	DBH	CONTRACTOR PENALTY IF IMPACTED AND DRAWINGS SHOW THE TREE IS TO BE PROTECTED OR SAVED	
1909	American elm	10	\$	4,477
1910	silver maple	15.5	\$	-
1911	white ash	8.5	\$	3,432
1912	silver maple	14.5	\$	-
1913	crabapple	12.5	\$	5,838
1914	crabapple	13.5	\$	6,338
1945	eastern sycamore	42	\$	33,031
1954	sycamore	11.5	\$	5,360
1960	cottonwood	25	\$	14,858
1961	ash	10	\$	4,477
1977	norway maple	9	\$	3,794
1979	norway maple	8.5	\$	3,432
2001	black walnut	8	\$	3,062
2026	American elm	8	\$	3,062
2058	cottonwood	40	\$	30,982
2059	horsechestnut	24	\$	13,914
2060	cottonwood	65	\$	51,882
2064	cottonwood	21	\$	11,317
2084	weeping willow	15.5	\$	-
2085	weeping willow	28	\$	-
2110	red mulberry	8.5	\$	-
2115	silver maple	26.5	\$	-
2116	eastern sycamore	30	\$	20,150
2124	silver maple	11.5	\$	-
2125	silver maple	30	\$	-
2128	green ash	9	\$	3,794
2140	cottonwood	33.5	\$	23,867
2146	silver maple	35	\$	-
2148	black willow	39.5	\$	30,459
2155	silver maple	19	\$	-
3038	crabapple	4	\$	-
3039	crabapple	4	\$	-
3040	crabapple	4	\$	-
3042	scarlet oak	10	\$	4,477
3043	willow	8	\$	3,062
3044	willow	12	\$	5,602
3045	willow	10	\$	4,477
3046	willow	8	\$	3,062
3065	pin oak	24	\$	13,914
3066	no field id	6	\$	-
3067	no field id	4	\$	-
3068	no field id	4	\$	-
3069	no field id	4	\$	-
3070	crabapple	6	\$	-
3071	no field id	15	\$	7,161
3072	unknown	12	\$	-

SECTION 31 13 33
TREE PROTECTION AND ROOT PRUNING

PART 1 GENERAL

1.01 SUMMARY

- A. This item shall consist of furnishing all labor, materials, tools and equipment required to protect those trees designated to remain on the site. Protection of designated trees shall include directing heavy construction work activity away from the protected trees. Section Includes the protection, trimming, and pruning of trees that interfere with, or are affected by, execution of the Work, whether temporary or new construction.
- B. Related Sections:
 - 1. 31 10 00, Site Clearing.
 - 2. 31 23 13, Subgrade Preparation.
 - 3. 31 23 16, Excavation.
 - 4. 31 23 23.15, Trench Backfill.
 - 5. 31 23 23, Fill and Backfill.
 - 6. 32 92 00, Turf and Grasses.
 - 7. 32 93 00, Plants.

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Tree Pruning Schedule: Written schedule from Certified Arborist detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.
- C. Qualification Data: For tree service firm and arborist, ISA certification required.
- D. Certification: From Certified Arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly pruned and repaired when damaged.
- E. Maintenance Recommendations: From Certified Arborist, for care and protection of trees affected by construction during and after completion of the Work.
- F. Provide final log of work performed including any damage that occurred during construction and subsequent repairs.

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1.03 QUALITY ASSURANCE

- A. Tree Service Qualifications: An experienced tree service firm that has successfully completed tree protection and trimming work similar to that required for this Project and that will assign an experienced, qualified Arborist to Project site on a full-time basis during execution of the Work.
- B. Arborist qualifications: An Arborist certified by the International Society of Arboriculture.
- C. Tree Pruning Standards: Comply with ANSI A300 (Part 1), "Trees, Shrubs, and other Woody Plant Maintenance—Standard Practices (Pruning)."
- D. Pre-installation Conference: Before starting tree protection and trimming, meet with representatives of authorities having jurisdiction, Owner, Architect, consultants, and other concerned entities to review tree protection and trimming procedures and responsibilities.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Materials for tree/vegetation protection barriers shall conform to the following requirements and AOB E:
 - 1. Chain Link Fence.
 - 2. Mesh Construction Fencing by Conwed or Approved Equal (orange or green color).
 - 3. Cedar Posts (minimum length 6.0 feet).
 - 4. #14 gauge steel wire.
- B. Temporary Signs: White or yellow weatherproof material, 8 inch by 40 inch minimum, with 3-inch black letter: text – "Tree Protection Area – Do Not Enter".

PART 3 EXECUTION

3.01 PREPARATION

- A. Temporary Fencing: Install temporary fencing around the tree protection zones designated on the plans or where directed by the Engineer to protect remaining vegetation from construction damage. Maintain temporary fence and remove when construction is complete.

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- B. Temporary Signs: Install temporary signs 60 feet apart, or two per protected tree, whichever is greater, on posts of temporary fencing. Maintain temporary signs and remove when construction is complete.
- C. Tree Trunk Protection: The Contractor shall provide 2 inches by 8 inches by 8-ft. boards, banded continuously around each trunk to prevent scarring of trees shown on the plans or designated by the Certified Arborist. For multi-stem trees, saplings, and shrubs to be protected within the area of construction, temporary fencing may be used for trunk protection.
 - 1. The Contractor shall repair or replace any and all damaged plant material determined by the Certified Arborist to any existing or newly installed plant material at its own expense. Unnecessary damage to ground cover or turf shall be repaired or replaced as specified for restoration of similar areas within the plans, or as directed by the Certified Arborist, and shall be at the Contractor's expense.
- D. Root Zone Protection: During the entire construction period all reasonable efforts shall be made to protect from damage those trees and their root system designated to remain. Around the trees to be protected, the Contractor shall avoid excessive excavation or compaction and damage during the removal of trees and shrubs designated to be removed. All plant material designated to be saved, or outside of the limits of construction, shall be protected during subsequent construction work. Work under these items will include construction and maintenance of temporary fencing to protect the root zones of existing trees and other plantings, construction and maintenance of tree trunk protection.
 - 1. A protection barrier or temporary fence of at least 1.2m (4 feet) in height shall be installed around each tree to be protected and preserved. The tree protection shall be installed prior to the actual construction start and maintained for the duration of the project.
 - 2. Within this protection zone, construction materials shall not be stored, equipment operated and/or temporary storage buildings or work trailers placed.
 - 3. The protection barrier shall be constructed of orange snow fencing securely fastened to fence posts spaced a maximum of 1.5 m (5 feet) on center. Posts are 1.8m (6 feet) in length with 60 cm (2 feet) set into the ground and 1.2m (4 feet) extending above ground. The fencing shall be attached to the post with a minimum of four (4) nylon-locking ties evenly placed at each post.

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E. Dimensions of the protection barrier are as follows:

1. Trees located in Tree Pits: Where trees are located within Tree Pits, the fencing should be installed at a minimum distance of the inside dimension of the Tree Pit opening with one stake at each corner of the opening.
2. Trees Located in Parkways or Boulevards:
 - a. Small Trees (<9" D.B.H.): Minimum 1.5m (5 feet) from face of tree along the parkway length. In the dimension bordered by the public sidewalk or curb, the fencing shall be the width of the grass parkway with a maximum offset of 30cm (1 foot) from back of curb or edge of sidewalk. In no case shall the closure be less than 61cm (2 feet) from the centerline of the tree. (Example: 6" Tree in a 6' parkway as measured from back of curb to sidewalk. The dimension of the protection fencing would be 1.2m x 3m (4' x 10') with tree in the center). Note: Larger grass parkways (>12') may allow for a ten-foot by ten foot (10' x 10').
 - b. Medium (10" to 15" D.B.H.): Minimum of ten (10) feet from face of tree along the parkway length. In the dimension bordered by the public sidewalk or curb, the fencing shall be the width of the grass parkway with a maximum offset of one (1) foot from back of curb or edge of sidewalk. In no case shall the closure be less than two (2) feet from the centerline of the tree.
 - c. Large (>15" D.B.H.): Minimum of fifteen (15) feet from face of tree along the parkway length. In the dimension bordered by the public sidewalk or curb, the fencing shall be the width of the grass parkway with a maximum offset of one (1) foot from back of curb or edge of sidewalk. In no case shall the closure be less than two (2) feet from the centerline of the tree.
 - 1) The Contractor shall be responsible to protect all trees from damage at the construction site in accordance with Municipal Code Title 10 Chapter 32. It shall be the responsibility of the Contractor to restore all damaged parkways to their original condition. Any trees damaged as a result of construction activity as determined by the Certified Arborist shall be repaired, removed and/or replaced at the Contractor's expense. The Contractor as specified in the Municipal Code shall pay liquidated damages in the amount of the appraised value of the tree(s).
 - 2) At a minimum, any tree greater than 4-inches D.B.H. that is permanently damaged due to the construction project and not originally marked for removal shall be replaced with a new tree as identified by the Owner and shall have a minimum of 4-inch caliper B&B. Any damaged tree smaller than 4-inch caliper

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measured 6-inches above the ground shall be replaced in kind,
inch for inch.

- F. Materials shall be disposed of in accordance with specifications.
- G. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.
- H. Do not store construction materials, debris, or excavated material inside tree protection zones. Do not permit vehicles or foot traffic within tree protection zones; prevent soil compaction over root systems.
- I. Do not allow fires under or adjacent to remaining trees or other plants.

3.02 EXCAVATION

- A. Install shoring or other protective support systems to minimize shoring or benching of excavations.
- B. Do not excavate within tree protection zones, unless otherwise indicated.
- C. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks and comb soil to expose roots.
 - 1. Relocate roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and relocate them without breaking. If encountered immediately adjacent to location of new construction and relocation is not practical; cut roots approximately 3 inches (75 mm) back from new construction.
 - 2. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect.
 - 3. Do not allow heavy equipment in tree protection areas. All excavation work is to be performed by hand.
- D. Root Pruning: Do not cut main lateral roots; cut only smaller roots that interfere with installation of utilities or construction. Cut roots with sharp pruning instruments; do not break or chop.
- E. When excavating, place excavated soil on opposite side of trench from tree.

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3.03 ROOT PRUNING

- A. Root pruning shall take place only where the roots of existing trees have been damaged by the Contractor during construction of the Project, as directed by the Certified Arborist.
- B. If construction is to occur within the root zone of existing plant material, root pruning and special plant care including fertilizing and watering will be required, as directed by the Certified Arborist and hereinafter specified. Prior to root pruning, remove all weeds growing in existing tree mulch rings. Root pruning using an approved mechanical root pruning saw shall be performed prior to digging where noted on the plans, or directed by the Certified Arborist. Air Spading excavation consisting of hand and/or pneumatic excavation may be required if indicated on plans or as directed by Certified Arborist. Whenever roots of plant material to remain are exposed during construction, the damaged root ends are to be removed by cutting them off cleanly.
- C. Initial watering shall be performed on all trees, which are designated for root pruning. Water trees immediately by thoroughly saturating root balls and provide a horticultural watering bag, such as a Gator Bag or equivalent, filled with water to keep root balls thoroughly saturated during first three weeks following root pruning. Thereafter refill bags as required, according to weather conditions, to keep root balls in a moist condition during growing seasons, through the duration of the Project. Test root balls for optimal moisture once a week using a soil auger.
- D. Contractor shall be responsible for location of all utilities prior to installation of trees. Notification of the local Utilities Alert Network is required for all planting sites.
- E. All pruning shall be overseen by a professional arborist (someone whose principal occupation is the care and maintenance of trees). All pruning shall be done according to the National Arborist Association's Pruning Standards for Shade Trees Class 11 - Standard Pruning Specifications.
- F. Any damage to the root zone, as determined by the Certified Arborist, will be compensated by pruning an equivalent amount of the top vegetative growth of the material within 1 week following root damage, fertilization and supplemental watering.
- G. Fertilize damaged trees with fertilizer that promotes root growth. Fertilizer nutrients shall be applied within 48 hours after root damage occurs. Fertilizer nutrients shall be applied within 48 hours after root damage occurs. A fertilizer with a 1: 1: 1 ratio shall be applied at the rate of .5 pounds of nutrients per 1000 square feet (2 kg per 90 square meters).

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- H. Application shall be accomplished by placing dry fertilizer in holes in the soil. The holes shall be 8 inches (200 mm) to 12 inches (300 mm) deep and spaced 24 inches (600 mm) apart in an area beginning 30 inches (1 meter) from the base of the plant. Holes can be punched with a punch bar, dug with a spade, drilled with an auger or any other method approved by the Certified Arborist.
- I. Approximately 0.02 pounds (10 grams) of fertilizer nutrients shall be placed in each hole 250 holes per 1000 square feet (90 square meters). Fertilizer Nutrients shall not be measured for payment but considered incidental to root pruning. If the Certified Arborist determines that the whole method of fertilizer placement is not practical or desirable, an approved method of uniform surface application will be allowed. Neither separate measurement nor payment will be made for fertilization, but will be considered incidental to the cost of Tree Protection.
- J. Supplemental water shall be applied within 48 hours of any root damage. The water shall be applied at the rate of 7 quarts per square yard of surface area within the root zone of plant material having sustained damage to the root zone. Root zone shall be calculated as the areas, which extend three meters beyond the limits of the crown's branches. Subsequent weekly watering shall be applied if deemed necessary by the Certified Arborist. Neither separate measurement nor payment will be made for supplemental watering but will be considered incidental to the cost of Tree Protection.
- K. The Contractor shall repair or replace any and all damage determined by the Certified Arborist to any existing or newly installed plant material at its own expense. Unnecessary damage to ground cover or turf shall be repaired or replaced as specified for restoration of similar areas within the plans, or as directed by the Certified Arborist, and shall be at the Contractor's expense.
- L. Materials shall be disposed of in accordance with specifications.

3.04 REGRADING

- A. Do not fill within tree protection zones, unless otherwise indicated.
- B. Where filling for new construction is required within drip line of trees, perform work by hand to minimize damage to root systems.
 - 1. Where existing grade is below elevation of finish grade, fill with topsoil. Place topsoil by hand in a single uncompacted layer and hand grade to required finish elevations.

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3.05 TREE PRUNING

- A. Prune trees to remain that are affected by temporary and permanent construction.
- B. Pruning Standards: Prune trees according to ANSI A300 (Part 1).
- C. Cut branches with sharp pruning instruments; do not break or chop.
 - 1. Clean all pruning instruments with antimicrobial solution between performing work on separate trees to avoid the potential spread of pathogens.
- D. Chip removed tree branches and uses as organic mulch or dispose of off-site.

3.06 TREE REPAIR AND REPLACEMENT

- A. Promptly repair trees damaged by construction operations within 24 hours. Treat damaged trunks, limbs, and roots according to arborist's written instructions.
- B. Remove and replace dead and damaged trees that arborist determines to be incapable of restoring to a normal growth pattern.
 - 1. Provide new trees of a 6-inch caliber size and of a species selected by Architect when damaged trees more than 6-inch caliber size, measured at breast height, are required to be replaced.
 - a. Planting New Trees: Comply with Columbia University standards.
 - b. Warranty and Maintenance Period: One year.
- C. Aerate surface soil, compacted during construction, 10 feet (3 m) beyond drip line. Drill 2-inch (50 mm) diameter holes a minimum of 12 inches (300 mm) deep at 24 inches (600 mm) o.c. Backfill holes with an equal mix of augured soil and sand.

3.07 DISPOSAL OF WASTE MATERIALS

- A. Burning is not permitted.
- B. Disposal: Remove excess excavated material, displaced trees, and excess chips from Owner's property. Disposal shall be in a legal manner.

END OF SECTION

SECTION 31 23 13
SUBGRADE PREPARATION

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
 - 1. ASTM International (ASTM): D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft³ (600 kN-m/m³)).

1.02 DEFINITIONS

- A. Optimum Moisture Content: As defined in Section 31 23 23, Fill and Backfill.
- B. Prepared Ground Surface: Ground surface after completion of clearing and grubbing, scalping of sod, stripping of topsoil, excavation to grade, and scarification and compaction of subgrade.
- C. Relative Compaction: As defined in Section 31 23 23, Fill and Backfill.
- D. Relative Density: As defined in Section 31 23 23, Fill and Backfill.
- E. Subgrade: Layer of existing soil after completion of clearing, grubbing, scalping of topsoil prior to placement of fill, roadway structure or base for floor slab.

1.03 SEQUENCING AND SCHEDULING

- A. Complete applicable Work specified in Sections 02 41 00, Demolition; 31 10 00, Site Clearing; and 31 23 16, Excavation, prior to subgrade preparation.

1.04 QUALITY ASSURANCE

- A. Notify Engineer when subgrade is ready for compaction or whenever compaction is resumed after a period of extended inactivity.

1.05 ENVIRONMENTAL REQUIREMENTS

- A. Prepare subgrade when unfrozen and free of ice and snow.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. Keep subgrade free of water, debris, and foreign matter during compaction.
- B. Bring subgrade to proper grade and cross-section and uniformly compact surface.
- C. Do not use sections of prepared ground surface as haul roads. Protect prepared subgrade from traffic.
- D. Maintain prepared ground surface in finished condition until next course is placed.

3.02 COMPACTION

- A. Under Earthfill: Compact upper 6 inches to minimum of 90 percent relative compaction as determined in accordance with ASTM D698, Method.
- B. Under Pavement Section, Compact the upper 6 inches to minimum of 90 percent relative compaction as determined in accordance with ASTM D698, Method.

3.03 MOISTURE CONDITIONING

- A. Dry Subgrade: Add water, then mix to make moisture content uniform throughout.
- B. Wet Subgrade: Aerate material by blading, discing, harrowing, or other methods, to hasten drying process.

3.04 CORRECTION

- A. Soft or Loose Subgrade:
 - 1. Adjust moisture content and recompact, or
 - 2. Over excavate as specified in Section 31 23 16, Excavation, and replace with suitable material from the excavation, as specified in Section 31 23 23, Fill and Backfill.
- B. Unsuitable Material: Over excavate as specified in Section 31 23 16, Excavation, and replace with suitable material from the excavation, as specified in Section 31 23 23, Fill and Backfill.

END OF SECTION

SECTION 31 23 16
EXCAVATION

PART 1 GENERAL

1.01 UNCLASSIFIED EXCAVATION

- A. All excavations are unclassified. Complete all excavation regardless of the type, nature, or condition of the materials encountered.

1.02 SUBMITTALS

- A. Informational Submittals:
 - 1. Excavation Plan, Detailing:
 - a. Methods and sequencing of excavation.
 - b. Proposed locations of stockpiled excavated material.
 - c. Proposed onsite and offsite spoil disposal sites.
 - d. Numbers, types, and sizes of equipment proposed to perform excavations.
 - e. Anticipated difficulties and proposed resolutions.

1.03 QUALITY ASSURANCE

- A. Provide adequate survey control to avoid unauthorized overexcavation.

1.04 WEATHER LIMITATIONS

- A. Material excavated when frozen or when air temperature is less than 32 degrees F shall not be used as fill or backfill until material completely thaws.
- B. Material excavated during inclement weather shall not be used as fill or backfill until after material drains and dries sufficiently for proper compaction.
- C. Material excavated to be used as earthfill shall meet the requirements specified in Section 31 23 23, Fill and Backfill.

1.05 SEQUENCING AND SCHEDULING

- A. Demolition: Complete applicable Work specified in Section 02 41 00, Demolition, prior to excavating.

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- B. Clearing, Grubbing, and Stripping: Complete applicable Work specified in Section 31 10 00, Site Clearing, prior to excavating.
- C. Dewatering: Conform to applicable requirements of Section 31 23 19.01, Dewatering, prior to initiating excavation.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. Notify Ohio Utilities Protection Service utility marking service prior to start of excavation. Do not commence any excavation before utility marking is complete.
- B. Excavate to lines, grades, and dimensions shown and as necessary to accomplish Work. Excavate to within tolerance of plus or minus 0.1 foot, except where dimensions or grades are shown or specified as maximum or minimum. Allow for forms, working space, granular base, topsoil, and similar items, wherever applicable. Trim to neat lines where concrete is to be deposited against earth.
- C. Do not overexcavate without written authorization of Engineer.
- D. Remove or protect obstructions as shown and as specified in Section 01 50 00, Temporary Facilities, Article Protection of Work and Property.
- E. Use of explosives is prohibited.

3.02 TRENCH WIDTH

- A. Minimum Width of Trenches:
 - 1. Single Pipes, Conduits, Direct-Buried Cables, and Duct Banks:
 - a. Less than 4-inch Outside Diameter or Width: 18 inches.
 - 2. Increase trench widths by thicknesses of sheeting.
- B. Maximum Trench Width: Unlimited, unless otherwise shown or specified, or unless excess width will cause damage to existing facilities, adjacent property, or completed Work.

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3.03 EMBANKMENT AND CUT SLOPES

- A. Shape, trim, and finish cut slopes to conform with lines, grades, and cross-sections shown, with proper allowance for topsoil or slope protection, where shown.
- B. Remove stones and rock that exceed 3-inch diameter and that are loose and may roll down slope. Remove exposed roots from cut slopes.
- C. Round tops of cut slopes in soil to not less than a 6-foot radius, provided such rounding does not extend offsite or outside easements and rights-of-way, or adversely impacts existing facilities, adjacent property, or completed Work.

3.04 STOCKPILING EXCAVATED MATERIAL

- A. Obtain approval from Owner prior to stockpiling excavated material onsite.
- B. As directed by the Owner, stockpile excavated material that is suitable for use as fill or backfill until material is needed.
- C. Post signs indicating proposed use of material stockpiled. Post signs that are readable from all directions of approach to each stockpile. Signs should be clearly worded and readable by equipment operators from their normal seated position.
- D. Confine stockpiles to within easements, rights-of-way, and approved work areas. Do not obstruct roads or streets.
- E. Do not stockpile excavated material adjacent to trenches and other excavations, unless excavation side slopes and excavation support systems are designed, constructed, and maintained for stockpile loads.
- F. Do not stockpile excavated materials near or over existing facilities, adjacent property, or completed Work, if weight of stockpiled material could induce excessive settlement.

3.05 DISPOSAL OF SPOIL

- A. Dispose of excavated materials, which are unsuitable or exceed quantity needed for fill or backfill, offsite all trash, refuse, and junk as specified in Section 31 10 00, Site Clearing.

END OF SECTION

SECTION 31 23 17
REINFORCED SOIL SLOPE SYSTEM

PART 1 GENERAL

1.01 DESCRIPTION

- A. This Work shall consist of furnishing all materials, labor, equipment, and supervision for construction of a Reinforced Soil Slope (RSS) in accordance with these specifications and in reasonably close conformity with the lines, grades, design and dimensions shown on the Drawings.
- B. This specification applies to slopes that are reinforced with geosynthetics and which use either sandstone blocks or Welded Wire Fabric (WWF) “basket” facing systems.

1.02 REFERENCE STANDARDS

- A. The publications and standards listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the abbreviation only. Unless otherwise stated, the most recent version or edition of each publication or standard is implied.
 - 1. FHWA NHI-00-043 – Mechanically Stabilized Earth Wall and Reinforced Soil Slopes Design and Construction Guidelines;
 - 2. American Society for Testing and Materials (ASTM):
 - a. A82 – Standard Specification for Steel Wire, Plain, for Concrete Reinforcement;
 - b. A123 – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; and
 - c. A185 – Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - d. D4354 – Practice for Sampling of Geosynthetics for Testing
 - e. D4595 – Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
 - f. D4759 – Practice for Determining Specification Conformance of Geosynthetics;
 - g. D4873 – Guide for Identification, Storage, and Handling of Geotextiles;
 - h. D5262 – Test Method for Evaluating the Unconfined Creep Behavior of Geosynthetics;
 - i. D5321 – Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method.

