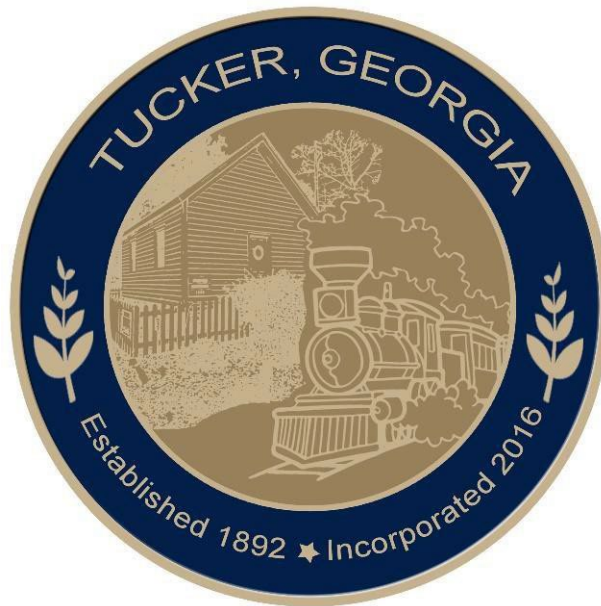


City of Tucker

Invitation to Bid  
ITB 2024-022

# LAKE ERIN DAM REHABILITATION PROJECT



## BID MANUAL

City of Tucker  
1975 Lakeside Parkway, Suite 350  
Tucker, Georgia 30084

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# ITB #2024-022 LAKE ERIN DAM REHABILITATION PROJECT

## INVITATION TO BID:

The City of Tucker, Georgia requests that interested parties submit proposals for the LAKE ERIN DAM REHABILITATION. Bids will be accepted until the date and time listed below and will be awarded to the lowest responsible and responsive bidder. The City reserves the right to negotiate with the lowest responsible and responsive bidder as provided for in O.C.G.A. § 36-91-21. Addenda and updates to this bid manual will be posted on the City of Tucker website <http://tuckerga.gov/bids> or may be requested by email [procurement@tuckerga.gov](mailto:procurement@tuckerga.gov).

BID ACTIVITY SCHEDULE	
Invitation to Bid Issued	October 1, 2024
Pre-Bid Conference	October 10, 2024 at 10 AM EST
Deadline for Questions	October 15, 2024 by 1 PM EST
Responses to Questions Posted (Addenda)	October 18, 2024
<b>Bid Submittal Deadline</b>	<b>October 31, 2024 by 1 PM EST</b>
Award at Council Meeting (Tentative)	November 28, 2024
Substantial Completion from Notice to Proceed	300 Calendar Days

**SCOPE OF WORK:** Refer to Exhibit A.

**QUESTIONS:** Submit all questions in writing to [procurement@tuckerga.gov](mailto:procurement@tuckerga.gov) with the subject line "Questions: ITB 2024-022".

**PRE-BID CONFERENCE:** A mandatory pre-bid conference is scheduled for October 10, 2024 at 10:00 am (EST). 4000 Henderson Park Road, Tucker, GA 30084. Attendees will meet at the pavilion in Henderson at the end of Henderson Park Road. (enter the park from the Livsey Road). A site visit to the adjacent project location will follow the meeting.

**ADDENDA:** Responses to the questions received will be by addenda and will be posted on the City website [www.tuckerga.gov/bids](http://www.tuckerga.gov/bids). The signed acknowledgement issued with each addendum must be submitted with the proposal. It is the bidder's responsibility to verify if any addenda were issued.

**SUBMITTAL REQUIREMENTS:** Vendor shall submit ITB Response electronically to [procurement@tuckerga.gov](mailto:procurement@tuckerga.gov) no later than October 31, 2024 at 1:00pm EST with the subject line "Submittal: ITB #2024-022". The email must contain the vendor's contact information. Submittals should be one PDF file and named <Company Name>.ITB 2024-022.Bid Submittal.pdf

**BID OPENING:** Bids will be publicly opened at City Hall at 1:05pm EST on Thursday, October 31, 2024.

**BID SUBMITTALS:** A listing of submittals received prior to the bid deadline will be posted on the City website [www.tuckerga.gov/bids](http://www.tuckerga.gov/bids) following the opening of the bids.

## **ITB #2024-022 LAKE ERIN DAM REHABILITATION PROJECT**

### **BID SUBMITTAL DOCUMENTS:**

1. Technical, Personnel and Work Plan Proposal as Specified in Section 1.3 Qualifications of Bidders
2. Cost Proposal Form (Exhibit B)
3. W-9 Form (Provided)
4. Certificate of Current Insurance
5. Notarized Contractor Affidavit (Provided)
6. Notarized Subcontractor Affidavit (Provided)
7. Notarized Bid Bond Form (Provided)
8. Proposed List of Subcontractors Form (Provided)
9. Notarized Oath of Non-Collusion (Provided)
10. Acknowledgement of Addendum form issued with each Addendum
11. Contact Form (Provided)

All responses must be received electronically by the Bid Deadline. (Addenda will show any schedule updates). No bids will be received orally or by phone. Late bids will not be considered. Bids received after the bid deadline will be filed unopened. The City of Tucker reserves the right to reject any and all bids or any part, to waive any formalities to make an award and to re-advertise in the best interest of the City.

The city reserves the right to negotiate pricing and may, in its discretion, award a contract to the lowest responsible and responsive bidder submitting the proposal.

**City of Tucker Request for Proposals  
RFP 2024-022  
LAKE ERIN DAM REHABILITATION**

**EXHIBIT A:  
BID SUBMITTAL REQUIREMENTS**

**PURPOSE, INTENT AND PROJECT DESCRIPTION**

The City of Tucker (City), requests that interested parties submit formal electronic bids for the construction of Lake Erin and Dam REHABILITATION Project.

Project Description: This project consists of repairs and associated site improvements to Lake Erin Dam located at Henderson Park, City of Tucker, Dekalb County, Georgia. The Work includes but is not limited to the following: reservoir control; demolition of existing spillways; partial excavation of the existing embankment; construction of a new spillway system and lake drain with an impact basin outfall; and reconstruction of the earth embankment dam with a flatter upstream slope. The project will also include temporary erosion and sediment control; rip rap protection both on the upstream slope and beyond the downstream slope in the floodway channel; permanent grass cover; and site restoration.

This document in its entirety for ITB 2024-022 is available for download on the City of Tucker website: <http://tuckerga.gov/bids> or request via email to [procurement@tuckerga.gov](mailto:procurement@tuckerga.gov). All future communications and supporting documents for ITB 2024-022 will be posted on the website.

**SUPPLEMENTAL INSTRUCTIONS TO BIDDERS**

**1.1 PREPARATION OF PROPOSAL**

Refer to “Invitation to Bid”

**1.2 MODIFICATIONS**

Any bidder may modify his/her bid any time prior to the scheduled submittal deadline for receipt of bids, provided such modification is received electronically by the Owner prior to the submittal deadline.

**1.3 QUALIFICATION OF BIDDERS**

- A. The Contractor shall be licensed in the State of Georgia as a General Contractor to perform work associated with this project.
- B. The Contractor shall provide a technical proposal which includes the following: Limit of three (3) pages:
  - 1. The Contractor shall demonstrate final completion of at least three (3) dam projects within the past ten years on dams greater than 30 feet in height and for contract values greater than \$2,000,000, one of the three being greater than \$3,000,000. Project descriptions should be provided which include the dam name, dam height, contract value, and description of work performed.

References shall be included for the three dam projects and shall include the following

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information:

- a. Name of client organization;
  - b. Name, title, telephone number, and e-mail address, if available, of point of contact for client organization.
2. At least one of the three dam projects shall demonstrate work experience constructing a concrete intake tower and / or a concrete impact basin.
  3. At least one of the three dam projects shall demonstrate work experience placing drain material within an earthen embankment dam.
- C. The Contractor must demonstrate that their proposed team meets the following minimum staffing requirements: Limit of two (2) pages:
1. The Contractor shall provide a Project Manager (responsible for overall construction coordination) with fifteen years' experience in the construction industry and with specific experience working (as a Project Manager or Site Superintendent) on at least one (1) dam project within the past ten years on a dam greater than 30 feet in height and a contract value greater than \$3,000,000. Project Manager identified in the Bid Package must serve as Project Manager on the Project and cannot be replaced without written consent of the Owner.
  2. The Contractor shall provide a Site Superintendent with at least ten years' experience in the construction industry and with specific experience working on at least one (1) dam project within the past ten years on a dam greater than 30 feet in height and a contract value greater than \$3,000,000. Project Superintendent identified in the Bid Package must serve as Superintendent on the Project and cannot be replaced without written consent of the Owner.
- D. The Contractor shall provide a Work Plan which includes the following: Limit of three (3) pages:
1. The specific methodology, techniques, equipment and number of staff to be used by the Contractor in providing each type of the required work as outlined in the project contract documents.
  2. An outline of the overall management concepts employed by the Contractor and a project management plan, including project control mechanisms and a project schedule.

### 1.4 POWER OF ATTORNEY

Attorneys-in-fact who sign bid bonds or contract bonds must file with each bond a certified and effectively dated copy of their power of attorney.

## GENERAL CONDITIONS

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## **1.01 DEFINITION OF TERMS:**

- A. Whenever used in these General Conditions or in the other Contract Documents, the following terms have the meanings indicated which are applicable to both the singular and plural thereof:
1. **Bidder** refers to any person, firm or corporation submitting a Proposal for the Work.
  2. **Bonds** refers to bid, performance, payment, and other instruments of security furnished by the Contractor and his Surety in accordance with the Contract Documents.
  3. **Change Order** refers to a written order to the Contractor signed by the Owner issued after execution of the Contract authorizing changes in the Work, or an adjustment to the Contract Price or Contract Time.
  4. **Owner** refers to the City of Tucker for whom the work is to be performed.
  5. **Contract** Shall mean the written agreement between the Owner and the Contractor covering the Work to be performed as set forth in the Contract Documents.
  6. **Contract Documents** Shall include Addenda, Bonds, Certificates of Insurance, Change Orders, Contract, Drawings, Conditions of the Contract, and Technical Specifications. The intent of these documents is to include all materials, appliances, tools, labor, and services of every kind necessary for the proper execution of the Work, and the terms and conditions of payment therefore. The Contract Documents shall be considered as one, and whatever is called for by one of them shall be as binding as if called for by all.
  7. **Contract Price** Shall refer to the total amount payable to the Contractor under the Contract Documents for the performance of the Work.

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8. **Contract Time** Shall refer to the number of calendar days stated in the Contract Documents for the Substantial Completion of the Work.
9. **Contractor** or **General Contractor** shall mean the individual, firm or corporation undertaking the execution of the Work under the terms of the Contract and acting through its agents and employees.
10. **Director** refers to the Executive Director, or any duly authorized representative of the Owner.
11. **Drawings** or Plans refers to those Drawings which show the character and scope of the Work and include all Drawings enumerated in a list of Drawings and or supplemental Drawings, if any, identified elsewhere in the Contract Documents.
12. **Field Order** refers to a written order issued by the Owner that clarifies or interprets the Contract Documents.
13. **Latent Defect** refers to a hidden defect in material, workmanship or discovered missing item(s) as required by Contract after the Warranty Period, it's omission that may cause failure, malfunction or not provide service as required, but is not or was not discoverable through general inspection.
14. **Notice of Award** refers to the written notice issued by the Owner to the selected Bidder stating that upon compliance with the conditions precedent to be fulfilled by him/her within the time specified, the Owner will execute and deliver the Contract to the Contractor.
15. **Notice to Proceed** refers to the written notice issued by the Owner to the Contractor authorizing him/her to proceed with the Work and establishing the date of commencement of the Work.
16. **Proposal** refers to the offer, bid, or Proposal of the Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
17. **Resident Inspector** or **Inspector** refers to the representatives of the Owner authorized to observe the construction of the Project.
18. **Shall** and **Will** are mandatory; **Should** and **May** are permissive.
19. **Subcontractor** Shall mean any individual, partnership, firm, corporation, or other entity that either maintains an employee or employees on the Project Site for the purpose of prosecuting the Work of the Contract or provides materials worked to a special design according to the Drawings and Specifications of these Contract Documents. Subcontractor shall not mean the General Contractor or any entity that merely furnishes materials not worked to special design.

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20. **Special Conditions** when included as a part of the Contract Documents, Special Conditions refer only to the Work under this Contract.
21. **Specifications** refers to those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards, and workmanship as applied to the Work. The Specifications generally consist of the Contract Documents and Technical Specifications, GDOT Specifications, if included as listed in the Table of Contents.
22. **Substantial Completion** refers to the stage in construction when a project can be utilized for the purposes for which it was intended. At Substantial Completion, minor items and items that are seasonally restricted need not be completed, but the items that affect operational integrity and function of the facility must be capable of continuous use. Contract Time with regard to Liquidated Damages and Contract duration terminates.
23. **Supplier** refers to any person or organization who supplies materials or equipment for the Work, including that fabricated to a special design, but who does not perform labor at the Site.
24. **Surety** refers to the corporate body which is bound with the Contractor and which engages to be responsible for the Contractor and his acceptable performance of the Work.
25. **Warranty Period** refers to the one-year period in which the Contractor warrants the Contracted for Work. The Period is 365 days from Substantial Completion. Warranted Work encompasses defects in workmanship, material, products, etc.
26. **Work** of the Contractor or Subcontractor(s) Shall include all labor, material, equipment, transportation, skill, tools, machinery and other equipment and things useful or necessary in order to complete the Contract.

### **1.02 CITY OF TUCKER REQUIREMENTS**

#### **A. CONTRACTOR REQUIREMENTS**

1. The contractor will be responsible for providing all labor, materials, and equipment necessary to perform the work. This is a lump sum bid. Payment will be made based on the percentage of work completed.
2. The contractor is responsible for inspecting the jobsite prior to submitting a bid. No change orders will be issued for differing site conditions.
3. Five percent (5%) retainage will be withheld from the total amount due the contractor until Final Acceptance of work is issued by the City. The City will inspect the work as it progresses.

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### B. PROSECUTION AND PROGRESS

1. The Contractor shall comply with the following:
  - a. Mobilize with sufficient forces such that all construction identified as part of this contract shall be substantially completed within 300 days of Notice to Proceed. The contractor will be considered substantially complete when all work required by this contract has been completed (excluding final punch list work).
  - b. Upon Notice of Award, the Contractor will be required to submit a Progress Schedule. The contractor shall provide a project progress schedule prior to or at the preconstruction meeting. This schedule should accurately represent the intended work and cannot be vague or broad such as listing “each dam” in the contract. The contractor shall submit a two-week advance schedule every **Friday by 2:00 p.m.**, detailing scheduled activities for the following week.
  - c. The normal workday for this project shall be 7:00AM to 7:00PM and the normal workweek shall be Monday through Friday. The City will consider extended workdays or workweeks upon written request by the Contractor on a case-by-case basis. No work will be allowed on national holidays (i.e. Memorial Day, July 4th, Labor Day, etc.).
  - d. The work will require a bidder to provide all labor, administrative forces, equipment, materials and other incidental items to complete all required work. A one (1) year landscape maintenance bond will be required. The selected contractor will be responsible for the maintenance of landscape materials for one (1) year including watering and replacement of dead materials. The City will conduct an inspection at the end of the warranty period.
2. The City shall perform a Final Inspection upon substantial completion of the work. The contractor will be allowed to participate in the Final Inspection. The contractor shall be assessed liquidated damages in the amount of \$500.00 per calendar day for any contract work (excluding punch list items) that is not completed within 300 days of Notice to Proceed. Liquidated damages shall be deducted from the 5% retainage held by the City.
3. The contractor shall complete any Punch List work within 45 calendar days of the Final Inspection. The contractor will be assessed liquidated damages in the amount of \$500.00 per calendar day for not completing any required Punch List work within 45 calendar days. All repairs shall be completed by the contractor at the contractor’s expense prior to issuance of Final Acceptance.

### C. PERMITS AND LICENSES

1. The contractor shall procure all permits and licenses, pay all charges, taxes and fees, and give all notices necessary and incidental to the due and lawful prosecution of the work.

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### **D. BONDING AND INSURANCE REQUIREMENTS**

1. No bid may be withdrawn for a period of ninety (90) days after the time has been called on the date of opening.
2. All bids must be accompanied by a Bid Bond of a reputable bonding company authorized to do business in the State of Georgia, in an amount equal to at least five percent (5%) of the total amount of the bid.
3. Upon Notice of Award, the successful contractor shall submit a Performance Bond pursuant to O.C.G.A. § 36- 91-70 payable to the City of Tucker in the amount of 100% of the total contract price. The successful contractor shall also submit a Payment Bond in the amount of 100% pursuant to O.C.G.A. § 36- 91-90.
4. The contractor shall procure and maintain the following insurance policies; all policies shall name the City of Tucker as an additional named insured and shall provide for waiver of subrogation in favor of the City of Tucker:
  - a. Commercial General Liability coverage at their sole cost and expense with limits of not less than \$3,000,000 in combined single limits for bodily injury and/or property damage per occurrence.
  - b. Statutory Workers Compensation and Employers Liability Insurance with limits of not less than \$1,000,000.
  - c. Commercial automobile liability insurance with limits of not less than \$1,000,000 combined single limit for bodily injury and/or property damage per occurrence, and such policies shall name the City of Tucker as an additional named insured.
  - d. Umbrella liability coverage of not less than \$5,000,000 per occurrence and \$5,000,000 in the aggregate.

### **E. PUBLIC NOTIFICATION**

1. The contractor shall be responsible for installing park and trail closure signage at each end of the project (assume three points of closure) one week prior to commencement of work. Payment for this will be included in the lump sum bid price. The contractor shall be responsible for installing road closure and construction signage per MUTCD guidelines. Payment for this will be included in the lump sum bid price.

### **F. EXISTING CONDITIONS / DEVIATION OF QUANTITIES**

1. It is the Contractor's responsibility to inspect the project site to verify existing conditions prior to submitting their bid. This is a blended bid with both unit price items and lump sum bid items. No payment will be made for additional non-unit price work without prior written approval from the City. At no time will Contractor proceed with work outside the prescribed scope of services for which additional payment will be requested without the written authorization of the City.

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2. The City reserves the right to add, modify, or delete scope items. The bid price will be adjusted by written authorized change order(s) as described herein, when determined to be necessary and agreed to by both parties. Items for which the Contractor provides unit prices will be paid based on the actual measured amount of work complete. The Contractor will not be entitled to any adjustment of unit prices because of adjustments made to quantities and/or work locations. For those specific unit price items, Contractor will be paid for actual in-place quantities completed and accepted for pay items listed in the Bid Schedule. All other work required by this ITB, plans, specs, standards, etc. but not specifically listed in the Bid Schedule shall be considered “incidental work” and included in the bid prices for items on the Bid Schedule.

### **1.03 APPLICABLE REQUIREMENTS:**

- A. The contractor shall execute the work according to and meet the requirements of the following:
  - The Bid /Contract Documents including, but not limited to, the scope of work, plans, and Specifications
  - City of Tucker ordinances and regulations
  - OSHA standards and guidelines
  - MUTCD Guidelines
  - Any other applicable codes, laws and regulations including but not limited to Section 45-10-20 through 45-10-28 of the Official Code of Georgia Annotated, Title VI of the Civil Rights Act, Drug-Free Workplace Act, and all applicable requirements of the Americans with Disabilities Act of 1990.
- B. Notice and Service Thereof:
  1. Any notice to Contractor from the Owner relative to any part of this Contract shall be in writing and considered delivered and the service thereof completed, when said notice is posted by registered mail, to the said Contractor at his last given address or delivered in person to said Contractor or his authorized representative on the Project Site or delivered via email to the official email address provided by the Contractor.

### **1.04 SPECIFICATIONS:**

- A. The Specifications and Drawings accompanying them, and any other Contract Documents shall be supplementary to each other and any material, workmanship, and/or service which may be in one, but not called for in the others, shall be as binding as if indicated, called for or implied by all.
- B. The Contractor will be held responsible for furnishing all labor, equipment, and materials necessary to complete the Work as indicated by the Contract Documents.
- C. The Contractor shall see to it that his/her work overlaps the work of all Subcontractors on the project site and agrees to assume all responsibility for liability, workmanship and

## **ITB #2024-022 LAKE ERIN DAM REHABILITATION PROJECT**

quality of material concerning any work done by said Subcontractors.