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- j. D5818 – Practice for Obtaining Samples of Geosynthetics from a Test Section for Assessment of Installation Damage;
 - k. D6637 – Standard Test Method for Determining Tensile Properties of Geogrids by the Single or Multi-Rib Tensile Method; and
 - l. D6706 – Standard Test Method for Measuring Geosynthetic Pullout Resistance in Soil.
 - m. D6992 – Standard Test Method for Accelerated Tensile Creep and Creep-Rupture of Geosynthetic Materials Based on Time-Temperature Superposition Using the Stepped Isothermal Method.
 - n. D422 – Test Method for Particle-Size Analysis of Soils.
 - o. D698 – Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort.
 - p. D2487 – Test Method for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
 - q. D3080 – Test Method for Direct Shear Test of Soils Under Consolidated Drained Conditions.
 - r. D4318 – Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 - s. D4767 – Test Method for Consolidated-Undrained Triaxial Compression Test on Cohesive Soils; and
 - t. D4972 – Standard Test Method for pH of Soils.
3. American Association of State Highway and Transportation Officials (AASHTO):
- a. M288-06 Geotextile Specification for Highway Applications.
 - b. T-104 – Standard Method of Test for Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate.
 - c. AASHTO T-267 – Standard Method of Test for Determination of Organic Content in Soils by Loss of Ignition.
 - d. AASHTO T-289 – Determining pH of Soil for Use in Corrosion Testing.
4. Occupational Safety and Health Administration (OSHA): Particular attention is called to Subpart S of the OSHA Standards (29 CFR 1926/1920), published as U.S. Department of Labor Publication 2207, Revised October 1, 1979. Second revision dated August 1, 1989. See Federal Register dated June 2, 1989 for revised standard and commentary.

1.03 DEFINITIONS

- A. RSS System: A soil-retaining system employing geogrid soil reinforcement in the soil mass and a galvanized wire basket facing element to facilitate alignment. At a minimum, the system includes galvanized wire facing units, geogrid reinforcement, and turf reinforcing mat.

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- B. Manufacturer: The individual or legal entity that performs part of the work through a contract agreement with the Contractor. This includes an individual or legal entity that owns the patent, product trademark, product copyright or product name for the approved RSS system. This includes an individual or legal entity that supplies materials for construction of the RSS system. This includes an individual or legal entity that fabricates components of the RSS system through a licensing agreement with the owner of the patent, product trademark, product copyright or product name.

1.04 SUBMITTALS

- A. Comply with Section 01 33 00, Submittal Procedures.
- B. Product Data: The Contractor shall submit technical specifications and product data from the manufacturer's for the following:
1. Geosynthetic Reinforcement.
 2. Facing System.
 3. Drainage Pipe.
 4. Drainage Composite.
 5. Geotextile Filter.
- C. Qualification Data Submittal: In Accordance with Item 1.06
- D. Informational Submittals:
1. Manufacturer's data sheets for compaction equipment.
 2. Certified test results from independent testing agency.
 - a. Certified gradation test results in accordance with ASTM D4222c for imported materials.
 - b. Certified modified Proctor compaction test results in accordance with ASTM D1557, for granular fill, and earthfill (up to 12 test samples).
- E. Certified Bulk Density Testing results of aggregate in accordance with ASTM C29. Samples for Verification:
1. Full-size units of Facing System and Sandstone Block.
 2. Geosynthetic Reinforcement.
 3. Geotextile Filter.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: The MSE Contractor shall document compliance with the following:
 - 1. Experience:
 - a. Five years' experience in construction of MSE structures with a total face area of no less than 500,000 square feet.
 - b. Construction experience with a minimum 20,000 square feet of RSS slopes with the proposed facing system (i.e. Welded Wire Baskets)
 - c. Construction of five (5) RSS slopes with heights that are comparable (within 6 feet) to that proposed
 - d. Construction of at least 10,000 square feet of the RSS slope within the past two years.
 - 2. Experience documentation to include:
 - a. Project name and location.
 - b. Date of construction.
 - c. Contact information of Owner or General Contractor.
 - d. Type of RSS slope facing system used and type.
 - e. Maximum RSS slope height constructed.
 - f. Face area of RSS slope.

1.06 QUALITY CONTROL

- A. The Engineer shall review all submittals for materials, and RSS slope Contractor qualifications.
- B. Provide an on-site technical representative from the Manufacturer during the wall erection to assist the Contractor and Engineer. Provide the Engineer with a copy of the Manufacturer's construction manual prior to erection.
- C. The Owner shall appoint, at its cost, an Inspection Engineer who is experienced with the construction of MSE structures to perform inspection and testing.
- D. The Inspection Engineer shall perform the following:
 - 1. Inspect the construction of the RSS slope for conformance with construction drawings and the requirements of this section.
 - 2. Verify soil installed in the reinforced soil zone conforms to the contract documents.
 - 3. Verify fill soil installed in retained and foundation zones exhibits shear strength specified by the Engineer.
 - 4. Verify shear strength of in-situ soil assumed by Engineer is appropriate.

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5. Inspect and document soil compaction in accordance with these specifications:
 - a. Required dry unit weight.
 - b. Actual dry unit weight.
 - c. Allowable moisture content.
 - d. Actual moisture content.
 - e. Pass/fail assessment.
 - f. Test location station number.
 - g. Rest elevation; and
 - h. Distance of test location behind RSS soil face.
 - i. Insure that excavated slopes are bench-cut.
 - j. Notify the RSS slope Contractor of deficiencies and provide Contractor with opportunity to repair.
 - k. Notify General Contractor and Owner of any deficiency that has not been corrected.
 - l. Document inspection results.
- E. Owner's engagement of Inspection Engineer does not relieve RSS Contractor of responsibility to erect the RSS slope in accordance with construction drawings and these Specifications.
- F. Compacted density and moisture content of soil in the reinforced soil zone shall be tested in accordance with the following:
 1. At least once per every 1,000 square feet (in plan) per 8-inch-thick vertical lift.
 2. At least once per every 3 feet of vertical RSS slope erection.
- G. The RSS slope Contractor, General Contractor, and Inspection Engineer shall provide a written certification to the Owner that states that the RSS slope has been constructed in accordance with the contract documents.

1.07 WARRANTY

- A. MSE structure Contractors shall be required to provide a five (5) year labor warranty on the project. This labor warranty is in addition to a Fifty (50) year product warranty provided by the RSS slope component manufacturer.
- B. Furnish the Owner a written warranty signed by an officer of the RSS slope component manufacturer and a written warranty from the RSS slope Contractor. All warranties shall start at construction completion date.

1.08 PRE-CONSTRUCTION MEETING

- A. The Owner reserves the right to require a pre-construction meeting. The Owner will determine the location and agenda of the meeting. If a pre-construction meeting is required, the General Contractor shall be responsible for its arrangement.
- B. Required attendance shall include the General Contractor, Engineer, RSS Contractor, Grading Contractor and the Inspection Engineer. The General Contractor shall provide notification to all required attendees at least 14 days prior to the meeting.
- C. Pre-Construction Meeting Agenda:
 - 1. Engineer to explain all aspects of the RSS slope construction drawings;
 - 2. Engineer to explain the required bearing capacity of soil below the RSS structure to the Inspection Engineer.
 - 3. Engineer to explain any measures that are required to coordinate the installation of rock facing in the RSS slope.
 - 4. Contractor to explain planned approach to construction the slope and perceived challenges.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. The Contractor shall inspect the materials upon delivery to assure that proper type, grade, and color material has been received.
- B. The Contractor shall store and handle all materials in accordance with manufacturer's recommendations, as specified herein and in a manner that prevents deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, UV exposure or other causes.
- C. The Contractor shall protect the materials from damage. Damaged material shall not be installed in the RSS slope.
- D. Geosynthetics:
 - 1. All geosynthetics shall be handled in accordance with ASTM D4873. Materials shall be stored off the ground and protected from precipitation, sunlight, dirt, and damage.
 - 2. Geosynthetic reinforcement shall be marked in such a manner as to make the style of the material readily identifiable to both the construction crew and the Inspection Engineer after the manufacturer's packaging is removed.

PART 2 PRODUCTS

2.01 GENERAL

- A. The materials used in the RSS slope shall meet the minimum requirements listed below.

2.02 MATERIALS

- A. Provide all test data certifications to the Engineer prior to material use.
- B. High density polyethylene Geogrid will only permitted due to the variable saturated conditions at the site. Polyester Geogrid will not be approved for use,
- C. Primary Geogrid Reinforcement: The minimum required physical and mechanical properties of geogrid reinforcement shall be as indicated:
 - 1. Tensile Strength at 5 percent Strain = 3,560 lb/ft.
 - 2. Ultimate Tensile Strength = 7,810 lb/ft.
 - 3. Junction Strength = 7,200 lb/ft.
 - 4. Flexural Stiffness = 5,100,000 mg-cm.
- D. Secondary Geogrid Reinforcement: The minimum required physical and mechanical properties of geogrid reinforcement shall be as indicated:
 - 1. Nominal Aperture Dimension = 1 inch.
 - 2. Minimum Rib Thickness = 0.05 inch.
 - 3. Tensile Strength at 5 percent Strain = 810 lb/ft.
 - 4. Ultimate Tensile Strength = 1,310 lb/ft.
 - 5. Carbon Black Content = 2.0 percent.
- E. Wire Mesh Facing Forms: Steel welded wire mesh facing form, bent 90 degrees at long center line to form "L" shaped unit; vertical section as face to retain fill, and horizontal leg extending into fill; diagonal steel struts supporting top edge of vertical leg.
 - 1. Wire Mesh Facing Unit: Black in accordance with ASTM A 82 and ASTM A 185.
 - 2. Wire Strut Type: Black in accordance with ASTM A 82.
 - 3. Wire Mesh Spacing: 4.0 inches by 4.0 inches (vertical x horizontal wires) unless otherwise indicated on the Drawings.
 - 4. Wire Mesh Minimum Diameters: 0.225 inch, vertical wires and 0.225 inches horizontal wire (before galvanizing).
 - 5. Wire Strut Minimum Diameter: 0.243 inch.
 - 6. Tie wire or cable ties to connect vertical wires of adjacent facing units.

- F. Geotextile: As defined in Section 31 32 19.16, Geotextile.
- G. Turf Reinforcement Mat: North American Green C350 permanent turf reinforcement mat. Mat shall consist of evenly distributed 100 percent coconut fiber matrix weighing 0.50 pounds per SY encapsulated in a 3-D matting structure consisting of two, top and bottom, heavyweight UV stabilized polypropylene nets, with a nominal weight of 8 lbs/1,000 SF and a corrugated high strength center net with an nominal weight of 24 lbs/1,000 SF. The three nets shall be stitched together on 1.50 inch centers with UV stabilized polypropylene thread to form a permanent three-dimensional turf reinforcement mat with a minimum thickness of 0.5 inches.

2.03 BACKFILL MATERIALS

- A. Reinforced Backfill: ODOT 304 Aggregate Backfill.
- B. Recycled concrete aggregate is also permitted having the following gradation with a pH range of 2 to 12:
 - 1. 100 to 75 percent passing a 2-in. sieve.
 - 2. 100 to 75 percent passing a 3/4-in. sieve.
 - 3. 100 to 20 percent passing a No. 4 sieve.
 - 4. 0 to 60 percent passing a No. 40 sieve.
 - 5. 0 to 35 percent passing a No. 200 sieve.
- C. Coarse Aggregate Backfill: ODOT No. 57 Coarse Aggregate.
- D. Facing Soil Fill: Fine grained organic soil placed on the slope for the purpose of supporting vegetation.
 - 1. 100 percent passing a no. 10 sieve.
 - 2. 0 to 75 percent passing a No. 200 sieve.
 - 3. LL < 50.
 - 4. PI < 20.

PART 3 EXECUTION

3.01 GENERAL

- A. Construct according to the approved working drawings and as specified below.
- B. All work shall be performed in accordance with OSHA requirements.
- C. All work shall be inspected by the Inspection Engineer who shall be engaged by the Owner.

3.02 SUBGRADE PREPARATION

- A. Excavate a level grade to the necessary elevation for a width equal to the reinforced soil mass plus 3 feet.
- B. Inspect the subgrade and compact if necessary prior to wall construction in accordance with the contract documents.
- C. Undercut unsuitable material as directed by the Engineer. Replace undercut soils with coarse aggregate backfill compacted to 95 percent of its maximum unit weight.
- D. General backfill is not permitted for backfilling undercut soils within the region of influence below the reinforced soil mass.

3.03 REINFORCED SOIL SLOPE ERECTION

- A. Wire Facing Form Installation: Place the first course of wire mesh facing forms with the horizontal legs resting on the foundation material.
 - 1. Verify that the first row of facing forms is level from end to end and from front to back.
 - 2. Overlap or butt the adjacent facing units. Tie together vertical wires of adjacent facing units as required to maintain alignment and prevent escape of backfill material.
 - 3. Use a string line or equivalent to align straight sections.
 - 4. Place subsequent courses of facing forms on previous courses, at a setback, if any, as shown on the Drawings.
- B. Geogrid placement:
 - 1. Unroll the structural geogrid on the compacted backfill and cut to the length indicated on the Drawings.
 - 2. Unroll and place uniaxial geogrids perpendicular to the slope face.
 - 3. Cut uniaxial geogrids within 2 inches from the thick transverse bar and place that end of the strip at the slope face or to the position near the slope face shown on the Drawings.
 - 4. Unroll and place biaxial geogrid parallel to the slope face unless otherwise shown on the drawings. Biaxial geogrids may be cut to the required width prior to unrolling.
 - 5. Place the structural geogrid over the horizontal leg of the facing units. The transverse bar of uniaxial geogrids shall be positioned immediately behind vertical face of the unit.

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6. Place the secondary biaxial geogrid across the horizontal leg and up the inside of the facing form. Drape the anchorage length of the structural geogrid over the top of the facing form during placement and compaction of the face fill and reinforced backfill.
7. Place the turf reinforcement mat inside the wire facing form anchored into the fill top and bottom as shown on the Drawings.
8. After placement of geogrid and any required face wrap, place seven wire support struts on approximately 20-inch centers connecting the upper horizontal wire on the face of facing form to the transverse wire at the rear of the facing form. Place one of the support struts at each end of the facing unit between the outer two vertical wires.
9. Pull the geogrid taut to remove slack.
10. Stake or pin the geogrid near the ends as required maintaining alignment and tension during filling.
11. Place a minimum of 3 inches of fill between any overlapping layers of geogrid where overlapping occurs behind curves and corners of the slope.
12. Rubber tired vehicles may travel on the HDPE and PP geogrid at low speeds, less than 5 miles per hour. Turning of vehicles should be avoided to prevent dislocation or damage to the geogrid and the connected wall facing units. No vehicles are allowed on PE geogrids.
13. Tracked vehicles shall not be operated directly on the geogrid. A minimum of 8 inches of fill cover over the geogrid is required for operation of tracked construction vehicles in the reinforced zone.

C. Backfill Placement for Reinforced Soil Mass:

1. Place reinforced backfill material and compact to a maximum 9 inches deep lifts. Compact to minimum of 95 percent Standard Proctor Dry Density in accordance with ASTM D 698 to within 3 feet of the slope face. Compact the near-face zone using a minimum of three passes.
2. Use only hand operated compaction equipment within 3 feet of the slope face.
3. Do not perform soil density testing within 3 feet of the slope face.
4. Place geotextile separator and stone or plan table face fill in the zone designated on the drawings and compact with hand operated equipment.
5. Place and compact subsequent lifts of fill to the level of the next layer of geogrid reinforcement. Smooth and level (or slope as shown on drawings) to ensure geogrid lays flat.
6. Shape the slope face above the lower level of geogrid reinforcement.
7. Pull any required slope wrapping geogrid and turf reinforcement mat up the slope and over the compacted fill to the distance shown on the drawings and stake or anchor as required to maintain alignment and tension.

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8. Repeat geogrid and fill placement procedures to top of slope.
9. Place, stake and anchor turf reinforcement mat on slope face as shown on the drawings.

END OF SECTION

**SECTION 31 23 19.01
DEWATERING**

PART 1 GENERAL

1.01 SUMMARY

- A. WORK is shown to be completed in the dry during a single phase of dewatering of Doan Brook. The vast majority of flow in the stream originates from the culvert at the upstream end of the project reach. Three stormwater outfalls exist along the project reach that drain:
 - 1. The parking lot.
 - 2. The rubber play surface/playground, and
 - 3. The splash pad adjacent to the playground.
- B. A combined sewer overflow (CSO #236) outfalls to Doan Brook in about the middle of the project reach. There is continuous flow from CSO #236 but the dry weather flow is thought to be groundwater infiltration.
- C. Two temporary diversion and pumping locations are shown on the Drawings to dewater Doan Brook for construction in dry conditions. The Drawings include diversion piping to dewater the entire project reach for discharge at the downstream end of the project reach. Alternatives to this dewatering design will be considered after contract award.
- D. Exact base flow rates from Doan Brook and CSO #236 have not been measured but the creek is estimated to be about 10-20 cfs and CSO less than two (2) cfs. Design flow rates shall be determined by the Contractor for providing dewatering operations to complete the WORK. It is the Contractor's responsibility to select pumping capacity at least to pump base flow, plus a flow rate above that to provide dry conditions for more times than just base flow. It is not unreasonable to consider 100 cfs of pumping capacity for Doan Brook during small precipitation events. A minimum of one (1) redundant pump is required if pumps are used to dewatering/bypass. The Contractor shall be prepared for flow events that will breach the temporary diversions and that the diversions will have to be rebuilt, the site repaired, and the site dewatered to restore dry conditions for WORK to proceed at no expense to the Owner. The Contractor shall minimize the areas that are exposed and unstabilized to prevent erosion and scour from flow events that breach the diversion. The Contractor is responsible for all site restoration that results from flow events during construction operations at no cost to the Owner.

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- E. Vandalism and crime has been reported in the project reach, especially during night time hours when construction activities may cease but dewatering operations may continue. Contractor shall take necessary steps to secure pumping equipment and protect equipment and pipelines from damage and destructive vandalism.

1.02 SUBMITTALS

A. Informational Submittals:

1. Doan Brook Water Control Plan.
2. Construction phasing and staging plan, including haul roads and access plan.
3. Temporary diversion size, design details, and engineering calculations.
4. Discharge permits.
5. Assumptions related to flow rates and the frequency or number of times that the diversion/berm/bypass will be breached.

1.03 DOAN BROOK WATER CONTROL PLAN

A. As a minimum, include:

1. Descriptions of proposed groundwater and surface water control facilities including, but not limited to, equipment; methods; standby equipment and power supply; pollution control facilities; pipeline alignments and methods for protecting the pipeline if it crosses construction traffic; discharge locations to be utilized; methods and results of stream flow rate estimates; explanation of how flows greater than design flow rate will be accommodated; methods for protecting the site and minimizing sediment scour and erosion when precipitation events are forecasted; and methods for dewatering during excavation.
2. Temporary diversion size, design details, and engineering calculations stamped by an Ohio licensed professional engineer.
3. Drawings showing locations, dimensions, and relationships of elements of each system.
4. Design calculations demonstrating adequacy of proposed dewatering systems and components.

- B. If system is modified during installation or operation, revise or amend and resubmit Doan Brook Water Control Plan.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. Continuously control water during course of construction, including weekends and holidays and during periods of work stoppages, and provide adequate backup systems to maintain control of water.

3.02 SURFACE WATER CONTROL

- A. See Section 01 50 00, Temporary Facilities, Article Temporary Controls.
- B. Remove surface runoff controls when no longer needed.

3.03 DEWATERING SYSTEMS

- A. Provide, operate, and maintain dewatering systems of sufficient size and capacity to permit excavation and subsequent construction in dry conditions. Continuously maintain excavations free of water, regardless of source, and until backfilled to final grade and stabilized.
- B. Groundwater control systems shall include sump pumps and other equipment necessary to maintain excavations free of water.

3.04 DISPOSAL OF WATER

- A. Obtain discharge permit for water disposal from authorities having jurisdiction.
- B. Treat water collected by dewatering operations, as required by regulatory agencies, prior to discharge.
- C. Discharge water as required by discharge permit and in manner that will not cause erosion or flooding, or otherwise damage existing facilities, completed Work, or adjacent property.
- D. Remove solids from treatment facilities and perform other maintenance of treatment facilities as necessary to maintain their efficiency.

END OF SECTION

SECTION 31 23 23
FILL AND BACKFILL

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. ASTM International (ASTM):
 - a. C117, Standard Test Method for Materials Finer Than 75-Micrometers (No. 200) Sieve in Mineral Aggregates by Washing.
 - b. C136, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
 - c. D75, Standard Practice for Sampling Aggregates.
 - d. D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - e. D1556, Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
 - f. D4253, Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
 - g. D4254, Standard Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
 - h. D6938, Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.02 DEFINITIONS

- A. Relative Compaction:
1. Ratio, in percent, of as-compacted field dry density to laboratory maximum dry density as determined in accordance with ASTM D698.
 2. Apply corrections for oversize material to either as-compacted field dry density or maximum dry density, as determined by Engineer.
- B. Optimum Moisture Content:
1. Determined in accordance with ASTM Standard specified to determine maximum dry density for relative compaction.
 2. Determine field moisture content on basis of fraction passing 3/4-inch sieve.

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- C. Relative Density: Calculated in accordance with ASTM D4254 based on maximum index density determined in accordance with ASTM D4253 and minimum index density determined in accordance with ASTM D4254.
- D. Prepared Ground Surface: Ground surface after completion of required demolition, clearing and grubbing, scalping of sod, stripping of topsoil, excavation to grade, and subgrade preparation.
- E. Completed Course: A course or layer that is ready for next layer or next phase of Work.
- F. Lift: Loose (uncompacted) layer of material.
- G. Geosynthetics: Geotextiles, geogrids, or geomembranes.
- H. Well-Graded:
 - 1. A mixture of particle sizes with no specific concentration or lack thereof of one or more sizes.
 - 2. Does not define numerical value that must be placed on coefficient of uniformity, coefficient of curvature, or other specific grain size distribution parameters.
 - 3. Used to define material type that, when compacted, produces a strong and relatively incompressible soil mass free from detrimental voids.
- I. Influence Area: Area within planes sloped downward and outward at 60-degree angle from horizontal measured from:
 - 1. 1 foot outside outermost edge at base of foundations or slabs.
 - 2. 1 foot outside outermost edge at surface of roadways or shoulder.
 - 3. 0.5 foot outside exterior at spring line of pipes or culverts.
- J. Borrow Material: Material from required excavations or from designated borrow areas on or near Site.
- K. Selected Backfill Material: Materials available onsite that Engineer determines to be suitable for specific use.
- L. Imported Material: Materials obtained from sources offsite, suitable for specified use.
- M. Structural Fill: Fill materials as required under structures, pavements, and other facilities.

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- N. Embankment Material: Fill materials required to raise existing grade in areas other than under structures.

1.03 SUBMITTALS

A. Action Submittals:

- 1. Samples:
 - a. Imported material taken at source.
 - b. Granular fill and crushed stone.

B. Informational Submittals:

- 1. Manufacturer's data sheets for compaction equipment.
- 2. Certified test results from independent testing agency.
 - a. Certified gradation test results in accordance with ASTM D4222c for imported materials.
 - b. Certified modified Proctor compaction test results in accordance with ASTM D698, for granular fill, and earthfill (up to 12 test samples).
 - c. Certified Bulk Density Testing results of aggregate in accordance with ASTM C29.