- D. Each section or type of work is described separately in the Technical Specifications; however, should any item of material, equipment, work or combinations of such be required in one section, and not be described in that section and a similar item described in another section, that description shall apply regardless of the section under which it is described.
- E. In case of difference between Drawings and Specifications, the Specifications shall govern.
- F. Contractor shall submit to Owner samples of all materials to be utilized in the project as indicated. Submission is to ensure compliance to the Contract in regard to texture, color, size, thickness, etc. All materials must meet specifications in regard to standard industry practice, unless so noted otherwise. Materials submitted for approval and their special installation, structural procedures, ANSI, ASTU, Test Lab results, etc., will be part of the submission.

### **1.05 SPECIFICATIONS AND DRAWINGS TO BE SUPPLEMENTARY:**

- A. The Contractor shall keep on the Work site, at all times, a copy of the Drawings and Specifications and shall give the authorized representatives of the Owner access thereto.
- B. The Specifications and Drawings accompanying them are intended to describe and provide for a finished piece of Work. They are intended to be complementary, and what is called for by either shall be as binding as if called for by both.
- C. The Contractor will understand that the Work herein described shall be complete in every detail, notwithstanding every item necessarily involved is not particularly mentioned and the Contractor shall be held responsible to provide all labor, material, equipment and incidentals necessary for the completion of the indicated Work.
- D. The Contractor shall, before the bid of the Contract, report in writing to the Owner any discrepancy that may be discovered in the Bid/Contract Documents. If the Contractor fails to call such discrepancy(s) to the attention of the Owner, the subsequent decision of the Owner as to which is correct shall be binding and final.
- E. Should any error or inconsistency appear in the Drawings or the Specifications, the Contractor, before proceeding with the Work, shall make mention of the same to the Owner and in no case shall he proceed with the Work in uncertainty.

### **1.06 PRESENT DOCUMENTS GOVERN:**

- A. The Contractor shall in no case claim a waiver of any Specifications requirements on the basis of previous approval of material or workmanship on other jobs of like nature or on the basis of what might be considered standard for material or workmanship in any particular location. The Contract Documents for this project shall govern all the Work in

## **ITB #2024-022 LAKE ERIN DAM REHABILITATION PROJECT**

this Contract.

### **1.07 DRAWINGS:**

- A. The Drawings generally show Work fully drawn out on only a portion of the Drawings, the remainder in outline. The drawn out Work Shall be understood as applying to other like or similar places.
- B. All necessary dimensions are given on the Drawings and shall in all cases, except where a discrepancy occurs, be followed exactly.
- C. The figures and notes on the Drawings, showing the indicated dimensions shall take precedence over scaling.

### **1.08 CONTRACTOR'S SHOP DRAWINGS:**

- A. The preparation and submission of shop drawings shall be in accordance with the Contract Documents, Technical Specifications, Product Data, and Samples based on the Specifications.

### **1.09 PUBLISHED SPECIFICATIONS:**

- A. When other published and generally available Specifications are referred to and identified on the drawings and in the Specifications, they shall become a part of the Contract Documents.

### **1.10 INSTRUCTIONS, CHANGES, ETC.:**

- A. All changes, alterations or instructions in regard to any feature of the Work that differ from the Contract Documents must be approved in writing in all cases, and no verbal orders will be regarded as a basis for claims for extra compensation.
- B. If the Contractor claims that any instruction by drawing or otherwise involves extra cost or an extension of time, he/she shall notify the Owner in writing within ten (10) days after the receipt of such instruction and in any event before proceeding to execute the Work. Thereafter, the procedure shall be the same as that described in Changes in the Work. No such claim shall be valid unless made in accordance with the terms of this section.
- C. No claims for extra cost will be considered based on the escalation of material prices throughout the period of the Contract.
- D. No extra work is to be performed or any changes made that involve any extra cost until the Owner has authorized the Contractor to proceed, in writing, except in an emergency that endangers life or property. The procedures for additional payment shall be as set forth under Changes in the Work.



**1.11 EXAMINATION OF WORK BY CONTRACTOR:**

- A. It is understood and agreed that the Contractor has by careful examination, satisfied him/herself as to the nature and location of the Work, the conformation of the ground, the character quality and quantity of the facilities needed preliminary to and during the prosecution of the Work, the general local conditions, and all other matters, which can in any way affect the Work or the cost thereof under this Contract. No verbal agreement or conversation with any officer, agent or employee of the Owner, either before or after the execution of the Contract, shall affect or modify any of the terms or obligations herein contained.

**1.12 MATERIALS, SERVICES AND FACILITIES:**

- A. The Contractor shall at all times employ sufficient labor and equipment for prosecuting the Work to full completion in the manner and time specified. Failure of the Contractor to provide adequate labor and equipment may result in the cancellation of the Contract as herein provided. The equipment to be used on the Work by the Contractor shall be sufficient size and quantity to meet the requirements of the Work and shall be such as to produce a satisfactory quality of Work.
- B. Materials and equipment shall be so stored and handled as to ensure the preservation of their quality and fitness for the Work. Stored materials and equipment to be incorporated in the Work shall be located so as to facilitate prompt inspection. No product that has in any way become unfit for the intended purpose shall be incorporated into the Work.
- C. Manufactured articles, materials and equipment shall be applied, installed, connected, erected, cleaned and conditioned as directed by the manufacturer.
- D. Materials, supplies and equipment to be incorporated into the Work shall be new and unused unless otherwise specifically stated in the Contract Documents. The source of supply for all such products shall be submitted to the Owner, together with detailed descriptions thereof in the form of samples, shop drawings, tests or other means necessary to adequately describe the items proposed. If, after trial it is found that sources of supply, even though previously approved by the Owner, have not furnished products meeting the intent of the Contract Documents, the Contractor shall thereafter furnish products from other approved sources, and shall remove completed Work incorporating products which do not meet Contract requirements at no additional cost to the Owner.
- E. Any Work necessary to be performed after regular working hours, on Sundays or legal holidays, shall be performed without additional expense to the Owner, unless previously negotiated with the Owner.
- F. The Contractor shall maintain an office with a telephone and viable email address.
- G. In the event of government supplied material, the Contractor shall inspect such material prior to installation. If said material is defective, he/she shall immediately inform the Owner. The installation of government supplied material shall be warranted by the

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Contractor. The material itself shall not be so warranted by the Contractor, unless the material fails due to improper installation.

- H. Contractor will be responsible for replacing any work performed with material from rejected sample lot at no cost to the City.

### **1.13 OR EQUAL CLAUSE:**

- A. Whenever a material or article required is specified or indicated on the Drawings by using the name of a proprietary product or of a particular manufacturer or vendor, it is intended to denote the quality standard of the article desired, but does not restrict the Contractor to the specified brand, make or manufacturer so named. Any material or article, which will perform specifically the duties imposed by the general design, may be considered equal and satisfactory providing the material or article so proposed is, in fact, of equal substance and function. Substitution of any item called for in the Drawings or specifications must be specifically approved in writing by the Owner prior to the bid opening. This shall not be construed to include allowing substitutions where certain items, if any, are specified as sole source. The opinion of the Owner shall be final and no substitute material or article shall be purchased or installed without the Owner's prior written approval.

### **1.14 INSPECTION AND TESTING OF MATERIALS:**

- A. The Contractor shall coordinate with the permitting authority to schedule all inspections required by the authority, including, but not limited to the building inspector and/or fire marshal.
- B. Unless otherwise specifically provided for, the Owner will hire a third-party consulting agency to perform inspections and testing of materials and finished articles to be incorporated in the Work. This includes, but is not limited to proof-rolling, compaction testing, concrete testing and any special inspections that may be required by the International Building Code.
- C. Within ten (10) days of the Notice to Proceed, the Contractor shall furnish to the Owner a complete list of all required inspections and an anticipated schedule of occurrence.
- D. The Contractor shall give the Owner at least two (2) weeks' notice prior to each inspection to be performed by the third-party agency.

### **1.15 INSPECTION OF WORK:**

- A. The Contractor shall, at all times, permit and facilitate inspection of the Work by authorized representatives of the Owner and/or public authorities/utilities having jurisdiction in connection with the Work of this Contract. The Owner shall interpret and enforce the terms of the Contract Documents, inspect the quality of the Work and make payment based on the acceptance or failure of the completed Work. It shall be the

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responsibility of the Contractor to call for inspections prior to covering any Work. Failure to do so will result in reopening the Work for Owner inspection, if so required by the Owner, at no cost to the Owner, EVEN IF THE WORK IS FOUND TO BE SATISFACTORY.

- B. The presence of the Owner or Owner's representative at the Site of the Work shall not be construed to, in any manner, relieve the Contractor of his/her responsibility for strict compliance with the provisions of the Contract Documents.

### **1.16 AUTHORITY OF OWNER:**

- A. The Contractor shall perform all of the Work herein specified to the satisfaction, approval and acceptance of the Owner. The Owner shall decide all questions relating to the character of the Work performed and as to whether the rate of progress is such that the Work will be completed within the time limit of the Contract. Questions as to the meaning of these Contract Documents and questions relating to design will be referred to the Owner and his/her determinations will be final.
- B. The approval by the Owner of any material(s), equipment, Drawings, plants or of any other items proposed by the Contractor shall be construed only to constitute an approval in general design. Such approval shall not relieve the Contractor from the performance of the material or Work in accordance with the Contract Documents, or from any duty, obligations, performance guarantee, or other liability imposed upon him/her by the provisions of the Contract.
- C. The responsibility of the Owner during construction shall be to make periodic visits to the Site to observe the progress and quality of the Work; he/she will not make continuous on-site inspections. The Owner will not be responsible for the Contractor's failure to perform the Work in accordance with the Contract Documents. Any defects or deficiencies in the Work of the Contract observed during such visits will immediately be brought to the attention of the Contractor. The Owner shall have the authority to stop the Work, if necessary, to assure proper execution, and to disapprove work as not conforming to the design.

### **1.17 AUTHORITY AND DUTIES OF THE DESIGN PROFESSIONAL:**

- A. The "Design Professional" includes the project Landscape Architect, Architect and/or Engineers and will serve as the Owner's representative(s), and shall be authorized to inspect all Work completed and all materials to be furnished, including; preparation, fabrication and manufacture of the materials. The Design Professional shall have full authority to alter or waive minor requirements of the Contract Documents through a written field order. The Design Professional may reject materials or suspend Work at no cost to the Owner or Design Professional until any question at issue can be referred and decided by the Owner. The responsibility of the Contractor is not lessened by the presence of the Inspector or Design Professional's representative.

### **1.18 NO PERSONAL LIABILITY:**

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- A. In carrying out any of the provisions of the Contract or in exercising any power or authority granted to him/her thereby, there shall be no personal liability upon the Owner or upon any officer or employee of the Owner, it being understood that in such matters, they act as the agent and representative of the Owner.

### **1.19 PROHIBITED INTERESTS:**

- A. No official of the Owner who is authorized in such capacity and on behalf of the Owner to negotiate, make, accept or approve, or to take part in negotiating, making, accepting, or approving any architectural, engineering, inspection, construction or material supply contract and any subcontract in connection in the construction of the Project, shall become directly or indirectly interested personally in this Contract or in any part thereof. No officer, employee, architect, landscape architect, attorney, Owner or Inspector of or for the Owner who is authorized in such capacity and on behalf of the Owner to exercise any legislative, executive, supervisory or other similar functions in connection with the construction of the Project, shall become directly or indirectly interested personally in this Contract or in any part thereof, any material supply contract, subcontract, insurance contract, or any other contract pertaining to the Project.

### **1.20 REJECTION OF WORK AND MATERIALS:**

- A. All materials and equipment furnished and all Work done that is not in accordance with the Contract Documents or that is defective will be rejected. All rejected materials, equipment or Work shall be removed immediately. If rejected materials, equipment or Work is not removed within forty-eight (48) hours from the date of notification, the Owner shall have the right and authority to stop the Contractor and his/her Work immediately, and/or shall have the right to arrange for the removal of said rejected materials, equipment or Work at the cost and expense of the Contractor. All rejected materials, equipment, or Work shall be replaced with other equipment, materials, or Work that conforms to the Contract Documents, at no additional cost to the Owner.
- B. Inspection of the Work shall not relieve the Contractor of any of his/her obligations to fulfill the Contract. Defective Work shall be made good regardless of whether such Work, material or equipment has been previously inspected by the Owner and accepted or paid for by progress payment. The failure of the Owner to condemn improper materials and/or workmanship shall not be considered as a waiver of any defect that may be discovered later, or for Work actually defective. All Work, material and/or equipment shall be guaranteed against defects for a period of one year from Date of Project acceptance as established by the Owner.

### **1.21 DISAGREEMENTS:**

- A. Should any disagreement or difference arise as to the estimate, quantities or classifications or as to the meaning of the Drawings or other Contract Documents, or any materials and construction thereof, the decisions of the Owner shall be final and conclusive and binding upon all parties to the Contract.

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### 1.22 WEATHER CONDITIONS:

- A. The Contractor shall keep a daily log of weather conditions on the job site for the duration of the project.
- B. The Contractor may make a claim for an extension of the contract schedule based on project delays that result from weather conditions that prohibit the Contractor from performing construction activities during accepted working hours. This includes delays that may occur after the weather event, in which the weather event renders the job site unworkable.
- C. Any request for an extension of contract time must be submitted in writing by the Contractor to the Owner and approved by signature of the Owner. Weather delay requests shall be submitted by the Contractor each month with the payment application paperwork.
- D. An extension of contract time does not entitle the Contractor to additional monies.

### 1.23 ROYALTIES AND PATENTS:

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

### 1.24 CONTRACTOR'S PERSONNEL:

- A. An experienced superintendent and necessary assistants competent to supervise the particular types of Work involved shall be assigned to the Project by the Contractor, and shall be onsite at **all times** when Work is in progress. The name of the superintendent shall be submitted, with qualifications of same, prior to start of the Work and shall be approved by the Owner prior to start of the Work. The superintendent so named by the Contractor shall be employed by the Contractor and shall have served in a supervisory capacity on at least one project of like description and size performed by the Contractor during the previous twelve (12) months. Under no circumstances shall any employee of any Subcontractor serve as project superintendent. The superintendent shall represent the Contractor, and all directions given to the superintendent shall be as binding as if given to the Contractor.
- B. Only persons skilled in the type of Work that they are to be performing shall be employed. The Contractor shall, at all times, maintain discipline and good order among his/her employees, and shall not employ on the Work any unfit person or persons or anyone unskilled in the Work assigned him/her. The Contractor shall discharge, at once, from his/her services voluntarily or when required by the Owner, any disorderly, dangerous, insubordinate or incompetent person employed on the Work and shall not

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again employ said person on the Project.

### **1.25 LINES, GRADES AND MEASUREMENTS:**

- A. The Contractor will furnish, unless otherwise provided, all lines, grades and measurement necessary in laying out the Work. The Contractor must exercise proper care and caution to verify the grades and figures given him/her and carefully check all dimensions before proceeding with the Work and shall be responsible for any damage or defective Work caused by his/her failure of such care and caution. He/she shall promptly notify the Owner of any errors or discrepancies that may be discovered in order that the proper corrections may be made.
- B. The Contractor shall be responsible for the preservation of all lines, points and elevations that may be furnished and shall bear the expense of resetting same, if destroyed.

### **1.26 LAWS AND REGULATIONS:**

- A. The Contractor's attention is directed to the fact that all applicable Federal, State and Local laws, municipal ordinances and the rules and regulations of all authorities having jurisdiction over construction of the Project shall apply to the Contract throughout. They will be deemed to be included in the Contract Documents the same as though herein written out in full. The Contractor shall keep himself/herself fully informed of all laws, ordinances and regulations; Federal, State, and Local, in any manner affecting those engaged or employed in the Work or the materials used in the Work or in any way affecting the conduct of the Work and of all orders and decrees of bodies or tribunals having any jurisdiction or authority over same. If any discrepancy or inconsistency should be discovered in this Contract, or in the Drawings or other Contract Documents herein referred to, in relation to any such law, regulation, ordinance, order of decree, he/she shall herewith report the same, in writing, to the Owner. He/she shall at all times observe and comply with all such laws, ordinances and regulations, and shall protect and indemnify the Owner and its agents against any such law, ordinance, regulation, order, or decree, to the fullest extent permissible by law, whether by the Contractor or by his/her employees.

### **1.27 CONTRACTOR'S OBLIGATIONS:**

- A. The Contractor shall, in a good workmanship manner, accomplish and perform all work, and furnish all supplies and materials, machinery, equipment, facilities and means; except as herein otherwise expressly specified; necessary or proper to perform and complete all the Work required by this Contract, within the time herein specified, in accordance with the provisions of this Contract, the Drawings, and other Contract Documents, and in accordance with the Work covered by the Contract and any and all supplemental Drawings of the Work covered by this Contract and in accordance with the directions of the Owner as given from time to time during the progress of the Work. He/she shall furnish, erect, maintain, and remove such construction, plant and temporary works as may be required. He/she alone shall be responsible for the safety, efficiency, and adequacy of his/her appliances and methods, and for any damage that may result from

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their failure or their improper construction, maintenance, or operation. The Contractor shall observe, comply with, be subject to all terms, conditions, requirements and limitations of the Contract Documents, local ordinances, and State and Federal laws; and shall do, carry on, and complete the entire Work to the satisfaction of the Owner. The Prime Contractor shall perform a minimum of 25% of Work under this Contract.

### **1.28 SUBCONTRACTING:**

- A. The Contractor shall not subcontract the complete Work, or any portion thereof, without prior written approval of the Owner. Any Contractor utilizing a subcontractor must submit a proposed list of subcontractors and a Subcontractor Affidavit (form provided).
- B. The Contractor shall be fully responsible to the Owner for the acts and omissions of his/her Subcontractors, and of persons or entities either directly or indirectly employed or providing services to him/her, (i.e. suppliers, off site fabricators, etc.)
- C. Nothing contained in this Contract shall create any contractual relationship between any Subcontractor and the Owner.

### **1.29 ASSIGNMENTS:**

- A. The Contractor shall not assign the whole or any part of this Contract or any monies due or to become due hereunder without written consent of the Owner. In the event that the Contractor assigns all or any part of any monies due or to become due under this Contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any monies due or to become due to the Contractor shall be subject to prior liens or all persons, firms and corporations for services rendered or materials supplied for the performance of the Work called for in this Contract.

### **1.30 OTHER CONTRACTS:**

- A. The Owner may award other contracts for additional Work and the Contractor shall fully cooperate with such other contractors and carefully fit his/her own Work to that provided under other contracts as may be directed by the Owner. The Contractor shall not commit or permit any act that will interfere with the performance of Work by any other Contractor.

### **1.31 MUTUAL RESPONSIBILITY OF CONTRACTORS:**

- A. If, through acts of neglect on the part of the Contractor, any other Contractor or any Subcontractor shall suffer loss or damage on the Work, the Contractor agrees to settle with such other Contractor or Subcontractor by agreement or arbitration if such other Contractor or Subcontractor will so settle. If such other Contractor or Subcontractor shall assert any claim against the Owner on account of any damage alleged to have been sustained, the Owner shall notify the Contractor, who shall indemnify and save harmless the Owner against any such claim to the fullest extent permissible by law.

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### **1.32 EMPLOYEE TAX:**

- A. The Contractor assumes and is liable specifically for all State, Federal and local employment taxes including withholding, FICA and FUTA taxes, and guarantees to hold the Owner harmless in every respect against same.

### **1.33 SALES TAX:**

- A. The Contractor assumes and is liable specifically for all Local, State and Federal Sales and Use taxes that may be in force at the time of the Award of the Contract.

### **1.34 LAND AND RIGHT-OF-WAY:**

- A. Prior to entering on any land or right-of-way, the Contractor shall ascertain the requirements of applicable permits or easements obtained by the Owner and shall conduct his/her Work in accordance with requirements thereof including the giving of notice. The Contractor shall be fully responsible for performing Work to the requirements of any permit, easement or license granting entry even though such requirements may exceed or be more stringent than that otherwise required by the Contract Documents, and shall compensate the Owner fully for any loss or expense arising from failure of the Contractor to perform as required by such entity. Prior to entry on to private property for Work under temporary easements, notice to the property Owner will be made by the Contractor, with concurrent notice to the Owner.
- B. The Owner may provide at Contractor expense and without liability to the Owner any additional land and access thereto that the Contractor may require for temporary construction facilities or for storage of materials.