1.04 QUALITY ASSURANCE

A. Notify Engineer when:

- 1. Excavation is ready for backfilling, and whenever backfilling operations are resumed after a period of inactivity.
- 2. Soft or loose subgrade materials are encountered wherever embankment or site fill is to be placed.
- 3. Fill material appears to be deviating from Specifications.

1.05 SEQUENCING AND SCHEDULING

- A. Complete applicable Work specified in Section 02 41 00, Demolition; Section 31 10 00, Site Clearing; Section 31 23 16, Excavation; and Section 31 23 13, Subgrade Preparation, prior to placing fill or backfill.
- B. Do not place granular base, subbase, or surfacing until after subgrade has been prepared as specified in Section 31 23 13, Subgrade Preparation.

PART 2 PRODUCTS

2.01 SOURCE QUALITY CONTROL

A. Gradation Tests:

1. As necessary to locate acceptable sources of imported material and earthfill.
2. During production of imported material, test as follows:
 - a. Earthfill: Three test.
 - b. Granular Drain Material: Three test.
 - c. Granular Filter Material: Three test.
 - d. Base Course Rock: Three test.

2.02 EARTH FILL

- A. Excavated material from required excavations approved by Owner and the Engineer. The material shall be free from rocks larger than 3 inches, with liquid limit (LL) less than 40 and plasticity index (PI) less than 20, free from contaminants as determined by the Owner, from roots and other organic matter, ashes, cinders, trash, debris, and other deleterious materials.
- B. Provide imported material of equivalent quality, if required to accomplish Work.

2.03 GRANULAR FILL

- A. 1-inch minus crushed gravel or crushed rock.
- B. Carbonate rock, crushed slag, or concrete is not acceptable.
- C. Free from dirt, clay balls, and organic material.
- D. Well-graded from coarse to fine and containing sufficient fines to bind material when compacted, but with maximum 8 percent by weight passing No. 200 sieve.
- E. Granular fill shall be imported material, and shall not contain high concentrations of soluble compounds such as iron, aluminum, calcium, magnesium, or organic carbon.

2.04 GRANULAR DRAIN MATERIAL

- A. As specified in Section 31 23 23.15, Trench Backfill.

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2.05 COARSE AGGREGATE FILL

- A. As specified in ODOT Specification Section 703.13, Table 703.1-1, #57 Stone.
- B. As specified in ODOT Specification Section 703.13, Table 703.1-1, #8 Coarse Aggregate.
- C. As specified in ODOT Specification Section 703.17, 304 Aggregate Base.

2.06 WATER FOR MOISTURE CONDITIONING

- A. Free of hazardous or toxic contaminants, or contaminants deleterious to proper compaction.

2.07 BASE COURSE ROCK

- A. As specified in Section 32 11 23, Aggregate Base Courses.

2.08 SOIL COVER OVER GEOTEXTILES

- A. Particle Size: Maximum 1/2 inch.
- B. Free of sharp angular pieces that may damage geotextile.

PART 3 EXECUTION

3.01 GENERAL

- A. Prepare subgrade as specified in Section 31 23 13, Subgrade Preparation.
- B. Keep placement surfaces free of water, debris, and foreign material during placement and compaction of fill and backfill materials.
- C. Place and spread fill and backfill materials in horizontal lifts of uniform thickness, in a manner that avoids segregation, and compact each lift to specified densities prior to placing succeeding lifts. Slope lifts only where necessary to conform to final grades or as necessary to keep placement surfaces drained of water.
- D. During filling and backfilling, keep level of fill and backfill around each structure and buried tank even.
- E. Do not place fill or backfill, if fill or backfill material is frozen, or if surface upon which fill or backfill is to be placed is frozen.

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F. If pipe is to be laid within fill or backfill:

1. Fill or backfill to an elevation 2 feet above top of item to be laid.
2. Excavate trench for installation of item.
3. Install bedding, if applicable, as specified in Section 31 23 23.15, Trench Backfill.
4. Install item.
5. Backfill envelope zone and remaining trench, as specified in Section 31 23 23.15, Trench Backfill, before resuming filling or backfilling specified in this section.

G. Tolerances:

1. Final Lines and Grades: Within a tolerance of 0.1 foot unless dimensions or grades are shown or specified otherwise.
2. Grade to establish and maintain slopes and drainage as shown. Reverse slopes are not permitted.

H. Settlement: Correct and repair any subsequent damage to structures, pavements, curbs, slabs, piping, and other facilities, caused by settlement of fill or backfill material.

3.02 FILL

A. Slopes, Walls, Pavements, Curbs, Slabs, Piping, and Other Facilities: Unless otherwise shown, place earthfill as follows:

1. Allow for 6-inch thickness of topsoil where required.
2. Maximum 6-inch thick lifts.
3. Place and compact fill across full width of embankment.
4. Compact each lift to minimum 90 percent relative compaction as determined in accordance with ASTM D698, Method at moisture content within 2 percent optimum for material.
5. Dress completed embankment with allowance for topsoil, crest surfacing, and slope protection, where applicable.

3.03 SITE TESTING

A. Gradation:

1. One sample from each 200 tons of finished product or more often as determined by Engineer, if variation in gradation is occurring, or if material appears to depart from Specifications.

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2. If test results indicate material does not meet Specification requirements, terminate material placement until corrective measures are taken.
 3. Remove material placed in Work that does not meet Specification requirements.
- B. In-Place Density and Moisture Content Tests: In accordance with ASTM D6938. During placement of materials, test as follows:
1. Testing requirements for backfilling of trenches for pipeline installation are specified in Section 31 23 23.15, Trench Backfill.
 2. Granular Fill: Minimum of two tests.
 3. Sand: Minimum of two tests
 4. Earthfill: One test.
 5. Granular Drain Material: One test.
 6. Granular Filter Material: One test.
 7. Base Course Rock: One test per lift.
 8. Soil Cover Over Geotextiles: Minimum of two tests
 9. Additional tests shall be performed if requested by the Engineer. The frequency and location of testing shall be determined solely by the Engineer. The Engineer may require a test on any lift of fill at any time, location, or elevation.

3.04 GRANULAR BASE, SUBBASE, AND SURFACING

- A. Place and Compact as specified in Section 32 11 23, Aggregate Base Courses.

3.05 COARSE AGGREGATE

- A. Place and Compact as specified in Section 32 11 23, Aggregate Base Courses.

3.06 REPLACING OVEREXCAVATED MATERIAL

- A. Replace excavation carried below grade lines shown or established by Engineer as follows:
1. Beneath Fill or Backfill: Same material as specified for overlying fill or backfill.
 2. Trenches:
 - a. Unauthorized Overexcavation: Either trench stabilization material or granular pipe base material, as specified in Section 31 23 23.15, Trench Backfill.
 - b. Authorized Overexcavation: Trench stabilization material, as specified in Section 31 23 23.15, Trench Backfill.

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3. Permanent Cut Slopes (Where Overlying Area is Not to Receive Fill or Backfill):
 - a. Flat to Moderate Steep Slopes (3:1, Horizontal Run: Vertical Rise or Flatter): Earthfill.
 - b. Steep Slopes (Steeper than 3:1):
 - 1) Correct overexcavation by transitioning between overcut areas and designed slope adjoining areas, provided such cutting does not extend offsite or outside easements and right-of-ways, or adversely impacts existing facilities, adjacent property, or completed Work.
 - 2) Backfilling overexcavated areas is prohibited, unless in Engineer's opinion, backfill will remain stable, and overexcavated material is replaced as compacted earthfill.

3.07 PLACING FILL OVER GEOSYNTHETICS

A. General:

1. Place fill over geosynthetics with sufficient care so as not to damage them.
2. Place fill only by back dumping and spreading only.
3. Dump fill only on previously placed fill.
4. While operating equipment, avoid sharp turns, sudden starts or stops that could damage geosynthetics.

B. Hauling: Operate hauling equipment on minimum of 3 feet of covering.

C. Spreading:

1. Spreading equipment shall be track mounted, low ground pressure, D-6 or lighter.
2. Operate spreading equipment on minimum of 12 inches of fill over geosynthetics.
3. Spread fill in same direction as unseamed overlaps to avoid separation of seams and joints.
4. Never push fill downslope. Spread fill over sideslopes by pushing up from slope bottom. If access to bottom of slope is unavailable, progressively place fill, beginning at toe of slope and working upslope, with backhoe or dragline operated from top of slope. Limit distance material falls onto the geosynthetics to maximum of 2 feet.
5. Flatten wrinkles of geotextiles, in direction of spreading. Correct wrinkles in geotextiles as specified in Section 31 32 19.16, Geotextile.
6. Maintain proper overlap of unseamed geosynthetics.
7. Avoid overstressing geosynthetics and seams.

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D. Compaction: Compact fill only after uniformly spread to full thickness shown.

E. Geosynthetic Damage:

1. Mark punctures, tears, or other damage to geosynthetics, so repairs may be made.
2. Clear overlying fill as necessary to repair damage.
3. Repairs to geosynthetics shall be made by respective installers as specified in respective specification section for each geosynthetic.

3.08 ACCESS ROAD SURFACING

A. Place and compact as specified in Section 32 11 23, Aggregate Base Courses.

END OF SECTION

SECTION 31 23 23.15
TRENCH BACKFILL

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Association of State Highway and Transportation Officials (AASHTO).
2. American Public Works Association (APWA): Uniform Color Code.
3. ASTM International (ASTM):
 - a. C33/C33M, Standard Specification for Concrete Aggregates.
 - b. C94/C94M, Standard Specification for Ready-Mixed Concrete.
 - c. C117, Standard Test Method for Materials Finer than 75 Micrometer (No. 200) Sieve in Mineral Aggregates by Washing.
 - d. C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - e. C150/C150M, Standard Specification for Portland Cement.
 - f. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
 - g. C1012/C1012M, Standard Test Method for Length Change of Hydraulic-Cement Mortars Exposed to a Sulfate Solution.
 - h. D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - i. D1140, Standard Test Methods for Amount of Material in Soils Finer than No. 200 (75 micrometer) Sieve.
 - j. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 - k. D2487, Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
 - l. D4253, Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
 - m. D4254, Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
 - n. D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 - o. D4832, Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders.

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4. National Electrical Manufacturers Association (NEMA): Z535.1, Safety Colors.

1.02 DEFINITIONS

- A. Base Rock: Granular material upon which manhole bases and other structures are placed.
- B. Bedding Material: Granular material upon which pipes, conduits, cables, or duct banks are placed.
- C. Imported Material: Material obtained by Contractor from source(s) offsite.
- D. Lift: Loose (uncompacted) layer of material.
- E. Pipe Zone: Backfill zone that includes full trench width and extends from prepared trench bottom to an upper limit above top outside surface of pipe, conduit, cable or duct bank.
- F. Prepared Trench Bottom: Graded trench bottom after excavation and installation of stabilization material, if required, but before installation of bedding material.
- G. Relative Compaction: The ratio, in percent, of the as-compacted field dry density to the laboratory maximum dry density as determined by ASTM D1557. Corrections for oversize material may be applied to either as-compacted field dry density or maximum dry density, as determined by Engineer.
- H. Relative Density: As defined by ASTM D4253 and ASTM D4254.
- I. Selected Backfill Material: Material available onsite that Engineer determines to be suitable for a specific use.
- J. Well-Graded: A mixture of particle sizes that has no specific concentration or lack thereof of one or more sizes producing a material type that, when compacted, produces a strong and relatively incompressible soil mass free from detrimental voids. Satisfying both of the following requirements, as defined in ASTM D2487:
 - 1. Coefficient of Curvature: Greater than or equal to 1 and less than or equal to 3.
 - 2. Coefficient of Uniformity: Greater than or equal to 4 for materials classified as gravel, and greater than or equal to 6 for materials classified as sand.

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1.03 SUBMITTALS

A. Action Submittals:

1. Samples:
 - a. Trench stabilization material.
 - b. Bedding and pipe zone material.
 - c. Granular drain.
 - d. Granular backfill.
 - e. Earth backfill.
 - f. Sand(s).
 - g. Geotextile.

B. Informational Submittals:

1. Catalog and manufacturer's data sheets for compaction equipment.
2. Certified Gradation Analysis: Submit not less than 30 days prior to delivery for imported materials or anticipated use for excavated materials, except for trench stabilization material that will be submitted prior to material delivery to Site.
3. Controlled Low Strength Material: Certified mix design and test results. Include material types and weight per cubic yard for each component of mix.

PART 2 PRODUCTS

2.01 GEOTEXTILE

- A. As specified in Section 31 32 19.16, Geotextile.

2.02 TRENCH STABILIZATION MATERIAL

A. Base Rock:

1. Clean, hard, durable 3-inch minus crushed rock or gravel, or pit run, free from clay balls, other organic materials, or debris.
2. Uniformly graded from coarse to fine, less than 8 percent by weight passing the 1/4-inch sieve. Carbonate rock, crushed slag, or concrete is not acceptable.

- B. Granular Backfill: As specified in Section 31 23 23, Fill and Backfill.

2.03 BEDDING MATERIAL AND PIPE ZONE MATERIAL

- A. Unfrozen, friable, and no clay balls, roots, or other organic material.

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B. Clean or gravelly sand with less than 5 percent passing No. 200 sieve, as determined in accordance with ASTM D1140, or gravel or crushed rock within maximum particle size and other requirements as follows unless otherwise specified.

1. PVC Irrigation System Piping: 3/8-inch maximum particle size.
2. Perforated Pipe: Granular drain material.

2.04 UNDER DRAIN GRAVEL

A. AASHTO A-7, washed.

2.05 GRANULAR DRAIN MATERIAL

A. Gradation: ASTM C117 and ASTM C136.

Sieve Size	Percent Passing By Weight
3 inches	100
1-1/2 inches	75-100
3/4 inch	45-85
3/8 inch	30-70
No. 4	20-55
No. 16	5-35
No. 50	0-5
No. 200	0-2

2.06 EARTH BACKFILL

- A. Soil, loam, or other excavated material suitable for use as backfill.
- B. Free from roots or organic matter, refuse, boulders and material larger than 1/2 cubic foot, or other deleterious materials.

2.07 GRAVEL SURFACING ROCK

A. As specified in Section 32 11 23, Aggregate Base Courses.

2.08 TOPSOIL

A. As specified in Section 32 91 13, Soil Preparation.

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2.09 SOURCE QUALITY CONTROL

- A. Perform gradation analysis in accordance with ASTM C136 for:
 - 1. Earth backfill, including specified class.
 - 2. Trench stabilization material.
 - 3. Bedding and pipe zone material.
- B. Contract with an independent testing laboratory to provide testing services required. Contractor shall be responsible for the cost of all testing required.

PART 3 EXECUTION

3.01 TRENCH PREPARATION

- A. Water Control:
 - 1. Promptly remove and dispose of water entering trench as necessary to grade trench bottom and to compact backfill and install manholes, pipe, conduit, direct-buried cable, or duct bank. Do not place concrete, lay pipe, conduit, direct-buried cable, or duct bank in water.
 - 2. Remove water in a manner that minimizes soil erosion from trench sides and bottom.
 - 3. Provide continuous water control until trench backfill is complete.
- B. Remove foreign material and backfill contaminated with foreign material that falls into trench.

3.02 TRENCH BOTTOM

- A. Firm Subgrade: Grade with hand tools, remove loose and disturbed material, and trim off high areas and ridges left by excavating bucket teeth. Allow space for bedding material if shown or specified.
- B. Soft Subgrade: If subgrade is encountered that may require removal to prevent pipe settlement, notify Engineer. Engineer will determine depth of overexcavation, if any required.

3.03 GEOTEXTILE INSTALLATION

- A. Where shown and as specified in Section 31 32 19.16, Geotextile, except as follows:
 - 1. Extend geotextile for full width of trench bottom and up the trench wall to the top of the pipe zone.

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2. Anchor geotextile to trench walls prior to placing trench stabilization or bedding material.
3. Provide 24-inch minimum overlap at joints.

3.04 TRENCH STABILIZATION MATERIAL INSTALLATION

- A. To be used where soft subgrade is encountered.
- B. Rebuild trench bottom with trench stabilization material.
- C. Place material over full width of trench in 6-inch lifts to required grade, providing allowance for bedding thickness.
- D. Compact each lift so as to provide a firm, unyielding support for the bedding material prior to placing succeeding lifts.

3.05 BEDDING

- A. Furnish imported bedding material where, in the opinion of Engineer, excavated material is unsuitable for bedding or insufficient in quantity.
- B. Place over full width of prepared trench bottom in two equal lifts when required depth exceeds 8 inches.
- C. Hand grade and compact each lift to provide a firm, unyielding surface.
- D. Minimum Thickness: 4 inches.
- E. Check grade and correct irregularities in bedding material. Loosen top 1 inch to 2 inches of compacted bedding material with a rake or by other means to provide a cushion before laying each section of pipe.
- F. Install to form continuous and uniform support except at bell holes, if applicable, or minor disturbances resulting from removal of lifting tackle.
- G. Bell or Coupling Holes: Excavate in bedding at each joint to permit proper assembly and inspection of joint and to provide uniform bearing along barrel of pipe or conduit.

3.06 BACKFILL PIPE ZONE

- A. Upper limit of pipe zone shall not be less than following:
 1. Pipe: 12 inches, unless shown otherwise.

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- B. Restrain pipe, conduit, cables, and duct banks as necessary to prevent their movement during backfill operations.
- C. Place material simultaneously in lifts on both sides of pipe and, if applicable, between pipes, conduit, cables, and duct banks installed in same trench.
 - 1. Pipe 10-Inch and Smaller Diameter: First lift less than or equal to 1/2 pipe diameter.
- D. Thoroughly tamp each lift, including area under haunches, with handheld tamping bars supplemented by “walking in” and slicing material under haunches with a shovel to ensure voids are completely filled before placing each succeeding lift.
- E. After the first lift is installed place succeeding material in 6-inch lifts and compact each lift with three passes of vibratory plate compactor only over the area between the sides of the pipe and the trench walls.
- F. Do not use power-driven impact compactors to compact pipe zone material.

3.07 BACKFILL ABOVE PIPE ZONE

- A. General:
 - 1. Process excavated material to meet specified gradation requirements.
 - 2. Adjust moisture content as necessary to obtain specified compaction.
 - 3. Do not allow backfill to free fall into trench or allow heavy, sharp pieces of material to be placed as backfill until after at least 2 feet of backfill has been provided over top of pipe.
 - 4. Backfill to grade with proper allowances for topsoil, crushed rock surfacing, and pavement thicknesses, wherever applicable.
- B. Beneath Grassed Areas:
 - 1. Backfill with earth backfill in lifts not exceeding 8 inches. Compact each lift to a minimum of 90 percent relative compaction in accordance with ASTM D1557 at moisture content within 2 percent optimum for material prior to placing succeeding lifts.
 - 2. Leave trench with backfill material neatly mounded across the entire trench width, but not more than 6 inches above the adjacent ground surface.
 - 3. In law, garden, or similar type areas, maintain trench level with the existing adjacent grade.

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4. At Other Locations:
 - a. Estimate and provide amount of backfill material required so that after normal settlement, the settled surface will match the adjacent ground surface.
 - b. Neatly window material over trench, and remove excess.
 - c. Correct excess or deficiency of backfill material apparent after settlement and within correction period by regrading, and disposing of excess material or adding additional material where deficient.

- C. Beneath Paved Areas: Backfill trench above the pipe zone with granular backfill in lifts not exceeding 8 inches. Compact each lift to a minimum of 95 percent relative compaction in accordance with ASTM D1557 at moisture content within 2 percent optimum for material prior to placing succeeding lifts.

3.08 REPLACEMENT OF TOPSOIL

- A. Replace topsoil in top 12 inches of backfilled trench.
- B. Maintain finished grade of topsoil even with adjacent area and grade as necessary to restore drainage.

3.09 MAINTENANCE OF TRENCH BACKFILL

- A. After each section of trench is backfilled, maintain surface of backfilled trench even with adjacent ground surface until final surface restoration is completed.
- B. Gravel Surfacing Rock: Add gravel surfacing rock where applicable and as necessary to keep surface of backfilled trench even with adjacent ground surface, and grade and compact as necessary to keep surface of backfilled trenches smooth, free from ruts and potholes, and suitable for normal traffic flow.
- C. Topsoil: Add topsoil where applicable and as necessary to maintain surface of backfilled trench level with adjacent ground surface.
- D. Asphaltic Pavement: Replace settled areas or fill with asphalt as specified in Section 32 12 16, Asphalt Paving.
- E. Other Areas: Add excavated material where applicable and keep surface of backfilled trench level with adjacent ground surface.

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3.10 SITE TESTING

- A. The Contractor will be responsible for removing any material that does not meet the Specification requirements at no additional cost to the Owner.
- B. Gradation:
 - 1. One sample from each 200 tons of finished product or more often as determined by Engineer, if variation in gradation is occurring, or if material appears to depart from Specifications.
 - 2. If test results indicate material does not meet Specification requirements, terminate material placement until corrective measures are taken.
 - 3. Remove material placed in Work that does not meet Specification requirements.
- C. In-Place Density and Moisture Content: In accordance with ASTM D6938. During placement of materials, perform minimum testing as follows:
- D. Testing for backfilling excavations other than trench backfill for pipe installation shall be as specified in Section 31 23 23, Fill and Backfill.
- E. One test for every 50 feet of pipe installed, except as specified herein for granular fill under paved road.
- F. Granular Fill under Paved Road: One test for every 150 square feet of every 3 lifts; or one test per 3 lifts, whichever requires more tests.
- G. Additional test shall be performed if requested by the Engineer. The frequency and location of testing shall be determined solely by the Engineer. The Engineer may require a test on any lift of fill at any time, location, or elevation.

3.11 SETTLEMENT OF BACKFILL

- A. Settlement of trench backfill, or of fill, or facilities constructed over trench backfill shall be corrected by the Contractor, at no additional cost to the Owner, to the satisfaction of the Owner.

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3.12 RESTORATION

- A. Final restoration shall be undertaken as soon as an area is no longer needed for construction, stockpiling, or access. Excavated material unsuitable for backfill shall be removed from the construction site and disposed of as specified in Section 31 23 16, Excavation. Workspace and access road shall be restored to pre-disturbance conditions. Care shall be taken to avoid damage to adjacent vegetation, earthen dikes, or other facilities.

END OF SECTION

SECTION 31 32 01
WOVEN MATTRESS COIR BLANKET (COIR FABRIC)

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. The publications and standards listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the abbreviation only. Unless otherwise stated, the most recent version or edition of each publication or standard is implied.
 - 1. American Society for Testing and Materials (ASTM):
 - a. D1777 – Standard Test Method for Thickness of Textile Materials;
 - b. D3776 – Standard Test Methods for Mass Per Unit Area (Weight) of Fabric;
 - c. D4595 – Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method;
 - d. D5035 – Standard Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method);
 - e. D5261 – Standard Test Method for Measuring Mass per Unit Area of Geotextiles.

1.02 DEFINITIONS

- A. Coir Fabric: Coir Blanket, 100 percent natural, organic blanket woven from spun mattress coir yarns.
- B. Straw/Coir Mat: Double jute netting filled with straw/coconut matrix for a biodegradable erosion blanket.
- C. Straw Mat: Tightly compressed straw matrix sewn to single jute netting for a biodegradable erosion blanket.
- D. Coir Wattle: Tubular netting packed with coir fiber; 100 percent natural, organic woven netting.
- E. Overlap: Distance measured perpendicular from overlapping edge of one sheet to underlying edge of adjacent sheet.

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- F. Dead Stout Stakes: Stakes shall be of a length shown on the Drawings and Details. These are referred to as “dead stout stakes” and are cut to the appropriate length from untreated pine boards then cut diagonally to yield two stakes from each length. Only new, sound, unused material shall be used. The stakes are to be used to secure woven coir fabric in place.
- G. SEL: Soil Encapsulated Lift consisting of compacted fill (earth) wrapped in BioD-Mat 90.