### **1.35 ESTIMATE OF QUANTITIES:**

- A. The estimated quantities of Work to be done and materials to be furnished under this Contract if shown in any of the Documents, including the bid, are given for use in comparing bids and to indicate approximately the total amount of the Contract.
- B. It is the Contractor's responsibility to inspect the project site to verify existing conditions prior to submitting their bid. This is a Blended Lump Sum and Unit Price bid and no payment will be made for additional work without prior written approval from the City. At no time will Contractor proceed with work outside the prescribed scope of services for which additional payment will be requested without the written authorization of the City.
- C. Refer to Section 1/-2.F.2 of this document for additional information.

### **1.36 USE OF PREMISES:**

- A. The Contractor shall confine his/her apparatus, the storage of materials or equipment, and the operations of his/her workmen to limits indicated by law, ordinances, permits or



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directions of the Owner and shall not unreasonably encumber the premises with materials or equipment. The Contractor shall not load or permit any part of the Work to be loaded with a weight that will endanger its safety. The Contractor shall enforce the Owner's instructions regarding signs, advertisements, fires and smoking.

### **1.37 PROTECTION OF WORK, PROPERTY AND PERSON:**

- A. The Contractor will be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. He/she will take all necessary precautions for the safety of, and will provide the necessary protection to prevent damage, injury or loss to all employees on the Work and other persons who may be affected thereby, all the Work and all materials or equipment to be incorporated therein, whether in storage on or off the Site, and other property at the Site or adjacent thereto, including trees, shrubs, lawns, lakes, drainage ways, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.
- B. The Contractor will comply with all applicable laws, ordinances, rules, regulations, and orders of any public body having jurisdiction. He/she will erect and maintain as required by the conditions and progress of the Work, all necessary safeguards for safety and precaution. He/she will notify owners of adjacent utilities when prosecution of the Work may affect them. The Contractor will remedy all damage, injury or loss to any property caused, directly or indirectly, in whole or in part, by the Contractor, any Subcontractor or anyone directly or indirectly employed by any of them or anyone for whose acts may have caused such a liability.
- C. If existing utilities or structures are indicated by the Contract Documents, no warranty is made as to the accuracy or completeness of such indication. The Contractor shall, prior to commencing other on-site Work, accurately locate above and below ground utilities and structures which may be affected by the Work, using whatever means may be appropriate. The Contractor shall mark the location of existing utilities and structures, not otherwise readily visible, with flagging, stakes, barricades, or other suitable means, and shall preserve and protect all utilities and structures not designated for removal, relocation, or replacement in the course of construction. He/she shall notify the Owner promptly on discovery of any conflict between the Contract Documents and any existing facility.
- D. In emergencies affecting the safety or persons or the Work or property at the Site or adjacent thereto, the Contractor, without special instruction or authorization from the Owner, shall act to prevent threatened damage, injury, or loss. He/she will give the Owner prompt written notice (within three (3) calendar days) of any required significant changes in the Work or deviations from the Contract Documents caused thereby. Any claim for compensation by the Contractor due to such extra Work shall be promptly (within seven (7) calendar days) submitted to the Owner for review. The amount of reimbursement claimed by the Contractor and approved by the Owner on account of any emergency action shall be determined in the manner prescribed for Changes in the Work and a Change Order may be issued covering such claim(s).

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- E. In the event of temporary suspension of Work, or during inclement weather, or whenever the Owner shall direct, the Contractor will be required to protect all Work and materials against damage or injury from the weather. If, in the opinion of the Owner, any Work or materials shall have been damaged or injured by reason of failure to protect such, all such materials or Work shall be removed and replaced at the expense of the Contractor.

### **1.38 CONTRACTOR'S RESPONSIBILITY FOR WORK:**

- A. All Work under this Contract shall be under the care of the Contractor and he/she shall take every necessary precaution against injury or damage to the same, until final written acceptance is received from the Owner. The Contractor shall rebuild, repair, restore and make good, at his/her own expense, all damages or injury occasioned by the action of the elements, or any other cause whatsoever, before its final completion or acceptance.
- B. The Contractor is responsible for project layout. All Work not properly installed or not installed as per plans will be removed and installed correctly at no additional expense to the Owner.

### **1.39 PRIOR USE BY OWNER:**

- A. Prior to completion of the Work, the Owner may take over operation and/or use of the uncompleted project or portions thereof. Such prior use of facilities by the Owner shall not be deemed as acceptance of any Work or relieve the Contractor from any of the requirements of the Contract Documents.

### **1.40 CLEANING UP:**

- A. The Contractor Shall clean up and remove accumulated dirt at such times as he/she may be directed to do so by the Owner and shall remove, at his/her own expense, from the Work and from the adjoining property(s) all rubbish and surplus materials resulting from construction operations, which may have accumulated during the process of the Work, and leave the project site in a neat and orderly condition upon daily Work completion. Clean up Work shall include the removal of stumps, limbs, pipes, surplus rock, dirt, lumber, tape, general debris from the Job Site, removal of all barricades and warning signs, and final dressing by bringing earth to original grade and seeding or sod as required.
- B. Failure to follow the Owner's written directions as to cleaning up at any time within twenty-four (24) hours after such directions are given shall thereupon give the Owner the right to clean up at the expense of the Contractor or may result in suspension of the work.

### **1.41 BARRICADES AND WARNING SIGNS:**

- A. The Contractor shall provide, erect, maintain and finally remove all barricades and detour signs necessary to properly protect and divert automotive and pedestrian traffic.

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Automotive barricades and signs shall be illuminated at night. The Contractor will be held responsible for all damage to the Work due to failure of the signs and barricades to properly protect the Work from traffic, pedestrians, animals and all other sources. The Contractor will also be held responsible for damage to persons or property due to failure to erect and maintain adequate barricades and signs. The construction of all barricades shall be acceptable to the Owner and agencies having control over traffic.

### **1.42 TRAFFIC UNDER CONSTRUCTION:**

- A. The Contractor shall expedite the Work as to interfere as little as possible with the access to park facilities.

### **1.43 MAINTENANCE OF SERVICE:**

- A. All existing utilities, both public and private, including sewer, gas, water, electrical, cable and telephone services, etc., shall be protected and their operation shall be maintained throughout the course of the Work. Any temporary shutdown of existing service shall be arranged between the Contractor and THE RESPONSIBLE AGENCY, with Owner notification. The Contractor shall assume full responsibility and hold the Owner harmless from the result of any damage that may occur as a result of the Contractor's activities. All utilities will be identified and located by the Contractor prior to any construction activities.

### **1.44 CHANGES IN THE WORK:**

- A. The Owner may order extra work, or make changes by altering, adding to, or deducting from the Work, the Contract sum being adjusted accordingly. All such orders and adjustments shall be in writing in the form of a Change Order. All such Work shall be executed under the conditions and requirements of the original Contract, except that any claim for an extension of time caused thereby shall be adjusted at the time of ordering such a change. Upon receipt of a fully executed Change Order, the Contractor shall proceed with the Work involved.
- B. The Owner shall have the authority to make minor changes in the Work, not involving extra cost and not inconsistent with the purpose of the Work. These changes may be accomplished by means of a Field Order. If the Contractor believes that any minor change or alteration authorized by the Owner entitles the Contractor to an increase in the Contract Price or an extension of the Contract Time, he/she may make a claim, but must do so in writing within three (3) calendar days of the decision that a field change was agreed upon.
- C. Additional Work performed by the Contractor without authorization of a Change Order, will not entitle the Contractor to a change in the Contract Price or the Contract Time, except in the case of an emergency endangering life or property.
- D. The value of any extra work or change, (which cannot be adjusted by an increase or decrease in a contract unit item, if part of this Contract) shall be determined by the Owner

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in the following way:

1. By estimate, with a breakdown of all necessary labor, material, equipment, overhead and profit.
2. To the cost of items enumerated in labor there may be added a fixed fee for combined overhead and profit not to exceed fifteen percent (15%) of the enumerated labor, material, and equipment cost. Among items considered as overhead costs are insurance, bonds, superintendence, time keeping, clerical work, watchman, use of small tools, general office expense and other such miscellaneous. Only forms as attached in the Contract Documents will be utilized for Change Order submissions.

### E. Change Order (CO) Forms:

The standard AIA Change Order Form will be utilized for changes to the Contract when there is cost and/or time involved. Other forms may be utilized if approved by the Owner. All Contract modification proposals shall be addressed to the Owner. Proposals must clearly state the conditions and scope of the modifications and shall be accompanied by the breakdown of the cost as indicated. Lump sum costs will not be accepted in either the Prime or the Subcontractor's breakdown cost. The total cost for labor, material, and equipment rental (or ownership) for each item shall be transferred to the corresponding item. The Proposal should include a request for an extension of time in calendar days. The Contractor shall not proceed with any of the Work included in the modification prior to receipt of an executed modification of Contract or as directed by the Owner.

### **1.45 CONTRACTORS DAILY REPORT:**

- A. Reports are required for each day's work throughout the life of the Contract and are to be submitted to the Owner every week by end of day Friday. The reporting of Work shall be identified by terminology consistent in the construction schedule and specifications. Contractor daily reports shall contain the following information:
1. Identify the Work performed that day; dated and signed by the contractor's on-site supervisor.
  2. Results of any meetings held; the location of Work performed and a list of personnel present. Indicate in the report that the Work, the Drawings and specifications have been reviewed, submittals have been approved, materials comply with approved submittals, materials are stored onsite properly, preliminary Work was done correctly, testing has been reviewed, and methods and schedule have been discussed, and that safety was addressed.
  3. Weather conditions, temperature, etc.
  4. Traffic conditions
  5. Any issue impacting the schedule or cost of construction

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6. Any potential Change Order or field change agreed upon

### **1.46 PAYMENTS BY CONTRACTOR AND LIEN WAIVERS:**

- A. The Contractor shall furnish the Owner, whenever requested, with satisfactory evidence that all persons who have done work, or furnished materials under this agreement, have been duly paid or satisfactorily secured.
- B. The Contractor shall submit Final Release of Lien Waivers with the Final Payment Application. A separate Waiver shall be signed by each Subcontractor, certifying that said Subcontractors have been paid in full for services rendered. The Owner will not release final payment to the Contractor without properly executed Waivers.

### **1.47 PAYMENTS TO CONTRACTOR:**

- A. Schedule of Values: The Contractor Shall immediately after the Contract has been awarded, submit to the Owner, a breakdown showing costs apportioned to the major elements of the Contract, (i.e. equipment, material, and labor) that comprises bid amount. This breakdown of costs, as approved, shall be referred to as the Schedule of Values. The Schedule of Values, as approved by the Owner, will serve as the basis for Progress Payment amounts. Front or rear loading or mobilization costs will not be allowed. The Owner has final approval of the Schedule of Values. The Contractor has ten (10) calendar days from Notice to Award to provide Owner with Schedule of Values.
- B. Monthly Progress Payments: The Contractor shall submit a monthly progress payment application to the Owner on the basis of his/her duly certified and approved estimate of the work performed to that date. Work behind schedule, outstanding claims from Suppliers or Subcontractors, defective work, failure to diligently pursue the work, failure to comply with the requirements of the Contract Documents, or an over estimated request for payment shall be cause for the Owner to withhold payment or portions of a requested payment and or seek redress under other provisions under this Contract and or State of Georgia Law.
- C. Payment will be made to the Contractor by the Owner within thirty (30) calendar days after receipt of request for payment by the Owner.
- D. Materials and Work Covered by Partial Payments: All materials and work covered by progress estimates shall, upon payment thereof, become the sole property of the Owner, but this provision shall not be construed as relieving the Contractor from the sole responsibility for the care and protection of materials and work upon which payments have been made, or the restoration of any damaged work, or the removal and replacement of any materials or work which does not comply with the Contract Documents.

### **1.48 OWNER'S RIGHT TO WITHHOLD PAYMENTS:**

- A. The Owner may withhold or, on account of subsequently discovered evidence, mollify the whole or a part of any payment request to such extent as may be necessary to protect

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the Owner from loss on account of:

1. Defective work not remedied;
  2. Claims filed or reasonable evidence indicating probable filing of claims, failure of the Contractor to make payments properly to Subcontractors or Suppliers for material, labor, or equipment;
  3. A reasonable doubt that the Contract can be completed for the balance then unpaid;
  4. Failure to provide insurance, bonds, or an office with telephone or other satisfactory means of contact.
- B. The Owner shall have the right to disburse and act as agent for the Contractor in disbursing such funds as have been withheld pursuant to this paragraph to the party or parties who are entitled to payment there from. The Owner will render to the Contractor a proper accounting of all such funds disbursed on behalf of the Contractor. A fee for such disbursement may be charged by the Owner due to the Contractors failure to appropriately disburse such funds.

### **1.49 OWNER'S RIGHT TO SUSPEND OR TERMINATE WORK:**

- A. The Owner may, at any time and without cause, suspend the Work or any portion thereof for a period of not more than ninety (90) calendar days or such further time as agreed upon by the Contractor, by written notice to the Contractor that shall fix the date on which Work shall be resumed. The Contractor will resume work on the date so fixed or earlier as directed. The Contractor must demonstrate any damage(s), if reimbursement is sought, as a result of Owner suspend or terminated work. Contractor will be allowed an increase in the Contract Price or extension of Contract Time, or both, directly attributable to any suspension. Owner has the right to audit contractors, sub-contractors and Suppliers overhead(s), bids, contracts and any other contract related documents to establish Contractor's damages due to Owner suspended or terminated work.
- B. If the Contractor is adjudged bankrupt or insolvent, or if he/she makes a general assignment for the benefit of his/her creditors, or if a trustee or receiver is appointed for the Contractor or for any of his/her property, or if he/she files a petition to take advantage of any debtor's act, or to reorganize under bankruptcy or applicable laws, or if he/she repeatedly fails to supply sufficient skilled workmen or suitable materials or equipment, or if he/she repeatedly fails to make prompt payments to Subcontractors or for labor, materials or equipment or if he/she disregards laws, ordinances, rules, regulations or orders of any public body having jurisdiction over the Work, or if he/she disregards the authority of the Owner, or if he/she otherwise violates any provision of the Contract Documents, then the Owner may, without prejudice to any other right or remedy and after giving the Contractor and his/her Surety a maximum of seven (7) calendar days from delivery of a written notice, terminate the services of the Contractor and take possession of the Project and of all materials, equipment, tools, construction equipment and machinery thereon owned by the Contractor, and finish the Work by whatever method he/she may deem expedient. In such case, the Contractor shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract

## **ITB #2024-022 LAKE ERIN DAM REHABILITATION PROJECT**

exceeds the direct and indirect costs of completing the Work, including compensation for additional professional services, such excess shall be paid to the Contractor. If such costs exceed the unpaid balance, the Contractor or Surety will pay the difference to the Owner. Costs incurred will be determined by the Owner and incorporated in the Contract via Change Order.

### **1.50 CONTRACTOR'S RIGHT TO TERMINATE CONTRACT:**

- A. Should the work be stopped by any public authority for a period of ninety (90) calendar days or more, through no fault of the Contractor or should the Owner fail to pay the Contractor any payment within a reasonable length of time after the payment shall become due, the Contractor, upon seven (7) Calendar days written notice to the Owner, may stop work, or terminate the Contract and recover from the Owner payment for all work executed.

### **1.51 MEASUREMENT OF WORK:**

- A. Except for any "Unit Price" Items included in the Bid Form, the Contractor will be paid based on the percentage of work complete and/or materials stored and in accordance with the accepted Schedule of Values.

### **1.52 ACCEPTANCE OF WORK AND FINAL PAYMENT:**

- A. Before final acceptance of the Work and payment to the Contractor of the percentage retained by the Owner, the following requirements shall be complied with:
  - 1. Final Inspection: Upon notice from the Contractor that the Work is completed, the Owner shall make a final inspection of the Work, and shall notify the Contractor of all instances where the Work fails to comply with the Contract Documents, per Section 01 7700 - Closeout.
  - 2. Liens: Final acceptance of the Work will not be granted and will not be due or payable until the Contractor has furnished the Owner proper and satisfactory evidence under oath that all claims for labor and materials employed or used in the construction of the Work under this Contract have been settled, and that no legal claims can be filed against the Owner or Contractor for such labor or materials and all billings from Suppliers have been settled.
  - 3. Final Payment: When the Work under this Contract is completed, a final request for payment shall be submitted to the Owner representing the original Contract sum plus or minus all Change Orders to the Contract. The final payment shall not be due until the Contractor has completed all Work, necessary and reasonably incidental to the Contract, including final clean-up, as-built red lined Drawings acceptable to the Owner, submission of manufacturer's warranty literature and any warranty provisions for specific materials or equipment that exceed the Contractors one year industry standard Warranty Period. Additionally, delivered to the Owner, certification of release of all liens, if any arising out of the Contract, and or receipts in full certifying

## ITB #2024-022 LAKE ERIN DAM REHABILITATION PROJECT

complete payment for all materials, labor, and equipment rentals for which liens could be filed, or submission of a bond acceptable to the Owner indemnifying the Owner against any such lien(s), to the fullest extent permissible by law.

4. Warranty: One year from Substantial Completion, except for manufacturers listed Warranty Periods that exceed the one-year period. Substantial Completion date will be established between the Contractor and Owner prior to Final Payment.
- B. Acceptance of the Work and the making of final payment shall not constitute waiver of any claims by the Owner. Payments otherwise due the Contractor may be withheld by the Owner because of defective Work not remedied, liens filed and unadjusted damage to others by the Contractor or Subcontractors, vendors or laborers.

### **1.53 DEDUCTION FOR UNCORRECTED WORK:**

- A. If the Owner deems it expedient to accept Work injured or not done in accordance with the Contract, an equitable adjustment will be made with a proper deduction from the Contract Price for unsatisfactory Work.

### **1.54 GUARANTEE AND CORRECTION OF WORK:**

- A. The Contractor shall guarantee all work to have been accomplished in conformance with the Contract Documents. Neither the final certificate of payment nor any provision of the Contract Documents, nor partial or entire occupancy or use of the Work by the Owner, shall constitute an acceptance of any part of the Work not done in accordance with the Contract Documents, or relieve the Contractor of liability for incomplete or faulty materials or workmanship. The Contractor shall promptly remedy omission or defect in the Work and pay for any damage to other improvements or facilities resulting from such omission or defect, which shall appear within a period of one (1) year from the Date of Substantial Completion, unless a longer period is specified. In the event that the Contractor should fail to make repairs, adjustments, or other remedy that may be made necessary by such defects, the Owner may do so and charge the Contractor the cost incurred. The Contract Performance Bond Shall remain in full force and effect through the Warranty Period.



**Exhibit B:**  
**Cost Proposal**

Cost Proposal of \_\_\_\_\_ (hereinafter called “**BIDDER**”)  
a contractor organized and existing under the laws of the state of \_\_\_\_\_, \*an  
individual, a corporation, or partnership doing business as  
\_\_\_\_\_.

*\*Strike out Inapplicable Terms.*

THIS BID SUBMITTED TO: **The City of Tucker** (hereinafter called “**OWNER**”)

The undersigned **BIDDER** proposes and agrees, if this Bid accepted, to enter into an Agreement with the **OWNER** in the form included in the Contract Documents to complete all Work as specified or indicated in the Contract Documents for the Cost Proposal and within the Contract Time indicated in this Bid.

**BIDDER** agrees to provide the necessary machinery, tools, apparatus, all materials and labor, and other means of construction necessary to complete the **Lake Erin Dam REHABILITATION Project**, as described in the bid documents, plans and specifications.

In submitting this Bid, the **BIDDER** represents that:

1. **BIDDER** agrees that in case of failure on his/her part to execute said contract and bond, or provide satisfactory proof of carriage of the insurance required, within twenty (20) calendar days after the award thereof, the Bid Bond or certified check accompanying his bid and the money payable thereon shall be forfeited to the **OWNER** as liquidated damages; otherwise, the check or Bond accompanying this proposal shall be returned to the **BIDDER**.
2. **BIDDER** has examined the plans, specifications and related documents with respect to the site of the proposed work. Being familiar with all of the conditions surrounding the construction of the proposed project, including the availability of materials and supplies, the **BIDDER** agrees to construct the project within the time set forth herein and in accordance with the Contract Documents.
3. **BIDDER** has given the **OWNER** written notice of all conflicts, errors or discrepancies discovered in the Bid Documents. **BIDDER** has received written resolution thereof by Addendum from the **OWNER**.
4. This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation.

Further, **BIDDER** agrees that the cost of any work performed, materials furnished, services provided, or expenses incurred, which are not specifically delineated in the Bid Documents, but which are incidental to the scope, intent, and completion of the Contract, shall be deemed to have been included in the prices bid for the various items scheduled.