1.03 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Drawings:
 - a. Manufacturer material specifications and product literature.
 - b. Description of proposed method of deployment of each product, provisions for holding product in place and permanently secured.
 - 2. Product Samples:
 - a. One piece, minimum 18 inches long, taken across full width of roll of each type and weight of Coir Fabric, Straw/Coir Mat, and Straw Mat furnished for Project. Label each with brand name and furnish documentation of lot and roll number from which each Sample was obtained.
 - b. One piece, minimum 24 inches long, taken across full width of each type of Coir Wattle furnished for Project. Label each with brand name and furnish documentation of lot and wattle number from which each Sample was obtained.
- B. Informational Submittals: Certifications from each product manufacturer that furnished products have specified property values. Certified property values shall be either minimum or maximum average roll values, as appropriate, for products furnished.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver each roll with sufficient information attached to identify it for inventory and quality control.
- B. Handle products in manner that maintains undamaged condition.
- C. Do not store products directly on ground. Ship and store products with suitable wrapping for protection against moisture and ultraviolet exposure. Store products in way that protects it from elements. If stored outdoors, elevate and protect products with waterproof cover.

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1.05 SCHEDULING AND SEQUENCING

- A. Prior to coir fabric, straw/coir mat, and straw mat installation, prepare ground surface as specified in Section 32 91 13, Soil Preparation.
- B. Notify Engineer whenever coir fabric, straw/coir mat, straw mat, or coir wattle are to be placed. Do not place products without Engineer's approval of underlying materials.

PART 2 PRODUCTS

2.01 COIR FABRIC

- A. Composed of 100 percent natural, spun mattress coir yarn interlaced to form woven mat with uniform weave pattern.
- B. Calendered or finished so yarns will retain their relative position with respect to each other.
- C. Unseamed Sheet Width: Minimum 8 feet.
- D. Physical Properties: Conform to requirements in Table No. 1, in paragraph 2.01.
- E. Equivalent substitute products to those listed in Table No. 1 will be acceptable only with written approval from Engineer.

Table No. 1		
Physical Property Requirements for Coir Fabric		
Property	Test Method	BioD-Mat 90
Weight (oz./sq. yd)	ASTM D5261	29
Weight (grams/sw.m)	ASTM D5261	980
Dry Tensile Strength (lbs/ft)	ASTM D4595	2,024 Min.
Wet Tensile Strength (lbs/ft)	ASTM D4595	1,776 Min.
% Open area	Calculated	38 Max.
Thickness (inch)	ASTM D1777	0.35

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Table No. 1 Physical Property Requirements for Coir Fabric		
Property	Test Method	BioD-Mat 90
Recommended slope	-	>1:1
Recommended flow velocity (fps)	-	16
Recommended shear stress (lbs/sq. ft)	-	5
“C” Factor	-	0.002

2.02 SECURING STAKES

A. Dead Stout Stakes:

1. Spacing as shown on the Drawings.
2. Dimensions as shown on the Drawings.
3. Length as shown on the Drawings.

2.03 STRAW/COIR MAT

- A. Composed of two organic jute nets with 0.50 inch x 1.00 inch openings.
- B. Filler matrix between netting is uniformly distributed 70 percent agricultural straw (0.385 lbs/yd²) and 30% coconut fiber (0.165 lbs/yd²).
- C. Blankets are securely sewn together with biodegradable thread (1.50” stitch spacing).
- D. Sheet Width: Minimum 7.5 feet.
- E. Physical Properties: Conform to requirements in Table No. 2, in paragraph 2.03.
- F. Equivalent substitute products to those listed in Table No. 2 will be acceptable only with written approval from the Engineer.

Table No. 2 Physical Property Requirements for Straw/Coir Mat		
Property	Test Method	ECSC-2B
Weight (oz./sq. yd)	ASTM D6475	11.2

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Table No. 2 Physical Property Requirements for Straw/Coir Mat		
Property	Test Method	ECSC-2B
Tensile Strength-MD (lbs/ft)	ASTM D6818	270 Min.
Tensile Strength –TD (lbs/ft)	ASTM D6818	195 Min.
Thickness (inch)	ASTM D6525	0.33
Recommended slope	-	>1:1
Recommended flow velocity (fps)	ASTM D6460	8.0
Recommended shear stress (lbs/sq. ft)	ASTM D6460	2.0
Light Penetration	-	11.5%

2.04 STRAW MAT

- A. Composed of single organic jute nets with 1/2-inch x 1-inch openings.
- B. Matrix attached to netting is uniformly distributed 100 percent agricultural straw (0.55 lbs/yd²).
- C. Blankets are securely sewn together with biodegradable thread (1-1/2 inch stitch spacing).
- D. Sheet Width: Minimum 7.5 feet.
- E. Physical Properties: Conform to requirements in Table No. 3, in paragraph 2.04.
- F. Equivalent substitute products to those listed in Table No. 3 will be acceptable only with written approval from the Engineer.

Table No. 3 Physical Property Requirements for Straw Mat		
Property	Test Method	ECS-1B
Weight (oz./sq. yd)	ASTM D6475	11.9
Tensile Strength-MD (lbs/ft)	ASTM D6818	106 Min.

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Table No. 3 Physical Property Requirements for Straw Mat		
Property	Test Method	ECS-1B
Tensile Strength –TD (lbs/ft)	ASTM D6818	118 Min.
Thickness (inch)	ASTM D6525	0.48
Recommended slope	-	>3:1
Recommended flow velocity (fps)	ASTM D6460	6.8
Recommended shear stress (lbs/sq. ft)	ASTM D6460	1.55
Light Penetration	-	6%

2.05 COIR WATTLE

- A. Machine fabricated 8 in (+/- 1 in) diameter cylindrical shape wattles.
- B. The 2 in x 2 in (5 cm x 5 cm) knotted outer netting is made of 60 pounds strength machine spun bristle coir twines. Earth-toned poly netting may be an acceptable alternative.
- C. Filler matrix is coir fiber mattress with density between 3.4 lbs/ft³ and 5.0 lbs/ft³.
- D. Wattle Length: Minimum 15 feet.
- E. Physical Properties: Conform to requirements in Table No. 4, in paragraph 2.04.
- F. Equivalent substitute products to those listed in Table No. 4 will be acceptable only with written approval from the Engineer.

Table No. 4 Physical Property Requirements for Coir Wattle		
Property	Test Method	Coir Wattle
Weight (lb./ft)	-	1.5
Density (lb/cu. ft)	-	3.4
Tensile Strength of netting twine (lb)	-	60

PART 3 EXECUTION

3.01 LAYING PRODUCTS

- A. Lay and maintain products smooth and free of tension, folds, wrinkles, or creases.
- B. Orient product with long dimension of each sheet in the direction of flow on channel banks.
- C. Lay product from upstream to downstream. Overlap the upstream sheet end a minimum of 12-inches over the top of the next downstream sheet end.
- D. Lay product from bottom of channel bank slope to top of slope. Overlap the up slope sheet edge a minimum of 9 inches over the top of the next down slope sheet edge.

3.02 SHEET JOINTS

- A. Unseamed Joints: Overlap minimum of 12 inches, unless otherwise shown on the Drawings.
- B. Seamed Joints: Overlap minimum of 9-inches, unless otherwise shown on the Drawings.

3.03 COIR WATTLE JOINTS

- A. Abut ends of adjacent coir wattles and stitch together ends of wattles with coir twine to eliminate gaps in coir wattle.

3.04 SECURING PRODUCTS

- A. Secure products during installation as shown on the Drawings, using trenches and stakes as indicated on the Drawings.
- B. Roll out sheets from upstream to downstream, install sheets from bottom of bank slope to top of slope.
- C. Install coir wattles and stakes from upstream to downstream.
- D. Install additional stakes at the break in bank slope at the back of the benches.

3.05 REPAIRING COIR FABRIC, STRAW/COIR MAT, STRAW MAT

- A. Repair or replace torn, punctured, flawed, deteriorated, or otherwise damaged products with new unused products.

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B. Repair Procedure:

1. Place patch of undamaged product over damaged area and at least 18-inches in all directions beyond damaged area, minimum of 4 square feet of product.
2. Remove interfering material as necessary to expose damaged product for repair.
3. Permanently attach repair using dead stout stakes.

3.06 SOIL ENCAPSULATED LIFTS

- A. Install Soil Encapsulated Lifts as shown on the Drawings.
- B. Anchor overlapping bottom sheets as shown on the Drawings.

END OF SECTION

SECTION 31 32 19.16
GEOTEXTILE

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards that may be referenced in this section:
1. ASTM International (ASTM):
 - a. D737, Standard Test Method for Air Permeability of Textile Fabrics.
 - b. D4355, Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.
 - c. D4491, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
 - d. D4533, Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
 - e. D4595, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
 - f. D4632, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
 - g. D4716, Test Method for Determining the (In-Plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
 - h. D4751, Standard Test Method for Determining Apparent Opening Size of a Geotextile.
 - i. D4833, Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
 - j. D4884, Standard Test Method for Strength of Sewn or Thermally Bonded Seams of Geotextiles.
 - k. D4886, Standard Test Method for Abrasion Resistance of Geotextiles (Sand Paper/Sliding Block Method).
 - l. D5199, Standard Test Method for Measuring the Nominal Thickness of Geosynthetics.
 - m. D5261, Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
 - n. D6193, Standard Practice for Stitches and Seams.

1.02 DEFINITIONS

- A. Fabric: Geotextile, a permeable geosynthetic comprised solely of textiles.

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- B. Maximum Average Roll Value (MaxARV): Maximum of series of average roll values representative of geotextile furnished.
- C. Minimum Average Roll Value (MinARV): Minimum of series of average roll values representative of geotextile furnished.
- D. Nondestructive Sample: Sample representative of finished Work, prepared for testing without destruction of Work.
- E. Overlap: Distance measured perpendicular from overlapping edge of one sheet to underlying edge of adjacent sheet.
- F. Seam Efficiency: Ratio of tensile strength across seam to strength of intact geotextile, when tested according to ASTM D4884.

1.03 SUBMITTALS

A. Action Submittals:

- 1. Shop Drawings:
 - a. Manufacturer material specifications and product literature.
 - b. Installation drawings showing geotextile sheet layout, location of seams, direction of overlap, and sewn seams.
 - c. Description of proposed method of geotextile deployment, sewing equipment, sewing methods, and provisions for holding geotextile temporarily in place until permanently secured.
- 2. Samples:
 - a. Geotextile: One-piece, minimum 18 inches long, taken across full width of roll of each type and weight of geotextile furnished for Project. Label each with brand name and furnish documentation of lot and roll number from which each Sample was obtained.
 - b. Field Sewn Seam: 5-foot length of seam, 12 inches wide with seam along center, for each type and weight of geotextile.
 - c. Securing Pin and Washer: One each.

B. Informational Submittals:

- 1. Certifications from each geotextile manufacturer that furnished products have specified property values. Certified property values shall be either minimum or maximum average roll values, as appropriate, for geotextiles furnished.
- 2. Field seam efficiency test results.

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1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver each roll with sufficient information attached to identify it for inventory and quality control.
- B. Handle products in manner that maintains undamaged condition.
- C. Do not store products directly on ground. Ship and store geotextile with suitable wrapping for protection against moisture and ultraviolet exposure. Store geotextile in way that protects it from elements. If stored outdoors, elevate and protect geotextile with waterproof cover.

1.05 SCHEDULING AND SEQUENCING

- A. Where geotextile is to be laid directly upon ground surface, prepare subgrade as specified in Section 31 23 13, Subgrade Preparation, first.
- B. Notify Engineer whenever geotextiles are to be placed. Do not place geotextile without Engineer's approval of underlying materials.

PART 2 PRODUCTS

2.01 NONWOVEN GEOTEXTILE

- A. Pervious sheet of polyester, polypropylene, or polyethylene fabricated into stable network of fibers that retain their relative position with respect to each other. Nonwoven geotextile shall be composed of continuous or discontinuous (staple) fibers held together through needle-punching, spun-bonding, thermal-bonding, or resin-bonding.
- B. Geotextile Edges: Salvaged or otherwise finished to prevent outer material from pulling away from geotextile.
- C. Unseamed Sheet Width: Minimum: 6 feet.
- D. Physical Properties: Conform to ODOT Type B geotextile requirements.

2.02 SEWING THREAD

- A. Polypropylene, polyester, or Kevlar thread.
- B. Durability: Equal to or greater than durability of geotextile sewn.

2.03 SECURING PINS

A. Steel Rods or Bars:

1. 3/16-inch diameter.
2. Pointed at one end.
3. With head on other end sufficiently large to retain washer.
4. Minimum Length: 12 inches.

B. Steel Washers for Securing Pins:

1. Outside Diameter: Not less than 1.5 inches.
2. Inside Diameter: 1/4 inch.
3. Thickness: 1/8 inch.

C. Steel Wire Staples:

1. U-shaped.
2. 10 gauge.
3. Minimum Length: 6 inches.

PART 3 EXECUTION

3.01 LAYING GEOTEXTILE

- A. Lay and maintain geotextile smooth and free of tension, folds, wrinkles, or creases.

3.02 SHEET ORIENTATION ON SLOPES

- A. Orient geotextile with long dimension of each sheet parallel to direction of slope.
- B. Geotextile may be oriented with long dimension of sheet transverse to direction of slope only if sheet width, without unsewn seams, is sufficient to cover entire slope and anchor trench and to extend at least 18 inches beyond toe of slope.

3.03 JOINTS

A. Unseamed Joints:

1. Overlapped.
2. Overlap, unless otherwise shown:
 - a. Foundation/Subgrade Stabilization: Minimum 18 inches.

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- b. Drain Trenches: Minimum 18 inches, except overlap shall equal trench width if trench width is less than 18 inches.
 - c. Other Applications: Minimum 12 inches.
- B. Sewn Seams: Made wherever stress transfer from one geotextile sheet to another is necessary. Sewn seams, as approved by Engineer, also may be used instead of overlap at joints for applications that do not require stress transfer.
 - 1. Seam Efficiency:
 - a. Minimum 70 percent.
 - b. Verified by preparing and testing minimum of one set of nondestructive Samples per acre of each type and weight of geotextile installed.
 - c. Tested according to ASTM D4884.
 - 2. Types:
 - a. Preferred: "J" type seams.
 - b. Acceptable: Flat or butterfly seams.
 - 3. Stitch Count: Minimum three to maximum seven stitches per inch.
 - 4. Stitch Type: Double-thread chainstitch according to ASTM D6193.
 - 5. Sewing Machines: Capable of penetrating four layers of geotextile.
 - 6. Stitch Location: 2 inches from geotextile sheet edges, or more, if necessary to develop required seam strength.

3.04 SECURING GEOTEXTILE

- A. Secure geotextile during installation as necessary with sandbags or other means approved by Engineer.
- B. Secure Geotextile with Securing Pins or Staples:
 - 1. Insert securing pins with washers through geotextile.
 - 2. Securing Pin Alignment:
 - a. Midway between edges of overlaps.
 - b. 6 inches from free edges.
 - 3. Spacing of Securing Pins:

<u>Slope</u>	<u>Maximum Pin Spacing</u>
Steeper than 3:1	2 feet
3:1 to 4:1	3 feet
Flatter than 4:1	5 feet

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4. Install additional pins across each geotextile sheet as necessary to prevent slippage of geotextile or to prevent wind from blowing geotextile out of position.
5. Push each securing pin through geotextile until washer bears against geotextile and secures it firmly to subgrade.
6. Where staples are used instead of securing pins, install in accordance with alignment and spacing above. Push in to secure geotextile firmly to subgrade.

3.05 PLACING PRODUCTS OVER GEOTEXTILE

- A. Before placing material over geotextile, notify Engineer. Do not cover installed geotextile until after Engineer provides authorization to proceed.
- B. If tears, punctures, or other geotextile damage occurs during placement of overlying products, remove overlying products as necessary to expose damaged geotextile. Repair damage as specified in Article Repairing Geotextile.

3.06 INSTALLING GEOTEXTILE IN TRENCHES

- A. Place geotextile in a way to completely envelope granular drain material to be placed in trench and with specified overlap at joints. Overlap geotextile in direction of flow. Place geotextile in a way and with sufficient slack for geotextile to contact trench bottom and sides fully when trench is backfilled.
- B. After granular drain material is placed to required grade, fold geotextile over top of granular drain material, unless otherwise shown. Maintain overlap until overlying fill or backfill is placed.

3.07 SILT FENCE APPLICATIONS

- A. Install geotextile in one piece, or continuously sewn to make one piece, for full length and height of fence, including portion of geotextile buried in toe trench.
- B. Install bottom edge of sheet in toe trench and backfill in a way that securely anchors geotextile in trench.
- C. Securely fasten geotextile to wire mesh backing and each support post in a way that will not result in tearing of geotextile when fence is subjected to service loads.
- D. Promptly repair or replace silt fence that becomes damaged.

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3.08 REPAIRING GEOTEXTILE

- A. Repair or replace torn, punctured, flawed, deteriorated, or otherwise damaged geotextile.
- B. Repair Procedure:
 - 1. Place patch of undamaged geotextile over damaged area and at least 18 inches in all directions beyond damaged area.
 - 2. Remove interfering material as necessary to expose damaged geotextile for repair.
 - 3. Sew patches or secure them with heat fusion tacking or with pins and washers, as specified above in Article Securing Geotextile, or by other means approved by Engineer.

3.09 REPLACING CONTAMINATED GEOTEXTILE

- A. Protect geotextile from contamination that would interfere, in Engineer's opinion, with its intended function. Remove and replace contaminated geotextile with clean geotextile.

END OF SECTION

SECTION 31 32 60
ROCK

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work associated with this section shall consist of furnishing, transporting, stockpiling, maintaining and placing rock for in-stream structures, retaining walls, and landscaping as specified in the Contract, or as directed by the Engineer.

1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this Section:
 - 1. ASTM International (ASTM):
 - a. C616, Standard Specifications for Sandstone Dimension Stone.
 - b. C1528, Standard Guide for the Selection of Dimension Stone.
 - c. C568, Specifications for Limestone Dimension Stone.

1.03 DEFINITIONS

- A. Landscaping Rock: Sandstone block used as facing stone in the construction of the reinforced soil slope (RSS).
- B. Rock Dimensions: A-axis is the length of the block, B-axis is the width of the block, and C-axis is the height of the block.

1.04 SUBMITTALS

- A. Comply with Section 01 30 00, Submittals.
- B. The Contractor shall locate potential sources for rock blocks. The Contractor and the Engineer will jointly visit the sites to determine whether the rock meets the specified requirements.
- C. The Contractor shall obtain from the approved quarry and submit to the Engineer a certificate verifying the following in accordance with ASTM C616, C568, and C1528:
 - 1. Rock Classification.
 - 2. Weight per Cubic Foot.

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3. Rock Finish Requirements.
- D. Samples of rock blocks for each location on the site shall be submitted to the Engineer for approval, prior to its use in the project. Any unsuitable material shall be removed at the Contractor's expense.
- E. Shop Drawings for all block walls in Zones 1-4 and all new right bank walls that include the following information:
 1. Plan view and elevation of each wall showing the block top elevations.
 2. Start and stop elevation of sandstone and limestone block.
 3. Bottom elevation of footer block.
 4. Start and stop station of each wall.
- F. Plan for salvaging existing sandstone block for use on site. Plan should include but not be limited to:
 1. Sequence of work for salvaging the sandstone block.
 2. Equipment that will be utilized in the process of salvaging the rock.
 3. Activities associated with the prepping of sandstone blocks for reuse.
 4. Location and layout of sandstone block storage area.
- G. The project includes a large quantity of sandstone and limestone blocks. The Contractor shall submit a Sandstone and Limestone Block Procurement Plan that includes:
 1. Estimated ordering date, delivery, and installation schedule for each zone or area of the Project.
 2. Confirmation from supplier(s) that block is available.
 3. Latest delivery and installation date to meet Milestone and Substantial Completion Dates.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Limestone and Sandstone Blocks shall be in conformance with ASTM C616, C1558, and C568 from an approved source.
- B. Sandstone Blocks shall be a minimum of Type II Quartzitic Sandstone in accordance with ASTM C616.

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- C. Limestone block shall be a minimum of Type III High Density Limestone in accordance with ASTM C568.
- D. All rock block shall be free from laminations, weak cleavage planes and/or nodules that degrade during wetting and drying cycles or when exposed to salt water.
- E. Rock shall be durable and able to withstand the Contractor's handling, storage and placement procedures.
- F. Rock sizes shall be as specified in this section and as defined in the contract drawings.
- G. The Contractor shall not be granted an extension of time or extra compensation due to delay caused by sampling, testing, approval or disapproval of rock protection material under the requirements of these Specifications.
- H. Due to the anticipated quarry preparatory time, and/or demand for the rock as specified in the Contract, it shall be the Contractor's responsibility to make all necessary arrangements with the source of supply in a timely fashion, so that the Contractor shall maintain an adequate supply of rock material and that work shall not be unnecessarily delayed due to insufficient supply.

PART 3 EXECUTION

3.01 WALL CONSTRUCTION

- A. Locate in the field, the start/stop of all new block walls prior. Notify the Engineer 7 days prior to starting and demolition of any existing walls so that the Engineer can confirm the locations.
- B. Repurposed sandstone block shall be stock piled and secured on site and remains the property of the Owner if not reused on site unless otherwise stated. The Contractor will be responsible for disposal of the repurposed sandstone block if not used on site or is not wanted by the Owner.

3.02 ROCK SIZING

- A. The Contractor shall install rock in accordance with the Contract.
- B. Rock sizing for in-stream structures are defined in the contract drawings.
- C. Rock Finish shall be in accordance with ASTM C1568.

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- D. All horizontal rock surfaces should be suitable for staking to maintain a stable structure.
- E. All rock that does not meet the size tolerance criteria, as determined by the Engineer or representative, will be removed and replaced at no additional cost to the Owner.
- F. Rock Retaining Structure (Zones 1-4) Sizing:

Retaining Wall Rock - Zone 1 and Zone 1A

	A-axis (ft)	B-axis (ft)	C-axis (ft)
Required Size	4.0	2.5	1.5
Minimum Size	3.5	2.0	1.0
Maximum Size	4.5	3.0	2.0
Finish	Split	Split	Bush-Hammered

Landscaping Rock / Facing Stone - Zone 1A

	A-axis (ft)	B-axis (ft)	C-axis (ft)
Required Size	4.0	2.5	1.5
Minimum Size	3.5	2.0	1.4
Maximum Size	4.5	3.0	1.6
Finish	Diamond - Sawn	Diamond - Sawn	Bush-Hammered

Retaining Wall Rock – Zone 2

	A-axis (ft)	B-axis (ft)	C-axis (ft)
Required Size	4.0	3.5	1.5
Minimum Size	3.5	3.0	1.0
Maximum Size	4.5	4.0	2.0
Finish	Diamond - Sawn	Diamond - Sawn	Bush-Hammered

Retaining Wall Rock – Zone 3 and Right Bank Walls

	A-axis (ft)	B-axis (ft)	C-axis (ft)
Required Size	4.0	2.0	1.0
Minimum Size	3.5	1.5	0.8
Maximum Size	4.5	2.5	1.2
Finish	Diamond - Sawn	Diamond - Sawn	Bush-Hammered

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Retaining Wall Rock – Zone 4

	A-axis (ft)	B-axis (ft)	C-axis (ft)
Required Size	Match Existing	Match Existing	Match Existing
Minimum Size	-	-	-
Maximum Size	-	-	-
Finish	Repurposed	Repurposed	Repurposed

END OF SECTION

SECTION 32 11 23
AGGREGATE BASE COURSES

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. T11, Standard Method of Test for Materials Finer Than 75 μ m (No. 200) Sieve in Mineral Aggregates by Washing.
 - b. T27, Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates.
 - c. T89, Standard Specification for Determining the Liquid Limit of Soils.
 - d. T90, Standard Specification for Determining the Plastic Limit and Plasticity Index of Soils.
 - e. T96, Standard Specification for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - f. T99, Standard Specification for the Moisture-Density Relations of Soils Using a 2.5 kg (5.5 pound) Rammer and a 305 mm (12 in) Drop.
 - g. T180, Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18-in) Drop.
 - h. T190, Standard Specification for Resistance R-Value and Expansion Pressure of Compacted Soils.
 - i. T265, Standard Method of Test for Laboratory Determination of Moisture Content of Soils.
 - j. T310, Standard Specification for In-Place Density and Moisture Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
2. ASTM International (ASTM):
 - a. C88, Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
 - b. D1883, Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
 - c. D2419, Test Method for Sand Equivalent Value of Soils and Fine Aggregate.

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- d. D4791, Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

1.02 DEFINITIONS

- A. Completed Course: Compacted, unyielding, free from irregularities, with smooth, tight, even surface, true to grade, line, and cross-section.
- B. Completed Lift: Compacted with uniform cross-section thickness.
- C. Standard Specifications: When referenced in this section, shall mean State of Ohio Department of Transportation Construction and Materials Specifications.

1.03 SUBMITTALS

- A. Action Submittals:
 - 1. Samples: Submit for specified materials 20 days prior to delivery to Site.
- B. Informational Submittals:
 - 1. Certified Test Results on Source Materials: Submit copies from commercial testing laboratory 20 days prior to delivery of materials to Project showing materials meeting the physical qualities specified.

PART 2 PRODUCTS

2.01 BASE COURSE

- A. As specified for crushed gravel, in Section 304, of the Standard Specifications.
- B. Clean, hard durable, pit run gravel or crushed stone graded from coarse to fine containing enough fines to bind material when compacted.

2.02 GRAVEL SURFACING

- A. As specified in Section 411, of the Standard Specifications.
- B. Physical Qualities: Same as for base course.

2.03 SOURCE QUALITY CONTROL

- A. Perform tests necessary to locate acceptable source of materials meeting specified requirements.

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- B. Final approval of aggregate material will be based on test results of installed materials.
- C. Should separation of coarse from fine materials occur during processing or stockpiling, immediately change methods of handling materials to correct uniformity in grading.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION

- A. As specified in Section 31 23 13, Subgrade Preparation.
- B. Obtain Engineer's acceptance of subgrade before placing base course or surfacing material.
- C. Do not place base course or surfacing materials in snow or on soft, muddy, or frozen subgrade.

3.02 EQUIPMENT

- A. In accordance with Section 304, of the Standard Specifications.

3.03 HAULING AND SPREADING

- A. In accordance with Section 304, of the Standard Specifications.

3.04 CONSTRUCTION OF COURSES

- A. Construction of Courses: In accordance with Section 304, of the Standard Specifications.
- B. Untreated Aggregate Base Course:
 - 1. Maximum Completed Lift Thickness: 6 inches.
 - 2. Completed Course Total Thickness: As shown.
 - 3. Spread lift on preceding course to required cross-section.
 - 4. Lightly blade and roll surface until thoroughly compacted.
 - 5. Add keystone to achieve compaction and as required when aggregate does not compact readily due to lack of fines or natural cementing properties, as follows:
 - a. Use leveling course or surfacing material as keystone.
 - b. Spread evenly on top of base course, using spreader boxes or chip spreaders.
 - c. Roll surface until keystone is worked into interstices of base course without excessive displacement.

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- d. Continue operation until course has become thoroughly keyed, compacted, and will not creep or move under roller.
- 6. Blade or broom surface to maintain true line, grade, and cross-section.

C. Gravel Surfacing:

- 1. Maximum Completed Lift Thickness: 9 inches.
- 2. Completed Course Total Thickness: As shown.
- 3. Spread on preceding course in accordance with cross-section shown.
- 4. Blade lightly and roll surface until material is thoroughly compacted.

3.05 ROLLING AND COMPACTION

- A. In accordance with Section 304, of the Standard Specifications.

3.06 SURFACE TOLERANCES

- A. Blade or otherwise work surfacing as necessary to maintain grade and cross-section at all times, and to keep surface smooth and thoroughly compacted.
- B. Finished Surface of Untreated Aggregate Base Course: Within plus or minus 0.04 foot of grade shown at any individual point.
- C. Gravel Surfacing: Within 0.04 foot from lower edge of 10-foot straightedge placed on finished surface, parallel to centerline.

3.07 FIELD QUALITY CONTROL

- A. In-Place Density Tests:
 - 1. Construct base course so areas shall be ready for testing.
 - 2. A qualified independent testing agency shall provide proper testing.

3.08 CLEANING

- A. Remove excess material from the Work area. Clean stockpile and staging areas of all excess aggregate.

END OF SECTION

SECTION 32 12 16
ASPHALT PAVING

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. M17, Standard Specification for Mineral Filler for Bituminous Paving Mixtures.
 - b. M81, Standard Specification for Cut-Back Asphalt (Rapid Curing Type).
 - c. M82, Standard Specification for Cut-Back Asphalt (Medium Curing Type).
 - d. M140, Standard Specification for Emulsified Asphalt.
 - e. M208, Standard Specification for Cationic Emulsified Asphalt.
 - f. T166, Standard Method of Test for Bulk Specific Gravity of Compacted Asphalt Mixtures Using Saturated Surface-Dry Specimens.
 - g. T176 Standard Method of Test for Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test.
 - h. T230, Standard Method of Test for Determining Degree of Pavement Compaction of Bituminous Aggregate Mixtures.
 - i. T245, Standard Method of Test for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus.
 - j. T246, Standard Method of Test for Resistance to Deformation and Cohesion of Bituminous Mixtures by Means of Hveem Apparatus.
 - k. T247, Standard Method of Test for Preparation of Test Specimens of Bituminous Mixtures by Means of California Kneading Compactor.
 - l. T283, Standard Method of Test for Resistance of Compacted Bituminous Mixture to Moisture Induced Damage.
 - m. T304, Standard Method of Test for Uncompacted Void Content of Fine Aggregate (Method A).
2. Asphalt Institute (AI):
 - a. Manual Series No. 2 (MS-2), Mix Design Methods for Asphalt Concrete.
 - b. Superpave Series No. 2 (SP-2), Superpave Mix Design.

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3. ASTM International (ASTM):
 - a. D2041, Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures.
 - b. D4318, Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 - c. D4791, Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
 - d. D5821, Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate.
 - e. E329, Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.

1.02 DEFINITIONS

- A. Combined Aggregate: All mineral constituents of asphalt concrete mix, including mineral filler and separately sized aggregates.
- B. Standard Specifications: State of Ohio Department of Transportation Construction and Materials Specifications.

1.03 SUBMITTALS

- A. Action Submittals:
 1. Provide certification that the proposed mix design conforms to the requirements of the standard specifications.
 2. Provide manufacture.
- B. Informational Submittals:
 1. Asphalt Concrete Mix Formula:
 - a. Submit minimum of 15 days prior to start of production.
 - b. Submittal to include the following information:
 - 1) Gradation and portion for each aggregate constituent used in mixture to produce a single gradation of aggregate within specified limits.
 - 2) Bulk specific gravity for each aggregate constituent.
 - 3) Measured maximum specific gravity of mix at optimum asphalt content determined in accordance with ASTM D2041.
 - 4) Properties as stated in Section 401 of the Standard Specifications, for at least four different asphalt contents other than optimum, two below optimum, and two above optimum.
 - 5) Percent of asphalt lost due to absorption by aggregate.

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- 6) Index of Retained Strength (TSR) at optimum asphalt content as determined by AASHTO T283.
 - 7) Percentage of asphalt cement, to nearest 0.1 percent, to be added to mixture.
 - 8) Optimum mixing temperature.
 - 9) Optimum compaction temperature.
 - 10) Temperature-viscosity curve of asphalt cement to be used.
 - 11) Brand name of any additive to be used and percentage added to mixture.
2. Test Report for Asphalt Cement:
 - a. Submit minimum 10 days prior to start of production.
 - b. Show appropriate test method(s) for each material and the test results.
 3. Manufacturer's Certificate of Compliance, in accordance with Section 01 43 33, Manufacturers' Field Services, for the following materials:
 - a. Aggregate: Gradation, source test results as defined in Section 703 of the Standard Specifications.
 - b. Asphalt for Binder: Type, grade, and viscosity-temperature curve.
 - c. Prime Coat: Type and grade of asphalt.
 - d. Tack Coat: Type and grade of asphalt.
 - e. Additives.
 - f. Mix: Conforms to job-mix formula.
 4. Statement of qualification for independent testing laboratory.
 5. Test Results:
 - a. Mix design.
 - b. Asphalt concrete core.
 - c. Gradation and asphalt content of uncompacted mix.
 - d. Field density.
 - e. Quality control.

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Independent Testing Laboratory: In accordance with ASTM E329.
2. Asphalt concrete mix formula shall be prepared by approved certified independent laboratory under the supervision of a certified asphalt technician.

1.05 ENVIRONMENTAL REQUIREMENTS

- A. Temperature: Do not apply asphalt materials or place asphalt mixes when ground temperature is lower than 10 degrees C (50 degrees F) or air

temperature is lower than 4 degrees C (40 degrees F). Measure ground and air temperature in shaded areas away from heat sources or wet surfaces.

- B. Moisture: Do not apply asphalt materials or place asphalt mixes when application surface is wet.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Prime Coat: Cut-back asphalt, conform to Section 408 of the Standard Specifications.
- B. Tack Coat: Emulsified asphalt, conform to Section 407 of the Standard Specifications.
- C. Parking Lot Pavement Striping: Traffic Paint, Type 1A, conform to Section 640 of the Standard Specifications.

2.02 ASPHALT CONCRETE MIX

- A. As specified in Section 401 of the Standard Specifications.
- B. Composition: Hot-plant mix of aggregate, mineral filler if required, and paving grade asphalt cement. The several aggregate fractions shall be sized, uniformly graded, and combined in such proportions that resulting mixture meets grading requirements of mix formula.
- C. Aggregate:
 - 1. General: As specified in Section 304 of the Standard Specifications however, RAP material will not be acceptable.
 - 2. Asphalt Cement: Paving Grade as specified in Section 448 of the Standard Specifications.

PART 3 EXECUTION

3.01 GENERAL

- A. Traffic Control:
 - 1. In accordance with Section 01 50 00, Temporary Facilities and Controls.
 - 2. Minimize inconvenience to traffic, but keep vehicles off freshly treated or paved surfaces to avoid pickup and tracking of asphalt.

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- B. Driveways: Repave driveways from which pavement was removed. Leave driveways in as good or better condition than before start of construction.

3.02 LINE AND GRADE

- A. Provide and maintain intermediate control of line and grade, independent of underlying base, to meet finish surface grades and minimum thickness.

3.03 APPLICATION EQUIPMENT

- A. In accordance with Section 401 of the Standard Specifications.

3.04 PREPARATION

- A. Prepare subgrade as specified in Section 31 23 13, Subgrade Preparation.
- B. Thoroughly coat edges of contact surfaces (curbs, manhole frames) with emulsified asphalt or asphalt cement prior to laying new pavement. Prevent staining of adjacent surfaces.

3.05 PAVEMENT APPLICATION

- A. General: Place asphalt concrete mixture on approved, prepared base in conformance with Section 401 of the Standard Specifications.
- B. Prime Coat:
 - 1. Heat cut-back asphalt, as specified in Section 408 of the Standard Specifications, prior to application.
 - 2. Apply uniformly to clean, dry surfaces avoiding overlapping of applications.
 - 3. Do not apply when moisture content of upper 75 millimeters (3 inches) of base exceeds optimum moisture content of base, or if free moisture is present.
 - 4. Application Rate: Minimum 70 (0.68) to maximum 2.28 liters per square meter of surface area (0.15 to 0.50 gallons per square yard).
 - 5. Remove or redistribute excess material.
 - 6. Allow a minimum of 1 full days for curing of primed surface before placing asphalt concrete.
- C. Tack Coat:
 - 1. Prepare material, as specified in Section 407 of the Standard Specifications, prior to application.

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2. Apply uniformly to clean, dry surfaces avoiding overlapping of applications.
3. Do not apply more tack coat than necessary for the day's paving operation.
4. Touch up missed or lightly coated surfaces and remove excess material.
5. Application Rate: Minimum 0.25 liter to maximum 0.70 liter of asphalt (residual if diluted emulsified asphalt) per square meter (0.05 to 0.15 gallon per square yard) of surface area.

D. Pavement Mix:

1. Prior to Paving:
 - a. Sweep primed surface free of dirt, dust, or other foreign matter.
 - b. Patch holes in primed surface with asphalt concrete pavement mix.
 - c. Blot excess prime material with sand.
2. Place asphalt concrete pavement mix in two equal lifts.
3. Compacted Lift Thickness:
 - a. Minimum: Twice maximum aggregate size, but in no case less than 25 millimeters (1 inch).
 - b. Maximum: 100 millimeters (4 inches).
4. Total Compacted Thickness: As shown.
5. Apply such that meet lines are straight and edges are vertical.
6. Collect and dispose of segregated aggregate from raking process. Do not scatter material over finished surface.
7. Joints:
 - a. Offset edge of each layer a minimum of 150 millimeters (6 inches) so joints are not directly over those in underlying layer.
 - b. Offset longitudinal joints in roadway pavements so longitudinal joints in wearing layer coincide with pavement centerlines and lane divider lines.
 - c. Form transverse joints by cutting back on previous day's run to expose full vertical depth of layer.
8. Succeeding Lifts: Apply tack coat to pavement surface between each lift.
9. After placement of pavement, seal meet line by painting a minimum of 150 millimeters (6 inches) on each side of joint with cut-back or emulsified asphalt. Cover immediately with sand.

E. Compaction:

1. Uniformly compact each course until there is no further evidence of consolidation and roller marks are eliminated. When placement rate

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- exceeds 90 mg (100 tons) per hour, operate minimum of two rollers for compaction.
2. Roll until roller marks are eliminated and minimum percent compaction as stated in the Standard Specifications is obtained.
 3. Joint Compaction:
 - a. Place top or wearing layer as continuously as possible.
 - b. Pass roller over unprotected end of freshly laid mixture only when placing of mix is discontinued long enough to permit mixture to become chilled.
 - c. Cut back previously compacted mixture when Work is resumed to produce slightly beveled edge for full thickness of layer.
 - d. Cut away waste material and lay new mix against fresh cut.

F. Tolerances:

1. General: Conduct measurements for conformity with crown and grade immediately after initial compression. Correct variations immediately by removal or addition of materials and by continuous rolling.
2. Completed Surface or Wearing Layer Smoothness:
 - a. Uniform texture, smooth, and uniform to crown and grade.
 - b. Maximum Deviation: 3 millimeters (1/8 inch) from lower edge of a 3.6-meter (12-foot) straightedge, measured continuously parallel and at right angle to centerline.
 - c. If surface of completed pavement deviates by more than twice specified tolerances, remove and replace wearing surface.
3. Transverse Slope Maximum Deviation: 6 millimeters (1/4 inch) in 3.6 meters (12 feet) from rate of slope shown.

G. Seal Coat:

1. General: Apply seal coat of paving grade or emulsified asphalt to finished surface at longitudinal and transverse joints, joints at abutting pavements, areas where asphalt concrete was placed by hand, patched surfaces, and other areas as directed by Engineer.
2. Preparation:
 - a. Surfaces that are to be sealed shall be maintained free of holes, dry, and clean of dust and loose material.
 - b. Seal in dry weather and when temperature is above 2 degrees C (35 degrees F).
3. Application:
 - a. Fill cracks over 1.5 millimeters (1/16 inch) in width with asphalt-sand slurry or approved crack sealer prior to sealing.

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- b. When sealing patched surfaces and joints with existing pavements, extend minimum 150 millimeters (6 inches) beyond edges of patches.

3.06 PAVEMENT OVERLAY

A. Preparation:

- 1. Remove fatty asphalt, grease drippings, dust, and other deleterious matter.
- 2. Surface Depressions: Fill with asphalt concrete mix, and thoroughly compact.
- 3. Damaged Areas: Remove broken or deteriorated asphalt concrete and patch as specified in Article Patching.
- 4. Portland Cement Concrete Joints: Remove joint filler to minimum 12 millimeters (1/2 inch) below surface.

B. Application:

- 1. Tack Coat: As specified in this Section.
- 2. Place and compact asphalt concrete as specified in Article Pavement Application.
- 3. Place first layer to include widening of pavement and leveling of irregularities in surface of existing pavement.
- 4. When leveling irregular surfaces and raising low areas, the actual compacted thickness of any one lift shall not exceed 50 millimeters (2 inches).
- 5. Actual compacted thickness of intermittent areas of 100 square meters (120 square yards) or less may exceed 50 millimeters (2 inches), but not 100 millimeters (4 inches).
- 6. Final wearing layer shall be of uniform thickness, and meet grade and cross-section as shown.

3.07 PATCHING

A. Preparation:

- 1. Remove damaged, broken, or unsound asphalt concrete adjacent to patches. Trim to straight lines exposing smooth, sound, vertical edges.
- 2. Prepare patch subgrade as specified in Section 31 23 13, Subgrade Preparation of the Standard Specifications.

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B. Application:

1. Patch Thickness: 75 millimeters (3 inches) or thickness of adjacent asphalt concrete, whichever is greater.
2. Place asphalt concrete mix across full width of patch in layers of equal thickness.
3. Spread and grade asphalt concrete with hand tools or mechanical spreader, depending on size of area to be patched.

C. Compaction:

1. Roll patches with power rollers capable of providing compression of 350 to 525 Newtons per linear centimeter (200 to 300 pounds per linear inch). Use hand tampers where rolling is impractical.
2. Begin rolling top course at edges of patches, lapping adjacent asphalt surface at least 1/2 the roller width. Progress toward center of patch overlapping each preceding track by at least 1/2 width of roller.
3. Make sufficient passes over entire area to remove roller marks and to produce desired finished surface.

D. Tolerances:

1. Finished surface shall be flush with and match grade, slope, and crown of adjacent surface.
2. Tolerance: Surface smoothness shall not deviate more than plus 6 millimeters (1/4 inch) or minus 0 millimeter when straightedge is laid across patched area between edges of new pavement and surface of old surfacing.

3.08 PAVEMENT MARKINGS

- A. All pavement markings shall be installed in accordance with Section 640 of the Standard Specifications.
- B. Pavement markings disturbed during construction, as determined by the Engineer, shall be restored to original condition in accordance with Section 640 of the Standard Specifications.

3.09 FIELD QUALITY CONTROL

- A. General: Provide services of approved certified independent testing laboratory to conduct tests.

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B. Field Density Tests:

1. Perform tests from cores or sawed samples in accordance with AASHTO T230 and AASHTO T166.
2. Measure with properly operating and calibrated nuclear density gauge in accordance with ASTM D2950.
3. Maximum Density: In accordance with ASTM D2041, using sample of mix taken prior to compaction from same location as density test sample.

END OF SECTION

SECTION 32 31 26
ORNAMENTAL FENCES

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. ASTM International (ASTM):
 - a. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - b. C94/C94M, Standard Specification for Ready-Mixed Concrete.
 - c. C150, Standard Specification for Portland Cement.
 - d. C387, Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete.
 - e. F883, Standard Performance Specification for Padlocks.

1.02 DEFINITIONS

- A. Assemblies: As defined in ASTM A702.
- B. Line Posts: As defined in ASTM A702.
- C. Sweep: Maximum deviation of center of post or brace from line drawn between centers of butt and tip of post or brace.

1.03 SUBMITTALS

- A. Action Submittals:
1. Shop Drawings: Include construction details, material descriptions, dimensions of individual components, and finishes for fence and gates.
 2. Samples:
 - a. Posts, Chains and Accessories: Minimum 6-inch length.
 - b. Approved Sample fittings may be incorporated in the Work when no longer needed by Engineer.

1.04 QUALITY ASSURANCE

- A. Erect fencing using skilled mechanics experienced in fence and gate construction.

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1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Site in undamaged condition. Store materials off the ground to provide protection against oxidation caused by ground contact.

1.06 SCHEDULING AND SEQUENCING

- A. Complete necessary Site preparation and grading before installing wire fences and gates.

PART 2 PRODUCTS

2.01 GENERAL

- A. Fencing materials and gates shall carry a tag identifying manufacturer.
- B. Legibly mark each roll of fencing material with style, class of zinc coating, and other pertinent identifying information.
- C. Manufactured Materials: Same kind and color for each type of fence on Project.

2.02 METAL POSTS AND CHAIN ASSEMBLIES

- A. General: Conform to ASTM A702.
- B. Posts: 48-inch Boston Garden Post and Cap by Hoover Fence Company or Approved Equal.
- C. Fence Chain: Size 1/4-inch x 1-1/4 inch by Hoover Fence Company or approved equal.
- D. Finish:
 - 1. Polyester Powder Coat.
 - 2. Color: Black.

2.03 CONCRETE

- A. Provide as specified in Section 03 30 00, Cast-in-Place Concrete.

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2.04 CONCRETE

- A. Mix: ASTM C94/C94M, Option A.
 - 1. Cement: ASTM C150, Type I.
 - 2. Coarse Aggregate Size: 3/4 inch.
 - 3. Design for Minimum Compressive Strength at 28 Days: 2,500 psi.

2.05 CONCRETE

- A. Materials: ASTM C387 packaged, dry, combined ingredients with Type I cement.
- B. Mixing: In a clean metal container, mix package of dry materials by hand or machine. Following manufacturer's instructions, add clean water in sufficient quantity to produce a slump of 2 inches to 3 inches.

PART 3 EXECUTION

3.01 PREPARATION

- A. Clear area to extent specified in Section 31 10 00, Site Clearing, on both sides of fence.
- B. Stake locations of fence posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.02 INSTALLATION—GENERAL

- A. Erect fencing in locations shown on plans.
- B. Provide necessary hardware for a complete fence installation.
- C. Postholes:
 - 1. Drill or hand-excavate holes for posts to diameters and spacing indicated, in firm, undisturbed soil. Driven posts are only acceptable for metal line posts.
 - 2. Clear of loose materials.
 - 3. Remove waste materials from postholes from Site or regrade into slopes on Site.

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D. Posts:

1. Set with minimum embedment below finished grade of 36 inches.
2. Verify set plumb, aligned, and at correct height and maximum spacing of 6 feet on center.
3. Set end posts at beginning and end of fence.
4. Set corner posts at angle points in fence alignment where deflection angle between adjoining panels of fence is 5 degrees or more for metal line posts.

3.03 METAL POST INSTALLATION

A. Backfill:

1. Place and vibrate or tamp concrete around posts and braces after they are in proper position and are securely restrained from movement.
2. Strike off concrete to a reasonably smooth surface to 2 inches above ground level. Crown each surface to drain away from post or brace.
3. Wait for concrete to cure for at least 7 days before subjecting posts and braces to stress or strain, unless otherwise authorized by Engineer.

B. Line Post Spacing: Maximum 6 feet. Set posts on lines and grades established or designated by Engineer. When posts are set, grade line on tops of posts shall present a neat, uniform appearance.

C. Line posts that are set by driving shall be free of damage when in place. Remove and replace with a new post any post which is twisted or bent, or which has a misshapen top.