**City of Tucker**  
**ITB 2024-022**  
**LAKE ERIN DAM REHABILITATION**

**Cost Proposal**

**BIDDER** further proposes and agrees hereby to promptly commence the Work with adequate force and equipment within twenty (20) calendar days from receipt of Notice to Proceed, or as may be specified by Special Provision; to continuously pursue the Work without interruption; and, to complete the Work within the time frame as specified in the bid documents.

Item Number	Description	Estimated Quantity	Unit	Unit Cost (\$)	Total Cost
1	Mobilization and Demobilization	1	LS		
2	Reservoir Control	1	LS		
3	Temporary E&S Control Measures	1	LS		
4	Layout of Work and Surveying	1	LS		
5	Demolition and Removal	1	LS		
6	Concrete Structures	1	LS		
7	Metal Works	1	LS		
8	Clearing and Grubbing	9,600	SY		
9	Embankment Excavation and Stockpiling	13,800	CY		
10	Controlled Fill from Stockpile	13,800	CY		
11	Controlled Fill from Import	1,800	CY		
12	Park Trail on Dam Crest	130	SY		
13	Permanent Terrain Stabilization	1	LS		
14	Piezometer Installation	4	EA		
15	6" Slotted HDPE Conduit	130	LF		
16	6" Solid HDPE Conduit	160	LF		
17	HDPE Bends and Cleanout	1	LS		
18	Riprap	800	CY		
19	ASTM #3	225	CY		
20	ASTM #8	295	CY		
21	C33 Sand	680	CY		
22	Site Restoration	1	LS		
23	Construction Security Fence	460	LF		
24	Orange Safety Fence	1,800	LF		

**1. BASE BID**

\$ \_\_\_\_\_ (figures)

**2. CONTINGENCY ALLOWANCE UP TO 5% (If Approved by City):**

\$ \_\_\_\_\_ (figures)

**BID TOTAL (ITEMS 1 AND 2)** \$ \_\_\_\_\_ (figures)

\_\_\_\_\_  
(written amount)

Said amount above shall be hereinafter referred to as the “Base Bid” or “Base Proposal”.

If the Contractor is given a Notice of Award by the Owner, within Sixty (60) calendar days after receipt of bids, the Contractor agrees to execute a contract for the above-named project work and the above-stated consideration on the form required within ten (10) calendar days of such notification. The undersigned hereby designates the email address and office address stated on the last page of this proposal as the address to which a Notice of Award of this Construction Contract may be delivered and to which all official correspondence and notices may be emailed or mailed, or delivered, unless the Owner is otherwise notified in writing by the Contractor.

**BID BOND CERTIFICATION:**

Attached hereto is a bid bond or certified check in the amount of

\$ \_\_\_\_\_.

(Five percent (5%) of Bid Total Amount)

**Bidder (Company Name):** \_\_\_\_\_

**Mailing Address:** \_\_\_\_\_

**Contact Person (Printed Name):** \_\_\_\_\_

**Phone Number:** \_\_\_\_\_

**Email Address:** \_\_\_\_\_

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

\_\_\_\_\_  
Date

## Request for Taxpayer Identification Number and Certification

**Give Form to the  
requester. Do not  
send to the IRS.**

▶ Go to [www.irs.gov/FormW9](http://www.irs.gov/FormW9) for instructions and the latest information.

<b>Print or type. See Specific Instructions on page 3.</b>	1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.			
	2 Business name/disregarded entity name, if different from above			
	3 Check appropriate box for federal tax classification of the person whose name is entered on line 1. Check only <b>one</b> of the following seven boxes.		4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):  Exempt payee code (if any) _____  Exemption from FATCA reporting code (if any) _____  <i>(Applies to accounts maintained outside the U.S.)</i>	
	<input type="checkbox"/> Individual/sole proprietor or single-member LLC	<input type="checkbox"/> C Corporation		<input type="checkbox"/> S Corporation
	<input type="checkbox"/> Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=Partnership) ▶ _____	<input type="checkbox"/> Partnership		
	<input type="checkbox"/> Trust/estate			
	<input type="checkbox"/> Other (see instructions) ▶ _____			
5 Address (number, street, and apt. or suite no.) See instructions.		Requester's name and address (optional)		
6 City, state, and ZIP code				
7 List account number(s) here (optional)				

### Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN*, later.

<b>Social security number</b>									
				-			-		

**Note:** If the account is in more than one name, see the instructions for line 1. Also see *What Name and Number To Give the Requester* for guidelines on whose number to enter.

**or**

<b>Employer identification number</b>										
				-						

### Part II Certification

- Under penalties of perjury, I certify that:
- The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
  - I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
  - I am a U.S. citizen or other U.S. person (defined below); and
  - The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

**Certification instructions.** You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

<b>Sign Here</b>	Signature of U.S. person ▶	Date ▶
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### General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

**Future developments.** For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to [www.irs.gov/FormW9](http://www.irs.gov/FormW9).

### Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following.

- Form 1099-INT (interest earned or paid)

- Form 1099-DIV (dividends, including those from stocks or mutual funds)
  - Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
  - Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
  - Form 1099-S (proceeds from real estate transactions)
  - Form 1099-K (merchant card and third party network transactions)
  - Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
  - Form 1099-C (canceled debt)
  - Form 1099-A (acquisition or abandonment of secured property)
- Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.
- If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding, later.*



## GEORGIA SECURITY AND IMMIGRATION COMPLIANCE ACT AFFIDAVIT

**GEORGIA E-Verify and Public Contracts: The Georgia E-Verify law requires contractors and all sub-contractors on Georgia public contract (contracts with a government agency) for the physical performance of services over \$2,499 in value to enroll in E-Verify, regardless of the number of employees.**

<b>Contractor Name:</b>	
<b>Solicitation/Bid number or Project Description:</b>	ITB 2024-022 Lake Erin Dam Rehabilitation

By executing this affidavit, the undersigned contractor verifies its compliance with O.C.G.A. § 13-10-91, stating affirmatively that the individual, entity or corporation which is engaged in the physical performance of services under a contract on behalf of the City of Tucker, Georgia has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91.

Furthermore, the undersigned contractor will continue to use the federal work authorization program throughout the contract period as required by O.C.G.A. § 13-10-91(b) and the undersigned contractor will contract for the physical performance of services in satisfaction of such contract only with subcontractors who present and affidavit to the contractor with the information required by O.C.G.A. § 13-10-91(b). Contractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

\_\_\_\_\_  
Federal Work Authorization User Identification Number  
(EEV/E-Verify Company Identification Number)

\_\_\_\_\_  
Date of Authorization

\_\_\_\_\_  
Name of Contractor

**I hereby declare under penalty of perjury that the foregoing is true and correct**

\_\_\_\_\_  
Printed Name (of Authorized Officer or Agent of Contractor)

\_\_\_\_\_  
Title (of Authorized Officer or Agent of Contractor)

\_\_\_\_\_  
Signature (of Authorized Officer or Agent)

\_\_\_\_\_  
Date Signed

SUBSCRIBED AND SWORN BEFORE ME ON THIS THE

\_\_\_\_ DAY OF \_\_\_\_\_, 20\_\_\_\_

[NOTARY SEAL]

\_\_\_\_\_  
Notary Public

My Commission Expires: \_\_\_\_\_



## GEORGIA SECURITY AND IMMIGRATION COMPLIANCE ACT AFFIDAVIT

**GEORGIA E-Verify and Public Contracts: The Georgia E-Verify law requires contractors and all sub-contractors on Georgia public contract (contracts with a government agency) for the physical performance of services over \$2,499 in value to enroll in E-Verify, regardless of the number of employees.**

<b>Contractor Name:</b>	
<b>Subcontractor's (Your) Name</b>	
<b>Solicitation/Bid number or Project Description:</b>	ITB 2024-022 Lake Erin Dam Rehabilitation

By executing this affidavit, the undersigned subcontractor verifies its compliance with O.C.G.A. § 13-10-91, stating affirmatively that the individual, entity or corporation which is engaged in the physical performance of services under a contract on behalf of the City of Tucker, Georgia has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91.

Furthermore, the undersigned subcontractor will continue to use the federal work authorization program throughout the contract period as required by O.C.G.A. § 13-10-91(b) and the undersigned subcontractor will contract for the physical performance of services in satisfaction of such contract only with sub-subcontractors who present and affidavit to the contractor with the information required by O.C.G.A. § 13-10-91(b). Subcontractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

\_\_\_\_\_  
Federal Work Authorization User Identification Number  
(EEV/E-Verify Company Identification Number)

\_\_\_\_\_  
Date of Authorization

\_\_\_\_\_  
Name of Subcontractor

**I hereby declare under penalty of perjury that the foregoing is true and correct**

\_\_\_\_\_  
Printed Name (of Authorized Officer or Agent of Contractor)

\_\_\_\_\_  
Title (of Authorized Officer or Agent of Contractor)

\_\_\_\_\_  
Signature (of Authorized Officer or Agent)

\_\_\_\_\_  
Date Signed

SUBSCRIBED AND SWORN BEFORE ME ON THIS THE

\_\_\_\_ DAY OF \_\_\_\_\_, 20\_\_\_\_

\_\_\_\_\_  
Notary Public

[NOTARY SEAL]

My Commission Expires: \_\_\_\_\_

**BID BOND**

KNOW ALL MEN BY THESE PRESENTS, THAT

(Name of Contractor) \_\_\_\_\_ at

(Address of Contractor) \_\_\_\_\_

(Corporation, Partnership and / or Individual) hereinafter called Principal, and

(Name of Surety) \_\_\_\_\_

(Address of Surety) \_\_\_\_\_

A corporation of the State of \_\_\_\_\_, and a surety authorized by law to do business in the State of Georgia, hereinafter called Surety, are held, and firmly bound unto

(Name of Obligee) City of Tucker Georgia

(Address of Obligee) 1975 Lakeside Parkway, Suite 350, Tucker, Georgia 30084

Hereinafter referred to as Obligee, in the penal sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

WHEREAS, the Principal is about to submit, or has submitted, to the City of Tucker, Georgia, a proposal for furnishing materials, labor, and equipment for:

**ITB # 2024-022  
LAKE ERIN DAM REHABILITATION PROJECT**

WHEREAS, the Principal desires to file this Bond in accordance with law in lieu of a certified Bidder's check otherwise required to accompany this Proposal.