D. Bracing:

1. Gate and End Posts: Install one metal brace in line of fence. Maintain plumb position and alignment of fencing.
2. Corner and Intermediate End Posts: Install two braces, one each way from post in line with fence.

3.04 REPAIR

A. Repair damage to galvanized surfaces, including welding, with paint containing zinc dust in accordance with ASTM A780.

3.05 CLEANUP

A. Remove excess fencing materials and other debris from Site.

END OF SECTION

SECTION 32 91 13
SOIL PREPARATION

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. ASTM International (ASTM):
 - a. C33/C33M, Standard Specification for Concrete Aggregates.
 - b. C602, Standard Specification for Agricultural Liming Materials.
 - c. D2974, Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils.
 - d. D5268, Standard Specification for Topsoil Used for Landscaping Purposes.

1.02 SUBMITTALS

- A. Action Submittals:
1. Samples:
 - a. Imported Topsoil. Contractor shall supply sample in 1-quart size plastic bag.
 - b. Bioretention Soil Mix. Contractor shall supply sample in a 1-quart size plastic bag.
- B. Informational Submittals:
1. Certified Topsoil Analysis Reports:
 - a. Indicate quantities of materials necessary to bring onsite topsoil into compliance with textural/gradation requirements.
 - b. Indicate quantity of lime, quantity and analysis of fertilizer, and quantity and type of soil additive.

1.03 SEQUENCING AND SCHEDULING

- A. Perform Work specified in Section 31 10 00, Site Clearing, prior to performing Work specified under this section.

PART 2 PRODUCTS

2.01 TOPSOIL

- A. General: Natural, friable, sandy loam, obtained from well-drained areas, free from objects larger than 1-1/2 inches maximum dimension, and free of subsoil, roots, grass, other foreign matter, hazardous or toxic substances, and deleterious material that may be harmful to plant growth or may hinder grading, planting, or maintenance.
- B. Composition: In general accordance with ASTM D5268:
 - 1. Gravel-Sized Fraction: Maximum 5 percent by weight retained on a No. 10 sieve.
 - 2. Sand-Sized Fraction: Minimum 20 to 60 percent passing No. 10 sieve.
 - 3. Silt and Clay-Sized Fraction: Minimum 35 to 70 percent.
- C. Organic Matter: Minimum 1.5 percent by dry weight as determined in accordance with ASTM D2974.
- D. pH: Range 5.0 to 7.0.
- E. Textural Amendments: Amend as necessary to conform to required composition by incorporating sand, peat, manure, or sawdust.
- F. Source: Stockpile material onsite, in accordance with Section 31 10 00, Site Clearing. Import topsoil if onsite material is insufficient in quantity.

2.02 BIORETENTION SOIL

- A. Sand: Clean natural sand meeting the requirements of ASTM C 33 for fine aggregate. Other Graduation Characteristics shall fall within the limits specified below:
 - 1. Fineness Modulus (FM) – 2.5 to 3.1.
 - 2. Coefficient of Uniformity – 2.5 to 3.5 preferred (less than 4.1 acceptable).
- B. Organic Amendment: Mature/stable aerobically composted yard debris (green waste) compost, and animal manure compost, a biosolids compost or a compost derived from a combination of these three feedstocks.
 - 1. pH: 6.0 to 7.5 (ASTM D2976).
 - 2. Salinity: less than 6.0 millimhos per cm (mS/cm).
 - 3. Organic Matter: not less than 35 percent by weight (ASTM D2974).

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4. Carbon: Nitrogen Ratio less than 36:1.
 5. Solvita Maturity Index: between 6 and 7.
 6. Compost: shall meet all applicable state regulations based on the feedstock type or U.S. EPA 503 Regulations for biosolids compost.
- C. Topsoil: A loamy, friable soil essentially free from heavy or stiff clay lumps, stones, cinders, concrete, brick, roots, sticks, brush, litter, plastics, metals, refuse or other deleterious materials in accordance with ASTM D 5268. The soil shall be free of herbicides, petroleum-based materials or other substances of a hazardous or toxic nature which may inhibit plant growth. The soil shall be free of noxious weeds, seeds, or vegetative parts of weedy plants that cannot be selectively controlled in the planting.
1. pH: 6.0 to 8.0 (ASTM D4972).
 2. Salinity: less than 1.5 millimhos per cm (mS/cm).
 3. Organic Matter: 3 to 8 percent by weight (ASTM F1647).
 4. Texture: USDA soil texture classification of Clay Loam or Loam and be taken from a well-drained site.
 - a. Existing topsoil at the site may be used provided it meets the requirements of this section for topsoils.
 - b. Off-site (borrow) topsoils may be used provided they meet the requirements of this section and their source or location is submitted to and approved by the Engineer or Landscape Architect.

2.03 LIME

- A. Composition: Ground limestone with not less than 85 percent total carbonates, ASTM C602.
- B. Gradation:
1. Minimum 50 percent passing No. 100 sieve.
 2. Minimum 90 percent passing No. 20 sieve.
 3. Coarser material acceptable provided rates of application are increased proportionately on basis of quantities passing No. 100 sieve.

2.04 SOIL ADDITIVES

- A. Sawdust or Ground Bark:
1. Nontoxic, of uniform texture, and subject to slow decomposition when mixed with soil.

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2. Nitrogen-treated, or if untreated mix with minimum 0.15 pound of ammonium nitrate or 0.25 pound of ammonium sulfate per cubic foot of loose material.

B. Peat:

1. Composition: Natural residue formed by decomposition of reeds, sedges, or mosses in a freshwater environment, free from lumps, roots, and stones.
 - a. Organic Matter: Not less than 90 percent on a dry weight basis as determined by ASTM D2974.
 - b. Moisture Content: Maximum 65 percent by weight at time of delivery.

C. Fertilizer:

1. Commercial:
 - a. Commercial, uniform in composition, free-flowing, suitable for application with equipment designed for that purpose.
 - b. Contain the following minimum percentage of plant food by weight:
 - 1) Summer Mix:
 - a) Nitrogen: 20 percent.
 - b) Phosphoric Acid: 10 percent.
 - c) Potash: 10 percent.
 - 2) Winter Mix:
 - a) Nitrogen: 16 percent.
 - b) Phosphoric Acid: 8 percent.
 - c) Potash: 0 percent.

- D. Sand: Fine Aggregate: Clean, coarse, well-graded, ASTM C33/C33M.

2.05 SOURCE QUALITY CONTROL

- A. Topsoil Analysis/Testing: Performed by county or state soil testing service or approved certified independent testing laboratory.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION

- A. Scarify subgrade to minimum depth of 6 inches where topsoil is to be placed.
- B. Remove stones over 2-1/2 inches in any dimension, sticks, roots, rubbish, and other extraneous material.

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- C. Limit preparation to areas which will receive topsoil within 2 days after preparation.

3.02 TOPSOIL PLACEMENT

- A. Do not place topsoil when subsoil or topsoil is frozen, excessively wet, or otherwise detrimental to the Work.
- B. Mix soil amendments, lime, and other soil additives, identified in analysis reports with topsoil before placement or spread on topsoil surface and mix thoroughly into entire depth of topsoil before planting or seeding. Delay mixing of fertilizer if planting or seeding will not occur within 3 days.
- C. Place one-half of the total depth of topsoil and work into top 4 inches of subgrade soil to create a transition layer. Place remainder of topsoil to depth of 6 inches where seeding and planting are scheduled.
- D. Uniformly distribute to within 1/2 inch of final grades. Fine grade topsoil eliminating rough or low areas and maintaining levels, profiles, and contours of subgrade.
- E. Remove stones exceeding 1-1/2-inch diameter, roots, sticks, debris, and foreign matter during and after topsoil placement.
- F. Remove surplus subsoil and topsoil from Site. Grade stockpile area as necessary and place in condition acceptable for planting or seeding.

END OF SECTION

SECTION 32 92 00
TURF AND GRASSES

PART 1 GENERAL

1.01 DEFINITIONS

- A. Maintenance Period: Begin maintenance immediately after each area is planted (seed, sod, or sprig) and continue for a period of 104 weeks after all planting under this section is completed.
- B. Satisfactory Stand: Lawn or section of lawn of 10,000 square feet or larger that has:
 - 1. No bare spots larger than 3 square feet.
 - 2. Not more than 10 percent of total area with bare spots larger than 1 square foot.
 - 3. Not more than 15 percent of total area with bare spots larger than 6 square inches.

1.02 SUBMITTALS

- A. Action Submittals: Product labels/data sheets.
- B. Informational Submittals:
 - 1. Seed: Certification of seed analysis, germination rate, and inoculation:
 - a. Certify that each lot of seed has been tested by a testing laboratory certified in seed testing, within 6 months of date of delivery.
Include with certification:
 - 1) Name and address of laboratory.
 - 2) Date of test.
 - 3) Lot number for each seed specified.
 - 4) Test Results: (i) name, (ii) percentages of purity and of germination, and (iii) weed content for each kind of seed furnished.
 - b. Mixtures: Proportions of each kind of seed.
 - 2. Seed Inoculant Certification: Bacteria prepared specifically for legume species to be inoculated.
 - 3. Certification of sod; include source and harvest date of sod, and sod seed mix.
 - 4. Certification of sprig type and name.

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5. Maintenance Plan: Proposed procedures for the maintenance sodded areas during a 2-year period, including but not limited to proposed plan dates, maintenance tasks and frequency, proposed equipment used, required labor per task, safety procedures, schedules, and site assessment documentation.

1.03 DELIVERY, STORAGE, AND PROTECTION

A. Sod:

1. Do not harvest if sod is excessively dry or wet to the extent survival may be adversely affected.
2. Harvest and deliver sod only after laying bed is prepared for sodding.
3. Roll or stack to prevent yellowing.
4. Deliver and lay within 24 hours of harvesting.
5. Keep moist and covered to protect from drying from time of harvesting until laid.

1.04 WEATHER RESTRICTIONS

- A. Perform Work under favorable weather and soil moisture conditions as determined by accepted local practice.

1.05 SEQUENCING AND SCHEDULING

- A. Complete Work specified in Section 32 93 00, Plants, and prepare topsoil as specified in Section 32 91 13, Soil Preparation, before starting Work of this section.
- B. Complete Work under this section within 3 days following completion of soil preparation.
- C. Notify Engineer at least 3 days in advance of:
1. Each material delivery.
 2. Start of planting activity.
- D. Planting Season: Those times of year that are normal for such Work as determined by accepted local practice.

1.06 MAINTENANCE SERVICE

- A. Contractor: Perform maintenance operations during maintenance period to include:
1. Watering: Keep surface moist.

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2. Washouts: Repair by filling with topsoil, liming, fertilizing, seeding, and mulching.
3. Mulch: Replace wherever and whenever washed or blown away.
4. Mowing: Mow to 2 inches after grass height reaches 3 inches, and mow to maintain grass height from exceeding 3-1/2 inches.
5. Reseed unsatisfactory areas or portions thereof immediately at the end of the maintenance period if a satisfactory stand has not been produced.
6. Reseed/replant during next planting season if scheduled end of maintenance period falls after September 15.
7. Reseed/replant entire area if satisfactory stand does not develop by July 1 of the following year.

PART 2 PRODUCTS

2.01 FERTILIZER

- A. Commercial, uniform in composition, free-flowing, suitable for application with equipment designed for that purpose. Minimum percentage of plant food by weight.
- B. Application Rates: Determined by soil analysis results.
- C. Mix:
 1. Nitrogen: 10.
 2. Phosphoric Acid: 10.
 3. Potash: 10.
- D. Top Dress Type: As recommended by local authority.

2.02 SOD

- A. Certified, containing grass mix:

Species	Proportion By Weight (%)
Kentucky Bluegrass	80
Manhattan 3 Perennial Rye	20

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- B. Strongly rooted pads, capable of supporting own weight and retaining size and shape when suspended vertically from a firm grasp on upper 10 percent of pad.
1. Grass Height: 1-1/2 to 2-1/2 inches.
 2. Strip Size: Supplier's standard.
 3. Soil Thickness: Uniform; 1 inch plus or minus 1/4 inch at time of cutting.
 4. Age: Not less than 10 months or more than 30 months.
 5. Condition: Healthy, green, moist; free of diseases, nematodes and insects, and of undesirable grassy and broadleaf weeds. Yellow sod, or broken pads, or torn or uneven ends will not be accepted.

PART 3 EXECUTION

3.01 PREPARATION

- A. Grade areas to smooth, even surface with loose, uniformly fine texture.
1. Roll and rake, remove ridges, fill depressions to meet finish grades.
 2. Limit such Work to areas to be planted within immediate future.
 3. Remove debris, and stones larger than 1-1/2-inch diameter, and other objects that may interfere with planting and maintenance operations.
- B. Moisten prepared areas before planting if soil is dry. Water thoroughly and allow surface to dry off before seeding. Do not create muddy soil.
- C. Restore prepared areas to specified condition if eroded or otherwise disturbed after preparation and before planting.

3.02 FERTILIZER

- A. Apply evenly over area in accordance with manufacturer's instructions. Mix into top 2 inches of topsoil, when applied by broad cast method.
- B. Application Rate: Determined by soil test results in accordance with Section 32 91 13, Soil Preparation.

3.03 SODDING

- A. Do not plant dormant sod, or when ground is frozen.
- B. Lay sod to form solid mass with tightly fitted joints; butt ends and sides, do not overlap.
1. Stagger strips to offset joints in adjacent courses.

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2. Work from boards to avoid damage to subgrade or sod.
 3. Tamp or roll lightly to ensure contact with subgrade; work sifted soil into minor cracks between pieces of sod, remove excess to avoid smothering adjacent grass.
 4. Complete sod surface true to finished grade, even, and firm.
- C. Fasten sod on slopes to prevent slippage with wooden pins 6 inches long driven through sod into subgrade, until flush with top of sod. Install at sufficiently close intervals to securely hold sod.
- D. Water sod with fine spray immediately after planting. During first week, water daily or more frequently to maintain moist soil to depth of 4 inches.

3.04 FIELD QUALITY CONTROL

- A. 8 weeks after seeding is complete and on written notice from Contractor, Engineer will, within 15 days of receipt, determine if a satisfactory stand has been established.
- B. If a satisfactory stand has not been established, Engineer will make another determination after written notice from Contractor following the next growing season.

END OF SECTION

SECTION 32 93 00
PLANTS

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Association of Nurserymen (AAN): Z60.1, Nursery Stock.
 2. Federal Housing Administration (FHA), Section 1103-103.
 3. Hortus Third, Liberty Hyde Bailey, Hortorium, 1976.

1.02 DEFINITIONS

- A. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- B. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.
- C. Finish Grade: Elevation of finished surface of planting soil.
- D. Herbaceous: Vegetation characteristic of an herb that is not woody in structure and has a texture and color of a leaf.
- E. Large Tree: Trees that have a mature height of 60-feet or greater.
- F. Manufactured Topsoil: Soil produced off-site by homogeneously blending material soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- G. Measurement:
1. In size grading Balled and Burlapped (B & B), caliper takes precedence over height.
 2. Take trunk caliper 6 inches above the ground level (up to and including 4-inch caliper size) and 12 inches above the ground level for larger trees.
 3. Measure size of container-grown stock by height and width of plant. Do not prune to obtain required sizes
 4. Measure herbaceous perennials pot size, not top growth.

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- H. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- I. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- J. Plant; Plants; Plant Material: These terms refer to vegetation in general, including shrubs, ground covers, ornamental grasses, or herbaceous vegetation.
- K. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- L. Root Flare: Also called “trunk flare” The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.
- M. Small Tree: Trees with a mature height of less than 60 feet.
- N. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees and shrubs below the soil surface.
- O. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- P. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- Q. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.03 SUBMITTALS

A. Action Submittals:

- 1. Plant materials source list. Include quantities, sizes, and quality.

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2. Product data on manufactured products specified.
3. Shrubs and Herbaceous Plant Material: Three samples of each variety and size delivered to the site for review. Maintain approved samples on-site as a standard for comparison.
4. Mulch: For any off-site mulch sources provide a 1-quart (1-liter) volume of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished, provide an accurate representation of color, texture, and organic makeup.

B. Informational Submittals:

1. Qualification Data: For qualified landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owner's contact persons.
2. Soil percolation test results.
3. Monitoring and Maintenance Plan:
 - a. As specified in Supplement A included at the end of this specification.
 - b. Submit 1 month before start of required maintenance periods.
4. Wildlife Management Plan: Wildlife detrimental to establishment of vegetation is known to exist in the Doan Brook area, including rabbits, geese, ducks, and deer. Wildlife management will be critical for a successful establishment of vegetation. A Wildlife Management Plan shall be submitted that summarizes proposed methods of managing wildlife on Project site during construction and warranty period. Methods for consideration, but not limited to, geese fencing and chemical application that might be effective in controlling wildlife on site.
5. Warranty: Sample of special warranty.
6. Plug and Container Procurement Plan.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants.
1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association
 2. Experience: Five years' experience in landscape installation.

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3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 4. Personnel Certifications: Installer's field supervisor shall have certification in the following categories from the Professional Landcare Network: Certified Landscape Technician – Exterior, with installation and maintenance specialty area(s).
 5. Pesticide Applicator: State licensed, commercial.
- B. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory.
1. The soil-testing laboratory shall oversee soil sampling.
 2. Report suitability of tested soil for plant growth.
 - a. State recommendations for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
 - b. Report presence of problem salts, minerals, or heavy metals; if present, provide additional recommendations for corrective action.
- C. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.
- D. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain sizes.
1. Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container grown stock. Measure main body of shrub for height and spread; do not measure branches or roots tip to tip.
 2. Other Plants: Measure with stems, petioles, and foliage in their normal position.
- E. Preinstallation Conference: Conduct conference at project site.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Balled and Burlapped Plants: Wrap each ball firmly with burlap and securely bind with twine, cord, or wire for shipment and handling. Drum-lace balls with a diameter of 30 inches or more.

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- B. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.
- C. Bulk Materials:
 - 1. Do not dump or store bulk materials near structures or utilities. Materials shall not be stored on walkways and pavements, or on existing turf areas or plants that are to remain, be protected, and are not designated within construction staging limits.
 - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 - 3. Accompany each delivery of bulk soil amendments with appropriate certificates.
- D. Do not prune plants prior to delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie plants in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.
- E. Handle planting stock by root ball.
- F. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.
- B. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:
 - 1. Notify Owner no fewer than three days in advance of proposed interruption of each service or utility.

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2. Do not proceed with interruption of services or utilities without Owner's written permission.
- C. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

1.07 SPECIAL GUARANTEE

- A. Provide extended guarantee or warranty, with Owner named as beneficiary, in writing, as special guarantee. Special guarantee shall provide for removal and replacement with new plants those transplanted or newly planted plants found defective or to be dead or not in a vigorous, thriving condition during a period of 2 growing seasons after the date of Substantial Completion. Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within the specified warranty period.
- B. Replace defective plants with new plants free of dead or dying branches and branch tips, and bearing foliage of a normal density, size, and color. Closely match new plants to adjacent specimens of the same species and meet requirements of this Specification.
- C. Plant replacement plants that die during a season unfavorable for planting during first month of next favorable planting season.
 1. Replace plants that are more than 25 percent dead or in an unhealthy condition at the end of warranty period.
 2. A limit of one replacement of each plant will be required except for losses or replacements due to failure to comply with requirements.
 3. Provide extended warranty for period equal to original warranty period for replacement plant material.
 4. Plants, planting areas, or planting accessories that have migrated or washed away shall be returned to conditions accepted at Substantial Completion, which may include replacement and/or relocation, for a period of 2 growing seasons after Substantial Completion.

1.08 MAINTENANCE

- A. Commence to maintain plant life immediately after planting and maintain for a minimum of two growing seasons, and until plants are well established and exhibit a vigorous growing condition through special guarantee period.

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- B. In accordance with accepted Submittal on care and maintenance of plants (in Monitoring and Maintenance Plan, Supplement A) and as follows:
 - 1. Maintain by watering, pruning, cultivating, and weeding as required for healthy growth. Restore planting saucers.
 - 2. Tighten and repair stake and guy supports and reset trees and shrubs to proper grades or vertical position as required.
 - 3. Restore or replace damaged wrappings. Spray as required to keep trees and shrubs free of insects and disease.
 - 4. Tighten and repair erosion control matting and stakes to maintain coverage in planting areas.
 - 5. Repair areas of soil or mulch that have been washed out or have migrated from installation location.
 - 6. Remove guys, stakes, and other supports at end of maintenance service.
 - 7. Maintenance includes temporary protection fences, barriers, and signs as required for protection.
 - 8. Coordinate watering to provide deep root watering to newly installed trees.
- C. The contractor shall ensure that the survival level of all planted vegetation is maintained at 90 percent or greater during the maintenance period. No areas 4 square feet or larger will be allowed with failed vegetation and they shall be repaired immediately.
- D. As required in Supplement A, Monitoring and Maintenance Plan, included at the end of this specification.

1.09 SCHEDULING AND SEQUENCING

- A. Plant Deliveries: Notify Engineer at least 1 day in advance of each delivery.
- B. Planting Season: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
 - 1. Spring Planting: April 15 to June 15.
 - 2. Fall Planting: August 15 to October 15.
- C. Plant trees and shrubs after final grades are established and before planting of lawns or grasses.

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- D. The project includes a large number and diversity of plugs and containers. The Contractor shall submit a Plug and Container Procurement Plan that includes:
1. Estimated ordering date, delivery, and installation schedule for each zone or area of the Project.
 2. Confirmation from plug and container supplier(s) that plant stock is available.
 3. Latest delivery and installation date to meet Milestone and Substantial Completion Dates.

PART 2 PRODUCTS

2.01 PLANT MATERIALS

- A. Provide quantity, size, genus, species, and variety of trees and shrubs indicated; comply with applicable requirements of AAN Z60.1.
- B. Nomenclature (Names of Plants): In accordance with "Hortus Third".
- C. Quality and Size:
1. Nursery-grown, habit of growth normal for species.
 2. Sound, healthy, vigorous, and free from insects, diseases, and injuries.
 3. Equal to or exceeding measurements specified in plant list. Measure plants before pruning with branches in normal position.
 4. Root System of Container-Grown Plants: Well developed and well distributed throughout the container, such that the roots visibly extend to the inside face of the growing container.
 5. Perform necessary pruning at time of planting.
 6. Sizes: Dimensional relationship requirements of AAN Z60.1 for kind and type of plants required.
 7. Balled and Burlapped Plants: Firm, intact ball of earth encompassing enough of the fibrous and feeding root system to enable full plant recovery.
 - a. Ball Size: AAN Z60.1.
 8. Container-Grown Plants: Self-established root systems, sufficient to hold earth together after removal from container, without being root bound.
 - a. Stock: Grown in delivery containers for at least 6 months but not over 2 years.
 9. Label at least one tree and shrub of each variety with securely attached waterproof tag bearing legible designation of botanical and common name.
- D. Plant List: As shown on the Drawings.

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- E. Replacement Shrubs and Trees: Same species, size, and quality as specified for plant being replaced, except existing trees larger than 4-inch caliper may be replaced with 4-inch caliper trees.

2.02 ANTIDESICCANT

- A. Provide transpiration retarding material to be used where any plant material is moved during the growing season.
- B. Products:
 - 1. Foliguard.
 - 2. Wiltpruf.
 - 3. Or approved equal.

2.03 STAKING MATERIALS

- A. Wood Stake: 2 inches by 2 inches by 8 feet.
- B. Tree Ties: No. 4 chainlock tree ties as manufactured by Arbortie or approved equal.
- C. Hose: Two-ply, reinforced rubber garden hose, not less than 1/2-inch diameter, new or used.

2.04 EROSION CONTROL BLANKET

- A. Erosion control blanket shall be open, flexible, and dimensionally stable network of fully biodegradable, bonded, interlocking fibers. The blanket shall have a functional longevity of up to 18 months. Blanket fibers shall be turf green or natural wood/straw color.
 - 1. ECS-1B – Biodegradable Single Net Straw Erosion Control.
 - 2. Or approved equal.

2.05 MULCH

- A. Free from noxious weed seed and foreign material harmful to plant growth.
- B. Shredded Recycled Hardwood Mulch: Well composted, stable, and weed free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight, 100 percent passing through 1-inch (25 mm) sieve; soluble salt content of 2 to 5 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings.

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2.06 PEAT MOSS

- A. Sphagnum peat moss, fibrous type with neutral pH.

2.07 HERBICIDE

- A. Selective, pre-emergent, surface-applied.
- B. Manufacturers and Products:
 - 1. Eli Lilly and Co.; Surflan.
 - 2. Thompson-Hayward Chemical Co.; Casoron.
 - 3. Or approved equal.

2.08 PLANTING SOIL MIX

- A. Top Soil: Amend to meet requirements of soil analysis.

2.09 FERTILIZER

- A. Commercial, complete, of neutral character; in granular, packet, or pellet form, 35 to 80 percent of nitrogen slow release.
 - 1. Minimum: 10 percent available nitrogen, 3 percent to 5 percent phosphoric acid, and 3 percent to 5 percent soluble potash.

2.10 SOURCE QUALITY CONTROL

- A. Top Soil Analysis/Testing: As specified in.

PART 3 EXECUTION

3.01 PERCOLATION TESTS

- A. Perform to determine subsoil drainage in planting areas by licensed engineer according to method specified in Minimum Property Standards For One- and Two-Unit Dwellings, FHA Section 1103-103.
- B. Test Hole Depth: 30 inches.

3.02 LOCATION OF PLANTS

- A. Locate new planting or stake positions as shown, unless obstructions are encountered, in which case notify Engineer.

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- B. Locate no planting, except ground cover, closer than 18 inches to pavements, pedestrian pathways, and structures.
- C. Request Landscape Architect observe locations and adjust as necessary before planting begins.

3.03 PREPARATION

- A. Subsoil Drainage: Furnish for plant pits and beds after percolation test results are received.
- B. Planting Soil: Delay mixing of amendments and fertilizer if planting will not follow preparation of planting soil within 2 days. For pit and trench type backfill, mix planting soil prior to backfilling and stockpile at Site.
- C. Plants: Place on undisturbed existing soil or well-compacted backfill.
- D. Trees and Shrubs:
 - 1. Pits, Beds, and Trenches: Excavate with vertical and scarified sides.
 - 2. Balled and Burlapped Trees and Shrubs: Make excavations at least twice as wide as root ball.
 - 3. Container-Grown Stock: Excavate as specified for balled and burlapped stock, adjust for size of container width and depth.
 - 4. Fill excavations with water and allow to percolate out prior to planting.
- E. Ground Cover Beds:
 - 1. Mix amendments and fertilizer with top soil prior to placing or apply on surface of top soil and mix thoroughly before planting.
 - 2. Scarify top soil to a depth of 4 to 6 inches.
 - 3. Establish finish grading of soil. Rake areas to smooth and create uniform texture and fill depressions.
 - 4. Moisten.

3.04 TREE AND SHRUB PLANTING

- A. Plant trees before planting surrounding smaller shrubs and ground covers. Adjust plants with most desirable side facing toward the prominent view (sidewalk, building, street).
- B. Before planting, verify that the root flare is visible at the top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk.

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After soil removal to expose root flare, verify that root ball still meets size requirements.

- C. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.
- D. Balled and Burlapped Trees and Shrubs: Place in pit by lifting and carrying by its ball (do not lift by branches or trunk). Lower into pit. Set straight and in pit center with tip of rootball 1 to 2 inches above adjacent finish grade.
- E. Container-Grown Trees and Shrubs: Remove containers, slash edges of rootballs from top to bottom at least 1-inch deep. Plant as for B & B Trees.
- F. Set stock plumb and in center of planting pit or trench with root flare 2 inches (50 mm) above adjacent finish grades.

3.05 TREE AND SHRUB PRUNING

- A. Remove only dead, dying or broken branches. Do not prune for shape.
- B. Prune and thin trees and shrubs according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by a Certified Arborists, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; prune to retain natural character.

3.06 GROUND COVER AND HERBACEOUS PLANTING

- A. Set out and space ground covers and plants other than trees and shrubs as indicated on plans, in even rows with triangular spacing.
- B. Dig planting holes through erosion control matting with one of the following: hand trowel, shovel, bulb planter, or hoe. Split biodegradable pots or remove non-biodegradable pots. Root systems of all potted plants shall be split or crumbled. Dig holes large enough to allow spreading of roots. Set potted plants so pot top is even with existing grade.
- C. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

3.07 BACKFILLING

- A. Backfill with planting soil, except where existing soil is suitable according to top soil analysis.

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B. Balled and Burlapped Plants:

1. Partially backfill pit to support plant. Remove burlap and binding from sides and tops of balled and burlapped plants, do not pull burlap from under balls.
2. When excavation is approximately 2/3 full, water thoroughly before placing remainder of backfill to eliminate air pockets even if it is raining. Finish backfilling pit sides.
3. Never cover top of rootball with soil. Form a saucer above existing grade, completely around the outer rim of the plant pit.

3.08 GUYING, STAKING, AND WRAPPING

- A. Support trees immediately after planting to maintain plumb position.
- B. Guying: Support deciduous trees over 4 inches in caliper and all coniferous trees with three guys equally.
- C. Staking: Support deciduous trees 4 inches in caliper or less with stakes spaced equally about each tree.

3.09 FERTILIZER

- A. Add as top dressing depending on plant size and manufacturer's recommendation.

3.10 MULCHING

- A. Cover planting beds and area of saucer around each plant with 2-inch thick layer of Shredded Recycled Hardwood mulch within 2 days after planting. Saturate planting area with water.
- B. Mulch backfilled surfaces of planting areas and other areas indicated.
 1. Trees in Turf Areas: Apply mulch throughout plant bed to an average thickness of 2 inches. Do not place mulch within 6 inches of trunks.
 2. Mulch in Planting Areas: Apply 2-inch thickness of mulch over whole surface of planting area, and finish level with adjacent finish grades.

3.11 PLANT MAINTENANCE

- A. The Contractor shall ensure that the survival level of all planted vegetation is maintained at 90 percent or greater during the maintenance period. No areas 4 square feet or larger will be allowed with failed vegetation and they shall be repaired immediately.

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- B. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.
- C. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.
- D. Protect plantings from damage and/or death as a result of wildlife such as but not limited to geese, deer, and rabbits. A wildlife management plan, including but not limited to goose fencing, chemical treatment, etc shall be carried out during the warranty period. Any plants that are damaged or die as a result of wildlife nuisances shall be replaced under warranty.

3.12 WEED CONTROL

- A. Maintain a weed-free condition within planting areas. Apply pre-emergent selective herbicide to mulched beds at manufacturer's recommended rate of application.
- B. Undesirable plant removal will be completed by hand whenever practical or as specified in the specifications and permits. If herbicides will be required within 50-feet of the stream or in regulated wetland areas, only herbicides labeled for application in aquatic sites shall be applied. Proper selective herbiciding procedures shall be performed by a trained and registered aquatic applicator, licensed in accordance with the applicable commercial laws/regulations of the State of Ohio. No sooner than two weeks from the date of application the herbicide the Contractor shall completely remove the dead vegetation of the undesirable species and properly dispose of the dead vegetation off-site. Herbicide shall not be applied during dormancy of the target plant.
- C. The Contractor shall effectively remove the undesirable species within the area to be maintained. At any time during the maintenance and establishment period, the Contractor shall ensure that the presence of the undesirable species in area coverage is contained at the 10 percent or less level. Example undesirable species include, but are not limited to, the following invasive plants:
 - 1. Black Locust/Robinia psuedoacacia.
 - 2. Tree-of-Heaven/Ailanthus altissima.
 - 3. Multiflora Rose/Rosa multiflora.
 - 4. Honeysuckle/Lonicera japonica.

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5. Japanese Knotweed/*Polygonum cuspidatum*.
6. Giant Reed/*Phragmites australis*.

3.13 CLEAN UP AND PROTECTION

- A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.
- B. Protect planting areas and plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance period. Treat, repair, or replace damaged plantings.
- C. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

3.14 SUPPLEMENTS

- A. Monitoring and Maintenance Plan.

END OF SECTION

MINIMUM REQUIREMENTS FOR THE 2-YEAR MONITORING AND MAINTENANCE PLAN

The work specified in this Supplement consists of monitoring and maintenance for all zones and areas of the Project. This includes the landscaped and planted areas, as well as the block walls and slopes, in-stream structures, and park features that are constructed as part of this Project. Although this supplement resides under specification 32 93 00, Plants, its requirements are beyond just plants as noted in specification 01 20 00, Measurement and Payment.

Monitoring and Inspections

The Contractor is required to complete inspections of the Project and observe and note deviations to the As Built Drawings. Monthly inspections are required during Year 1; Bi-Monthly inspections are required during Year 2. All inspections shall be submitted to the NEORSRD within 15 days of completion. Notes should include a detailed description of observation, approximate station location, extent and magnitude of defect, and a photograph. The monitoring and inspections shall be completed by an Ohio Licenses Professional Engineer who was familiar with the construction. The Contractor shall submit an inspection form and checklist and the names of the inspectors and their role during the construction. Observations shall include at a minimum:

Zone 1 and Zone 1A

1. Verticality of block walls
2. Any block displacement
3. Scour along base of wall
4. Erosion behind block or at top of the wall
5. Condition at transitions both upstream and downstream
6. Displacement of baskets (if visible)
7. Condition of vegetation
8. Erosion of slope

Zone 2

1. Verticality of block walls
2. Any block displacement
3. Scour along base of wall
4. Erosion behind block or at top of the wall
5. Condition at transitions both upstream and downstream
6. Condition of vegetation
7. Visible groundwater discharge through the face of the wall
8. Erosion of slope

Zone 3

1. Verticality of block walls
2. Any block displacement
3. Scour along base of wall
4. Erosion behind block or at top of the wall
5. Condition at transitions both upstream and downstream
6. Condition of vegetation
7. Visible groundwater discharge through the face of the wall
8. Erosion of slope

Supplement A - MONITORING AND MAINTENANCE PLAN
Specification 32 93 00B Plants

Zone 4

1. Verticality of block walls
2. Any block displacement
3. Scour along base of wall
4. Erosion behind block or at top of the wall
5. Condition at transitions both upstream and downstream
6. Condition of vegetation
7. Visible groundwater discharge through the face of the wall
8. Condition of grout

Right Bank Walls

1. Verticality of block walls
2. Any block displacement
3. Scour along base of wall
4. Erosion behind block or at top of the wall
5. Condition at transitions both upstream and downstream
6. Condition of vegetation
7. Visible groundwater discharge through the face of the wall
8. Erosion of slope

In-Stream Structures (J-hook, Cascades and Riffles)

1. Any block displacement
2. Confirmation that flow is towards mid-channel

Bioretention Area

1. Scour, sedimentation, and trash accumulation
2. Observation of ponded water or poor draining soil
3. Confirmation of underdrain outfall is free of obstruction
4. Condition of vegetation

Sculpture Play Area

1. Condition of play surface
2. Condition of sculptures
3. Condition of stone benches

Stream Bank Terraces

1. Verticality of block terraces
2. Any block displacement
3. Scour along terraces
4. Erosion behind block or at top of terraces
5. Condition at transitions both upstream and downstream
6. Condition of vegetation
7. Condition of pavers

Victory (Liberty) Oaks

1. Condition of trees

Supplement A - MONITORING AND MAINTENANCE PLAN
Specification 32 93 00B Plants

General Park Area Within Project Limits

1. Condition of erosion fabric within 20-ft of stream bank
2. Condition of erosion fabric beyond 20-ft of stream bank
3. Condition of sod
4. Condition of planted areas
5. Condition of decorative fence
6. Condition of new asphalt paths
7. Condition of educational/interpretive signage

Parking Lot

1. Condition of pavement, pavement striping, and curbs
2. Condition of erosion fabric beyond 20-ft of stream bank

Maintenance Plan

The Contractor shall submit a Maintenance Plan to maintain all features installed as part of this Project for the two year period. This includes all maintenance equipment, labor and supplies for vegetation (weeding, watering, pruning, grass cutting, etc. within the project limits) and those items listed in Monitoring and Inspections. The Maintenance Plan shall include proposed procedures, maintenance tasks and frequency, proposed equipment used, required labor per task, safety procedures, and schedules.

Grass cutting shall occur at a frequency to provide successful establishment while maintaining a neat park appearance. Cutting shall occur at least as frequently as grass cutting completed by the City in adjacent areas of the Park. Weekly cutting may be necessary during some months. Grass cutting shall occur at least bi-weekly during the growing season (April 25 – October 26). At least once per year in either April or May, the mulch in the Bioretention Area shall be manually turned to maintain infiltration capacity. Litter shall be removed from the Bioretention Area as it is observed.

The Maintenance Plan shall also include instructions for storage, planting, care, and maintenance of each type of plant for a 2-year period in climate and location of the Project. This shall be a separate section of the Plan such that it can also be used beyond the 2-year period.

The contractor shall ensure that the survival level of all planted vegetation is maintained at 90% or greater during the maintenance period. No areas 4 square feet or larger will be allowed with failed vegetation and they shall be repaired immediately. Replanting shall conform to the requirements of the planting specifications and the Special Guarantee. A summary of replants installed shall be submitted to the NEORS in the maintenance reports.

A Maintenance Report shall be submitted to the NEORS in April and October of each year of the maintenance period.

Maintenance of non-vegetative features of the park shall be completed if the Monitoring and Inspections reveal that the features (e.g. cascade, riffle, j-hook, bioretention area, etc.) differ from the As Built Drawings such that they are unstable, can create instability in the future, change the flow patterns within the stream, or change the current or future function or operation of that feature or downstream features. Recommendations for maintenance repair shall be immediately communicated to the NEORS for approval prior to commencing the maintenance repair.

Supplement A - MONITORING AND MAINTENANCE PLAN
Specification 32 93 00B Plants

The Contractor shall remove all temporary features (e.g. wildlife fencing [if used]) at the end of the 2-year period, unless otherwise directed by the NEORSD. The Contractor shall not be responsible for features that have been damaged by vandalism, fire or acts of private property owners after construction has been accepted by NEORSD. The Contractor shall not be responsible for removing litter from the project site within the 2-year period, except within the Bioretention Area.

SECTION 33 41 01
STORM DRAIN PIPING

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section and any supplemental Data Sheets:
1. ASTM International (ASTM):
 - a. C311, Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete.
 - b. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
 - c. D1248, Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable.
 - d. D1784, Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
 - e. D2412, Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
 - f. D3034, Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 - g. D3212, Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
 - h. F477, Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
 - i. F794, Standard Specification for Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.

1.02 DEFINITIONS

- A. CCTV: Closed Circuit Television.
- B. SDR: Standard Dimension Ratio.

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1.03 SUBMITTALS

A. Action Submittals: Information on gasket polymer properties.

B. Informational Submittals:

1. Certificates:
 - a. Manufacturer's Certificate of compliance, in accordance with Section 01 43 33, Manufacturer's Field Services, that products furnished meet requirements of this section.
 - b. Certification of calibration: Approved testing laboratory certificate if pressure gauge for hydrostatic test has been previously used. If pressure gauge is new, no certificate is required.
 - c. Certified statement from manufacturer of gaskets, setting forth that basic polymer used in gaskets and test results of physical properties of compound are in accordance with ASTM F477.
2. Manufacturer's Written In-Plant Quality control Program: Quality control procedures and materials testing to be used throughout manufacturing process. Submit prior to manufacture of any pipe for this Project.
3. Letter from independent testing agency certifying that pipe furnished meets requirements of this section.
4. Test or historical performance data to verify that joint design meets requirements of these specifications.
5. Provide pipe and pipe joint test results with delivery of pipe. do not deliver pipe not meeting test requirements to Project Site.
6. Manufacturer's written recommendations for pipe handling and installation.
7. Field Leakage Testing Plan: Submit at least 15 days in advance of the testing and include at least the following:
 - a. Testing dates.
 - b. Piping systems and sections to be tested.
 - c. Test type.
 - d. Method of isolation.
 - e. Method of conveying water from source to system being tested.
 - f. Calculation of maximum allowable leakage piping section(s) to be tested.
 - g. Method for disposal of test water, if applicable.
8. CCTV Inspection Equipment: Submit minimum 15 days prior to performing inspections:
 - a. Name and qualifications of inspection firm.
 - b. Brand name and model number of video equipment to be used..
9. Leakage test results.

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- 10. PVC pipe deflection test results.
- 11. CCTV inspection DVDs and inspection logs.

1.04 QUALIFICATIONS

- A. CCTV Inspection Firm: Actively performed such services for minimum of 2 years.

PART 2 PRODUCTS

2.01 PIPE AND FITTINGS

- A. As specified in the Data Sheets following “End of Section.”

2.02 FLEXIBLE COMPRESSION COLLAR

- A. Mechanical joint coupling with No. 305 stainless steel bands.
- B. Manufacturers:
 - 1. Calder, Inc., Bellflower, CA.
 - 2. Fernco Inc., Davison, MI.

2.03 SOURCE QUALITY CONTROL

- A. Pipe Fittings:
 - 1. Tees:
 - a. Shop fabricated by pipe manufacturer.
 - b. Tee stubs shall not protrude inside pipe.
 - c. Insert-a-tee PVC fitting.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Notify Engineer immediately of manufacturing imperfections or damage caused by improper handling.
- B. Verify size, material, joint types, elevation, and horizontal location of existing pipeline to be connected to new pipeline.

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3.02 PREPARATION

- A. Pipe Distribution: Do not distribute more than 1 week's supply of materials in advance of laying unless otherwise approved by Engineer.
- B. Inspect pipe and fittings prior to lowering into trench to ensure no cracked, broken, or otherwise defective materials are being used.
- C. Remove foreign matter and dirt from inside of pipe and fittings and keep clean during and after laying. Wash ends of section clean with wet brush prior to joining sections of pipe.

3.03 INSTALLATION OF PIPE, FITTINGS, AND APPURTENANCES

A. General:

- 1. Install pipe sections in accordance with manufacturer's recommendations.
- 2. Provide and use proper implements, tools, and facilities for safe and proper prosecution of Work.
- 3. Lower pipe, fittings, and appurtenances into trench, piece by piece, by means of crane, slings, or other suitable tools and equipment, in such a manner as to prevent damage to pipe materials, protective coatings and linings. Do not drop or dump pipe into trenches.
- 4. Establish line and grade for pipe by use of lasers.
- 5. Measure for grade at pipe invert, not at top of pipe.
- 6. Do not deviate from line or grade, as shown on the Drawings, more than ½ inch, provided that such variation does not result in a level or reverse sloping invert.

B. Laying and Jointing:

- 1. Use gasket lubricant as recommended by gasket manufacturer.
- 2. Lay pipe upgrade with bell ends pointing in direction of laying.
- 3. When field cutting or machining pipe is necessary, use only tools and methods recommended by pipe manufacturer and approved by Engineer.
- 4. After section of pipe has been placed in its approximate position for jointing, clean end of pipe to be joined, inside of joint, and rubber ring immediately before joining pipe.
- 5. Assemble joint in accordance with recommendations of manufacturer.
- 6. Apply sufficient pressure in making joint to assure that joint is "home" as defined in standard installation instructions provided by pipe manufacturer. Inside joint space shall not exceed 50 percent of pipe manufacturer's recommended maximum allowance.

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7. Place pipe to specified line and grade to form smooth flow line.
8. Ensure that bottom of pipe is in contact with bottom of trench for full length of each section.
9. Check for alignment and grade after joint has been made.
10. Place sufficient pipe bedding material to secure pipe from movement before next joint is installed.
11. When pipe is laid within movable trench shield, take precautions to prevent pipe joints from pulling apart when moving shield ahead.
12. When laying operations are not in progress, and at close of day's work close and block open end of last laid section of pipe to prevent entry of foreign material or creep of gasketed joints.
13. Take precautions to prevent "uplift" or floating of line prior to completion of backfill operation.
14. Connections between one pipe material and another shall be by means of flexible compression collar, installed in accordance with the manufacturer's recommendations, or concrete closure collar.

- C. Concrete Closure Collars: Only use concrete closure collars where shown or authorized by Engineer.

3.04 CONCRETE CLOSURE COLLAR

- A. Use only when approved by Engineer, and then only to make connections between dissimilar pipe or where standard rubber gasketed joints or flexible compression collars are impractical or unavailable.
- B. Procedure:
1. Remove water from excavation; placement of concrete in standing water will not be allowed.
 2. Wash pipe to remove loose material.
 3. Wrap and securely fasten light gauge sheet metal or building felt around pipe joint to ensure that concrete does not enter line.
 4. Wet nonmetallic pipe thoroughly prior to concrete placement.
 5. Placement shall be monolithic for each collar.
 6. Place to minimum 6 inch thickness around outside diameter of pipe.
 7. Extend concrete minimum of 12 inches on each side of joint.
 8. Cure concrete, after initial set, by covering with well moistened earth.

3.05 HYDROSTATIC AND PNEUMATIC TESTS

A. General:

1. Notify Engineer in writing 5 days in advance of testing. perform testing in presence of Engineer.
2. Pipe 18 inches in diameter and smaller shall be tested for leakage using Hydrostatic Exfiltration or Pneumatic Test Methods at Contractor's option.
3. Pipe shall successfully pass leakage test prior to acceptance.
4. Test sections of constructed sewer between stations only after backfilling is completed. Testing may be done prior to placement of asphaltic concrete or roadway structural section.
5. Isolate new pipelines that are connected to existing pipelines. Install pipe plugs as required to allow section of new pipe to be pressure tested.
6. Plug wyes, tees, stubs, and service connections with gasketed caps or plugs securely fastened or blocked to withstand internal test pressure. Such plugs or caps shall be removable, and their removal shall provide socket suitable for making flexible jointed lateral connection or extension.
7. Furnish testing equipment and perform tests as approved by Engineer. Testing equipment shall provide observable and accurate measurement of leakage under specified conditions.
8. Supply of temporary water shall be as state in Section 01 50 00. Temporary Facilities and Controls.
9. Dispose of test water in a manner that will not damage or interfere with adjacent property and in a manner acceptable with Engineer and regulatory agencies.

B. Hydrostatic Exfiltration Test:

1. Fill pipe test section 24 hours prior to time of testing, if desired, to permit normal absorption into pipe walls.
2. Procedure:
 - a. Maximum filling velocity shall not exceed 0.25 foot per second, calculated based on full area of pipe.
 - b. Expel air from piping system during filling.
 - c. Apply and maintain specified test pressure with hydraulic force pump. Valve off piping system when test pressure is reached.
 - d. Maintain hydrostatic test pressure continuously for 2 hours minimum, adding additional make-up water only as necessary to restore test pressure.

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- e. Determine actual leakage by measuring quantity of water necessary to maintain specified test pressure for duration of test.
3. Measurement Accuracy: plus or minus 1/8 gallon of water leakage under specified conditions.
4. PVC pipe and joints shall sustain maximum water loss limit of 0.8 gallon per inch diameter per 1,000 feet of pipe, including service connections within test section per 2 hours. Allowable leakage shall be modified as stated below if hydrostatic head is other than 6 feet.
5. Hydrostatic Head:
 - a. At least 6 feet above maximum estimated groundwater level in section being tested, but no less than 6 feet above inside top of highest section of pipe in test section, including service connections.
 - b. In every case, determine height of water table at time of test by exploratory holes or such other methods approved by Engineer. Engineer will make final decision regarding test height for water in pipe section being tested.
 - c. If hydrostatic head is other than 6 feet, allowable leakage as computed by criteria above shall be adjusted by the square root of actual head divided by square root of 6.
6. Length of Pipe Tested: Limit length such that pressure on invert of lower end of section does not exceed 16 feet of water column. In no case shall length be greater than 700 feet.
7. Dispose of test water in a manner that will not damage or interfere with adjacent property and in a manner acceptable with Engineer and regulatory agencies.

C. Pneumatic Testing for 18-inch and Smaller Diameter Pipe:

1. Equipment:
 - a. Calibrate gauges with standardized test gauge provided by Contractor at start of each testing day. Engineer will witness calibration.
 - b. Install compressor, air piping manifolds, gauges, and valves at ground surface.
 - c. Provide pressure release device, such as rupture disc or pressure relief valve, to relieve pressure at 6 psi or less.
 - d. Restrain plugs used to close sewer lines to prevent blow-off.
2. Procedure:
 - a. No person shall enter manhole or structure, or occupy area above opening of manhole or structure where pipe is under pressure.
 - b. Determine height of groundwater table at time of test.

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- c. Slowly introduce air into pipe section until internal air pressure reaches 4 psi greater than average backpressure of groundwater submerging pipe.
- d. Allow 2 minutes minimum for air temperature to stabilize.
- e. Allowable leakage for sewers constructed of air-permeable materials, such as concrete or clay:
 - 1) When pressure is decreased to 3.5 psig, air pressure test shall begin.
 - 2) Test shall consist of measuring time in seconds for pressure in pipe to drop from 3.5 psig to 2.5 psig.
 - 3) Pipe leakage shall be considered acceptable if time in seconds for pressure drop is equal to or greater than required time as calculated below:

$$K = 0.0111d^2L$$

$$C = 0.000392dL$$

If C_t is less than or equal to 1.0, then time = K_t

If C_t is between 1.0 and 1.75, then time = K_t/C_t

If C_t is greater than or equal to 1.75, then time = $K_t/1.75$

Where: d = pipe diameter in inches
 L = pipe length in feet
 K = value for each length of pipe of a specific diameter
 C = value for each length of pipe of a specific diameter
 K_t = Sum of all K values
 C_t = Sum of all C values

- f. This method is based on allowable air loss rate of 0.003 cubic foot per minute (cfm) per square foot of internal pipe surface, with total air loss rate not less than 2.0 cfm nor greater than 3.5 cfm.
- g. Allowable leakage for sewers constructed of nonair-permeable materials such as ductile iron, and polyvinyl chloride (PVC).
 - 1) When nonair-permeable pipe is subjected to low pressure air test, time in seconds for pressure drop shall be equal to or greater than three times required time calculated using procedure above.
 - 2) Defective Piping Sections: Replace or test and seal individual joints and retest as specified.

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D. Hydrostatic Joint Testing:

1. If pipe fails to pass hydrostatic test and location of leak cannot be readily identified, individual joint tests shall be performed. After leaking joints have been located and repaired, retest pipeline.
2. Testing shall be performed prior to installing PVC liner patch at joints.
3. Provide device specifically designed for testing of pipe joints and consisting of a metal cylinder, seal ring on each side of joint, and method of applying pressure to joint.
 - a. Manufacturer:
 - 1) Mechanical Research and Design, Inc., Manitowoc, WI.
 - 2) Cherne Industries, Inc., Minneapolis, MN.
4. Measurement Accuracy: Plus or minus 0.05 gallon of water leakage under specified conditions.
5. Determine height of groundwater table at time of test.
6. Minimum Pressure, Each Joint: 2.5 psi above backpressure of groundwater.
7. Minimum Test Duration, Each Joint:
 - a. 20 minutes for 60-inch diameter pipe and smaller.
 - b. 10 minutes for pipe larger than 60-inch diameter.
8. Maximum Leakage: Leakage per joint shall not exceed maximum water loss limit of 0.0008 gallon per hour per inch-diameter times length of distance between pipe joints.

E. Test Report Documentation:

1. Test date.
2. Pipe section or pipe joint tested.
3. Test Method.
4. Test Pressure.
5. Length of test.
6. Pressure or water loss.
7. Remarks, including:
 - a. Leaks (type, location).
 - b. Repair/ replacement performed to remedy excessive leakage.
8. Signed by Contractor and Engineer to represent that test has been satisfactorily completed.

F. Subsequent Failure: Visible infiltration of groundwater following successful test shall be considered evidence that original test was in error or that subsequent failure of pipeline has occurred.

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G. PVC Pipe Deflection Test:

1. General:
 - a. Test installed pipeline for deflection by pulling a mandrel through sewer without aid of mechanical pulling device.
 - b. Perform test at least 10 days after trench backfill and compaction have been completed.
2. Mandrel:
 - a. Full circle, solid or rigid odd number of legs (minimum 9 legs) steel cylinder with pulling rings at each end.
 - b. Diameter: Sized to allow only as much initial deflection for ultimate deflection of 5 percent.
 - c. Obtain Engineer approval, through Contractor calculations, for use of mandrel smaller than 96-2/3 percent of inside diameter of pipe.
3. Correcting Deficiencies or Obstructions:
 - a. Excavate to spring-line of pipeline and replace and re-compact pipe zone material.
 - b. Internal pipe re-rounding or vibration will not be allowed.
 - c. If pipe does not pass mandrel test after replacement of pipe zone material and trench backfill, re-excavate and replace pipeline.

3.06 INSPECTION

A. Television Pipeline Inspection:

1. General:
 - a. Internally inspect sewer pipelines by closed circuit television (CCTV) after completion of pipeline cleaning and testing.
 - b. Conduct inspection in presence of Engineer.
2. Procedure:
 - a. Provide complete and continuous taped record and written log of inspection.
 - b. Format: DVD, color.
 - c. Television Camera Equipment:
 - 1) Rotating lens or pan and tilt.
 - 2) Resolution: Minimum 350 lines per inch.
 - 3) Focal Distance: Adjustable through a range of 6 inches to infinity.
 - 4) Remote-Reading Footage Counter: Accurate to less than 1 percent error.
 - 5) Lighting: Sufficient to provide clear, in-focus picture of entire inside periphery of pipe, and minimizes reflection.

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- d. Pull camera at uniform rate, stopping to properly document defects. Maximum pull of camera shall not exceed 30 feet per minute.
- 3. Quality Standard:
 - a. Provide clear, sharp image when played back on conventional television receiver.
 - b. Neatly label videotape showing contents, project title, tape number, pipe structure identification numbers, date tape was made, and inspection company.
 - c. Tapes to include:
 - 1) Opening Screen:
 - a) Date of inspection.
 - b) Pipe structure identification number.
 - c) Upstream and downstream node identification numbers.
 - d) Street address.
 - e) Pipe size.
 - f) Normal (upstream to downstream) or reverse (downstream to upstream) pull.
 - 2) Continuous View: Current distance along reach (tape counter footage).
 - d. Log sheets to show time and date of inspection, location, upstream and downstream manholes, direction of pull, pipeline length, pipe size, pipe material, location of lateral connections, video tape number and detail of defects encountered.
 - e. Show sufficient detail to determine cracks in pipe, offset joints, leaking joints, sags, and other flaws in pipeline installation. Record location of deficiencies by distance from center of reference manhole.
 - f. Upon completion, playback tape in presence of Engineer. Any tape not meeting quality standard will be rejected and taping process repeated.
 - g. Correct deficiencies found as a result of video replay, and repeat CCTV inspection.

B. Deficiencies Requiring Correction:

- a. Variations in alignment greater than specified herein.
- b. Joint separations greater than allowed by pipe manufacturer.
- c. Visible infiltration.
- d. Presence of debris or foreign objects.
- e. Obvious damage or defects in pipeline.

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3.07 REPAIR AND RETESTING

- A. Sections of pipe not meeting the pressure test requirements shall be replaced or have individual joints tested and sealed.
- B. Following repairs, sections shall be retested as specified.

3.08 SEWER CLEANING

- A. Prior to final acceptance and inspection of the sewer system by Engineer, flush and clean all parts of the system. Remove all accumulated construction debris, rocks, gravel, sand, silt, and other foreign material from the sewer system. If necessary, use mechanical rodding or bucketing equipment.
- B. Upon Engineer's final inspection of the sewer system, if any foreign matter is still present in the system, reflush and clean the sections and portions of the lines as required.

3.09 SUPPLEMENTS

- A. Data Sheets.

<u>Number</u>	<u>Title</u>
-.03	Polyvinyl Chloride (PVC)

END OF SECTION

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SECTION 33 41 01.03 POLYVINYL CHLORIDE (PVC)	
Item	Description
Pipe: 15-inch diameter and under	ASTM D3034: Standard dimension ratio less than 35, except that the cell classification shall be 12454-B or 12454-C as defined in ASTM D1784.
Pipe: 18- through 24-inch diameter	ASTM F679: Standard dimension ratio less than 35, except that the cell classification shall be 12454-C as defined in ASTM D1784.
Ribbed Profile Pipe: 18- through 36-inch diameter	ASTM F794: Minimum stiffness of 46 psi when tested in accordance with ASTM D2412, except that the cell classification shall be 12454-C as defined in ASTM D1784.
Joints	ASTM D3212 rubber gasketed.
Gaskets	ASTM F477. Lubricants: As approved by manufacturer.
Fittings	PVC, gasketed. Provide plug when service piping is not required.
Plugs	Removable. Removal shall provide a socket suitable for making a flexible jointed lateral connection or extension.
Source Quality Control Testing	In accordance with specified ASTM.

END OF SECTION

SECTION 33 42 01
CHANNEL CONSTRUCTION

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. This section includes earthwork and related operations, including, but not limited to, channel excavation, grading, compaction, and as-built verification of the constructed channel.

1.02 REFERENCES

- A. Section 31 23 16, Excavation.
- B. Section 31 32 01, Woven Mattress Coir Blanket (Coir Fabric).
- C. Section 33 49 00, Stream Structures.
- D. The following is a list of standards which may be referenced in this Section:
 - 1. American Society for Testing and Materials (ASTM):
 - a. C117, Standard Test Method for Materials Finer than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing.
 - b. C136, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
 - c. D75, Standard Practice for Sampling Aggregates.
 - d. D698, Standard Test Methods for Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 5.5-pound (2.49 kg) Rammer and 12-inch (305 mm) Drop.
 - e. D1556, Standard Test Method for Density of Soil in Place by the Sand-Cone Method.

1.03 DEFINITIONS

- A. Stream Line of Channel: Location in the channel that is approximately equidistant from both the left and right banks. Stream Line stationing distance from upstream end of reach used as reference for location along the stream.

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- B. Bench: A channel feature consisting of a break or change in the channel bank slope occurring, in most cases, behind at grade with walls lining the channel. The cross slope of this bank feature is typically flat or greater than 12 to 1 draining toward the channel.
- C. Thalweg: Defined as the "flowline" or deepest point of the channel cross section.
- D. Top of Bank: The point at which the proposed channel cross section intercepts the existing ground. Any land disturbance beyond this point is covered under Section 31 10 00, Site Clearing. Other than as specified for the parking lot and bioretention areas, positive drainage toward the channel must be maintained beyond the top of bank.
- E. Right Bank: Facing downstream, the streambank on the right.
- F. Left Bank: Facing downstream, the streambank on the left.
- G. Refer to applicable definitions in Section 33 49 00, Stream Structures.

1.04 SUBMITTALS

- A. Written Excavation Plan, Detailing:
 - 1. Methods and sequencing of excavation.
 - 2. Proposed offsite spoil disposal sites of suitable and unsuitable excess backfill material.
 - 3. Copy of applicable disposal permits.
 - 4. Proposed locations and extents of onsite stockpiled excavated material.
 - 5. Quantity, types and sizes of equipment proposed to perform the Work.
 - 6. As-built survey of constructed channel.

1.05 QUALITY ASSURANCE

- A. Survey Control: The Contractor shall have onsite, at all times when Work is performed, a survey level, rod, and personnel competent of confirming and recording spot elevations and grades.

1.06 SCHEDULING AND SEQUENCING

- A. Construction Limits: Survey and establish construction limits as shown on the Drawings and as specified in Section 31 10 00, Site Clearing.
- B. Erosion Control: Install all erosion control measures as shown on the Drawings.

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- C. Clearing, Grubbing, Grinding, and Stripping: Complete applicable Work in accordance with the Construction and Erosion Control Sequence shown on the Drawings and as specified in Section 31 10 00, Site Clearing.
- D. Maintain utilities in accordance with the Drawings.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 CHANNEL CONSTRUCTION

- A. The Contractor shall be responsible for providing stream line construction staking (and necessary off-set staking) to facilitate construction.
- B. The Contractor shall obtain the Engineer's approval of the staked channel alignment prior to commencing channel excavation.
- C. The Contractor must use "single-edge" blade excavation equipment for all channel construction activities including excavation, installation of structures, installation of utilities, and any grading operations within the limits of the stream channel as shown on the Drawings. The uses of buckets with teeth are prohibited in these areas of work.
- D. It is recommended that the channel excavation equipment have an articulated bucket and/or blade.
- E. The Contractor shall provide progress as-built surveys of the constructed channel, verifying the field location of points and elevations shown on the Drawings, prior to acceptance of the channel work for payment.
- F. Do not over-excavate without written authorization of Engineer.
- G. The use of explosives will not be allowed.

3.02 UNCLASSIFIED EXCAVATION

- A. See Section 31 23 16, Excavation.

3.03 INSTALLATION OF IN-STREAM STRUCTURES

- A. In-Stream Structures shall be constructed per the Drawings and in accordance with Section 33 49 00, Stream Structures.

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- B. Excavation for In-Stream Structures shall be from the downstream limits of the structure face to the upstream limits necessary to install the materials and maneuver the equipment. Boulder stones shall be pushed into downstream limits of the over excavation.
- C. Engineer must review the limits of over excavation for In-stream structures prior to performing the Work.

3.04 FILL MATERIAL CLASSIFICATIONS:

A. General:

1. Refer to Section 31 23 23, Fill and Backfill.
2. Refer to Section 31 23 16, Excavation.
3. Refer to Drawings.

B. Fill Material Classifications:

Fill Material Type	Location of Application	Physical Characteristics	Compaction Requirements	Moisture Content Requirements
Type 1	Underlying pavement and within existing channel at elevations at and lower than Bankfull elevation (including Bankfull bench).	Clean compatible soil material. Free of debris, organic matter, and/or rock.	92 percent of maximum dry density as determined by Standard Proctor Analysis.	Within range of 1 percent below to 3 percent above optimum moisture content as determined by ASTM D1557.
Type 2	Soil Encapsulated Lifts (stream plugs) and within existing channel at elevations higher than Bankfull elevation. Lifts shall be constructed as shown on Drawings.	Clean compatible soil material. Free of debris, organic matter, and/or rock.	85 percent of maximum dry density as determined by Standard Proctor Analysis.	Within range of 1 percent below to 3 percent above optimum moisture content as determined by ASTM D1557.
Type 3	Abandoned channel.	Clean common excavation soil material. Free of debris, organic matter, and/or rocks greater than ½ cubic yard.	85 percent of maximum dry density as determined by Standard Proctor Analysis.	Within range of 1 percent below to 3 percent above optimum moisture content as determined by ASTM D1557.

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Fill Material Type	Location of Application	Physical Characteristics	Compaction Requirements	Moisture Content Requirements
Type 4	All other applications.	Clean compatible soil material. Free of debris, organic matter, and/or rock.	90 percent of maximum dry density as determined by Standard Proctor Analysis.	Within range of 1 percent below to 3 percent above optimum moisture content as determined by ASTM D1557.

END OF SECTION

SECTION 33 49 00
STREAM STRUCTURES

PART 1 GENERAL

1.01 REFERENCES

- A. Section 31 32 01, Woven Mattress Coir Blanket (Coir Fabric).
- B. Section 31 32 19.16, Geotextiles.
- C. Section 31 37 00, Riprap.
- D. Section 31 32 60, Rock.
- E. Section 33 42 01, Channel Construction.
- F. The following is a list of standards which may be referenced in this section:
 - 1. ASTM International (ASTM):
 - a. C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - b. C535, Standard Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

1.02 DEFINITIONS

- A. Structures
 - 1. J-Hook Vane: “J” shaped rock structure with an outside rock arm, inside rock arm, and rock center (hook), all composed of limestone blocks arranged per the Drawings. Functions to direct flow away from the outside bank. Includes all earthwork, rock, and geotextiles as required per the Drawings.
 - 2. Cascade: Limestone boulder sills and native channel rock substrate. Functions as a grade control structure. Includes all earthwork, rock, and geotextiles as required per the Drawings.
 - 3. Constructed Riffle: Subpavement, Sills, and native channel rock substrate. Functions as a grade control structure. Encompasses part of the preceding pool, riffle, run, and part of downstream pool. Includes all earthwork, rock, and geotextiles as required per the Drawings.

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B. Structure Components:

1. Structure Center (Hook): The portion of the structure that is in the center of the channel, at the thalweg elevation.
2. Structure Face: The downstream edge of the top of the center boulder or crest stone located in the thalweg of the stream.
3. Structure Arm: The portion of the J-Hook Vane structure that connects the structure center (at the thalweg elevation) to the adjacent stone block walls lining the channel.
4. Subpavement: The below-grade portion of the Constructed Riffle that provides an immobile foundation in stream bed that spans the full channel bottom width; composed of limestone riprap sized as shown in the Drawings.
5. Sill: The portion of the Cascade or Constructed Riffle that spans the full channel bottom width. Intercepts the channel bank at 90 degrees into the bank. Composed of limestone riprap for Constructed Riffle; composed of limestone boulders for Cascade.

C. Structure Materials:

1. Limestone Boulder: Tumbled natural stone of the specified size and shape shown on the Drawings and shall be sound, dense, resistant to the natural elements, and suitable for the purposes intended.
2. Limestone Block: Angular natural stone of the specified size and shape shown on the Drawings and shall be sound, dense, resistant to the natural elements, and suitable for the purposes intended.
3. Crest and Footer Stones are large stones used for the construction of Stream Structures. Rocks shall consist of limestone boulders or limestone blocks of the required size and shape shown on the Drawings.
4. Limestone Riprap: stone of the specified size and shape shown on the Drawings and shall be sound, dense, resistant to the natural elements, and suitable for the purposes intended.

- D. Over excavation: Any excavation required for the installation of Stream and Stormwater Treatment structures outside the limits of excavation for the proposed channels. Over excavation shall be limited as described on the Drawings. The upstream and bottom limits of over excavation shall be dependent on the size of the fieldstones, crest, and footer stones used in the structure, the size of the equipment necessary to install the material, and pending approval of the Engineer.

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1.03 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
 - a. Refer to applicable submittals in Section 31 32 19.16, Geotextiles.
 - b. Refer to applicable submittals in Section 31 37 00, Riprap.
 - c. Refer to applicable submittals in Section 31 32 60, Rock.
2. Samples:
 - a. Refer to applicable samples in Section 31 32 19.16, Geotextiles.
 - b. Refer to applicable samples in Section 31 37 00, Riprap.
 - c. Refer to applicable samples in Section 31 32 60, Rock.

B. Informational Submittals:

1. Trip tickets showing source, type, and weight of each load of material delivered to Site.
2. The size of equipment to be used to install the structures. Include bucket dimensions and the minimum trench width required to maneuver.

1.04 QUALITY ASSURANCE

- A. Any rock for use in a Stream Structure will be approved individually onsite by the Engineer prior to placement and/or acceptance of the Work.

1.05 SCHEDULING AND SEQUENCING

- A. Complete proposed channel excavation and rough grading as specified in Section 33 42 01, Channel Construction and per the Drawings, site grading.
- B. Complete any over excavation in accordance with Drawings and installation of geotextiles as specified in Section 31 32 19.16, Geotextiles, prior to placing rocks.
- C. After installation of structure, proceed with installation of backfill as shown on the Drawings.

PART 2 PRODUCTS

2.01 CREST STONES AND FOOTER STONES

A. Limestone Blocks for J-Hook Vanes.

1. Limestone Blocks as specified in Section 31 32 60, Rock.

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- B. Limestone Boulders for Cascade Sills: Limestone Boulders as specified in Section 31 32 60, Rock.

2.02 LESTONE RIPRAP

- A. Limestone Riprap as specified in Section 31 37 00, Riprap.

2.03 GEOTEXTILES

- A. Geotextiles as specified in Section 31 32 19.16, Geotextiles.

PART 3 EXECUTION

3.01 CONSTRUCTING STREAM STRUCTURES

- A. Notify Engineer at least 2 weeks prior to construction of stream structures. Engineer must be present on Site before Contractor may proceed with construction of stream structures.
- B. Excavate proposed channel area as shown on the Drawings.
- C. The subgrade to receive each stone shall be excavated and any unstable material shall be removed. Approved material shall be placed and compacted in a maximum of 6-inch lift to 95 percent of Maximum Standard Proctor Density (ASTM D698) to re-establish the subgrade of each stone. Unstable material shall be removed from the Project site and disposed of by Contractor. Removal and replacement of unstable material shall only be completed at the direction of Engineer and shall be paid for under Section 31 23 16, Excavation. Backfill behind stones shall be compacted to 95 percent Maximum Standard Proxy Density (ASTM D698). Care shall be taking during compaction to avoid disturbing and/or damaging integrity of the stone channel edge. The top of all stones shall be as indicated on the Drawings. Finished grades and subgrades for stones will be determined from the height of stone used.
- D. Install the geotextiles as shown on Drawings and in accordance with Section 31 32 19.16, Geotextiles.
- E. The stones shall be carefully picked and arranged so that adjacent rock surfaces match within 0.1 foot in top elevation and 2 inches along the vertical exposed face or channel side of rock. Stones shall be placed such that adjacent stones "touch" each other and voids do not exceed 4 inches. It is the intent of construction to minimize voids between stones. Stones shall be placed such that upstream stones are wedges up against downstream stones, to prevent downstream movement of stones.

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- F. Smaller rocks shall be “chinked in” to fill all voids between the stones. Placement shall be approved by Engineer.
- G. Crest stones shall be installed per the Drawings to tolerances of 0.1 feet from established final grade.
- H. J-Hook crest stones shall be installed per the Drawings to tolerance of 0.1 feet from established final grade.
- I. Place crest and footer stones and fieldstones on geotextile without puncturing or damaging geotextile. If accidentally damaged, repair geotextile prior to proceeding.
- J. Contractor shall, if deemed necessary, support the stones from falling over before and during the placement of rip rap, backfill, and compaction Work on either side of the stone.

3.02 PLACING BACKFILL

- A. Place backfill upstream of the installed rock structure stones. Work backfill as necessary to distribute it, prevent future settling, and to eliminate detrimental voids. Backfill shall be applied as needed to fill the excavation limits and match the established grade. The use of backfill is limited to locations shown on the Drawings or locations approved by the Engineer.
- B. Contractor shall utilize existing native rock substrate harvested from disturbed riffles and bars within the limits of disturbance, provided that the material meets or can be amended to meet the Product requirements in Section 31 32 60, Rock.
- C. Intermix different sizes of rock to eliminate segregation and to fill voids between larger pieces with smaller pieces and work surface of rock backfill free from irregularities.
- D. Use placement and intermixing methods that avoid disturbing the stream structure and the underlying geotextile or damaging existing facilities, completed Work, or adjacent walls.

END OF SECTION