NOW, THEREFORE, the conditions of this obligation are such that if the bid is accepted, the Principal shall within ten days after receipt of notification of the acceptance execute a Contract in accordance with the Bid and upon the terms, conditions, and prices set forth in the form and manner required by the City of Tucker, Georgia, and execute a sufficient and satisfactory Performance Bond and Payment Bond payable to the City of Tucker, Georgia, each in an amount of 100% of the total Contract Price, in form and with security satisfactory to said the City of Tucker, Georgia, and otherwise, to be and remain in full force and virtue in law; and the Surety shall, upon failure of the Principal to comply with any or all of the foregoing requirements within the time specified above, immediately pay to the City of Tucker, Georgia,

upon demand, the amount hereof in good and lawful money of the United States of America, not as a penalty, but as liquidated damages.

PROVIDED, FURTHER, that Principal and Surety agree and represent that this bond is executed pursuant, to and in accordance with the applicable provisions of the Official Code of Georgia Annotated, as Amended, including, but not limited to, O.C.G.A. § 13-10-20, et. Seg. And § 36- 91-50, et. Seg. and is intended to be and shall be constructed as a bond in compliance with the requirements thereof.

Signed, sealed, and dated this \_\_\_\_\_ day of \_\_\_\_\_ A.D., 20 \_\_\_\_ .

ATTEST:

\_\_\_\_\_  
(Principal Secretary)

\_\_\_\_\_  
(Principal)

(SEAL)

BY: \_\_\_\_\_

\_\_\_\_\_  
(Witness to Principal)

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
(Surety)

ATTEST:

BY: \_\_\_\_\_  
(Attorney-in-Fact) and Resident Agent

\_\_\_\_\_  
(Attorney-in-Fact)

(SEAL)

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
(Witness as to Surety)

\_\_\_\_\_





## PROPOSED SUBCONTRACTOR FORM: ITB 2024-022

BIDDERS MUST RETURN THIS FORM WHICH WILL BE ADDED TO SUBMITTED PROPOSAL  
Please complete this form and return as part of your bid package when it is submitted.

Name of Bidder \_\_\_\_\_

**1. Subcontractor Name:** \_\_\_\_\_

% of Bid Amount: \_\_\_\_\_

Description of Work provided: \_\_\_\_\_

**2. Subcontractor Name:** \_\_\_\_\_

% of Bid Amount: \_\_\_\_\_

Description of Work provided: \_\_\_\_\_

**3. Subcontractor Name:** \_\_\_\_\_

% of Bid Amount: \_\_\_\_\_

Description of Work provided: \_\_\_\_\_

**4. Subcontractor Name:** \_\_\_\_\_

% of Bid Amount: \_\_\_\_\_

Description of Work provided: \_\_\_\_\_

**Please complete and submit in bid package. Duplicate if needed.**



**OATH OF NON-COLLUSION**

COMES NOW, \_\_\_\_\_ (“Contractor”),  
[*name of Contractor*]

appearing by and through \_\_\_\_\_,  
[*name of individual with authority to bind Contractor*]

its \_\_\_\_\_ (“Individual And Representative Affiant”), and  
[*title*]

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

[*insert the names of all those required to give the oath*]

(collectively, “Individual Affiants”), and each of the Individual And Representative Affiant and Individual Affiants, after first being duly sworn, deposes and says that:

1. Contractor has not directly or indirectly violated subsection (d) of the Official Code of Georgia Annotated Section 36-91-21, which provides as follows:

Whenever a public works construction contract for any governmental entity subject to the requirements of this chapter is to be let out by competitive sealed bid or proposal, no person, by himself or herself or otherwise, shall prevent or attempt to prevent competition in such bidding or proposals by any means whatever. No person who desires to procure such work for himself or herself or for another shall prevent or endeavor to prevent anyone from making a bid or proposal therefor by any means whatever, nor shall such person so desiring the work cause or induce another to withdraw a bid or proposal for the work.

Code Section 36-91-21(d) also applies to municipal street system contracts pursuant to Official Code of Georgia Annotated Section 32-4-122.

2. Individual And Representative Affiant is the officer of Contractor whose duty it is to make the payment.

3. If Contractor is a partnership, then Individual and Representative Affiant and Individual Affiants together constitute all of the partners and any officer, agent or other person who may have represented or acted for Contractor in bidding for or procuring the contract.

4. If Contractor is a corporation, then Individual and Representative Affiant and Individual Affiants together constitute all officers, agents, or other persons who may have acted for or represented Contractor in bidding for or procuring the contract.

Further affiants sayeth not.

This \_\_\_\_ day of \_\_\_\_\_, 20\_\_.

By: \_\_\_\_\_, individually and on behalf of Contractor  
[signature of Individual And Representative Affiant]

Name: \_\_\_\_\_

Title: \_\_\_\_\_

*Individual Affiants' signatures and names:*

\_\_\_\_\_  
Name:

\_\_\_\_\_  
Name:

\_\_\_\_\_  
Name:

\_\_\_\_\_  
Name:

\_\_\_\_\_  
Name:

\_\_\_\_\_  
Name:

Subscribed and Sworn before me on this  
\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

\_\_\_\_\_  
NOTARY PUBLIC  
My Commission Expires:

\_\_\_\_\_

# Contact Information Form

Please fill out this form with the appropriate contact information for your company.

Full Legal Name of Company: \_\_\_\_\_

Date: \_\_\_\_\_

Contractor Information:

Primary Contact Person: \_\_\_\_\_

Title: \_\_\_\_\_ Telephone Number: \_\_\_\_\_

E-mail Address: \_\_\_\_\_

Secondary Contact Person: \_\_\_\_\_

Title: \_\_\_\_\_ Telephone Number: \_\_\_\_\_

E-mail Address: \_\_\_\_\_

Preferred Contact for Administration: (i.e. Document Processing) (Choose one)

Primary Contact

Secondary Contact

Address: \_\_\_\_\_

City / State / Zip: \_\_\_\_\_

Mailing Address (If different than above): \_\_\_\_\_

City / State / Zip: \_\_\_\_\_

Federal Employee ID Number (FEIN): \_\_\_\_\_

# Exhibit C Technical Specifications

## SECTION 01 00 00 SITE RESTORATION

### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. General requirements for the protection and restoration of property and landscape.

#### 1.2 RELATED WORK

- A. 01 43 00 Quality Assurance
- B. 01 57 13 Temporary Erosion and Sediment Control
- C. 01 74 19 Disposal of Waste Materials
- D. 02 41 13 Selective Demolition
- E. 03 01 30 Concrete Repair
- F. 32 91 19 Topsoil
- G. 32 92 00 Turf and Grasses

#### 1.3 REFERENCES

- A. Georgia Department of Transportation (GDOT)
  - 1. Standard Specifications Construction of Transportation Systems 2021

#### 1.4 SCOPE OF WORK

- A. The Contractor shall be responsible for the preservation of all public and private property, , trees, monuments, signs and markers, fences, grassed and sodded areas, etc. along and adjacent to the construction site and shall take precautions necessary to prevent damage or injury thereto, unless the removal, alteration, or destruction of such property is provided for under the contract.
- B. When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect or misconduct in the execution of the work, or in consequence of the non-execution thereof by the Contractor, the Contractor shall restore, at the Contractor's own expense, such property to a condition similar or equal to that existing before such damage or injury was done, by repairing, rebuilding or otherwise restoring as may be directed, or the Contractor shall make good such damage or injury in an acceptable manner. The Contractor shall correct all disturbed areas before retainage will be released.
- C. The Contractor shall take the necessary precautions to prevent damage to property during construction activities. Damaged site features and conditions not called to be demolished, removed, or otherwise altered by the construction documents shall be repaired and returned to pre-construction conditions or better. The Contractor is responsible for repairing damage to these features.
- D. Items noted to be selectively demolished are to be demolished within the limits shown and/or described. The Contractor shall reconstruct or otherwise restore site features demolished beyond these limits at the Contractor's own expense. All demolished materials must be removed by the Contractor and disposed of in accordance with applicable local, state, and federal laws, ordinances, and regulations at the Contractor's own expense.

#### 1.5 DEFINITIONS (NOT USED)

- A. Property: All tangible property, both real and personal.

## 1.6 SUBMITTALS

- A. The Contractor shall document any damages to property and its restoration efforts. The documentation shall be compiled into one report as an electronic copy (portable document format - PDF) for submittal to the Engineer and the Owner. The report shall contain the following items at a minimum:
  - 1. Location Map documenting the location and orientation for each photograph provided.
  - 2. Sequential number or ID for each photograph provided.
  - 3. Date each photograph was taken.
  - 4. Detailed caption or description provided for each photograph.
  - 5. Detailed schedule for the completion of restoration efforts.
- B. The Contractor shall provide a restoration plan to the Engineer and obtain approval prior to performing any restoration efforts of damaged property. The restoration plan shall provide the limits, horizontal and vertical geometry including but not limited to length, width, depth, slope, alignment, etc., equipment, and construction methods required for completing the restoration work.
- C. The Contractor shall provide photographic evidence of pre- and post-construction conditions to the Engineer and the Owner.
- D. The Contractor shall provide photographic evidence of pre- and post-site restoration conditions to the Engineer and the Owner.
- E. Equipment Data: Submit data for equipment to be used for the restoration of damaged property (e.g., saw cutting, pavement patching or reconstruction, concrete, sidewalk, or curb and gutter repair, landscaping, etc.).
- F. Test reports (as required)

## 1.7 COORDINATION

- A. The Contractor shall coordinate an onsite walk-through with the Engineer and the Owner to document any damages to property and its restoration efforts. The Contractor shall provide a minimum of 48 hours' notice to the Engineer and the Owner prior to conducting the onsite walk-through.

## 1.8 QUALITY ASSURANCE AND QUALITY CONTROL

- A. Contractor quality assurance and quality control shall be in accordance with the Terms and Conditions and as prescribed in the related Specifications.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. Topsoil: As specified in Specification Section 32 91 19 "Topsoil."
- B. Fertilizer: As specified in Specification Section 32 92 00 "Turf and Grasses."
- C. Seed mixtures: As specified in Specification Section 32 92 00 "Turf and Grasses."
- D. Mulch: As specified in Specification Section 32 92 00 "Turf and Grasses."
- E. Paving materials: As specified in Section 400 of the GDOT Standard Specifications Construction of Transportation Systems 2021.

- F. Concrete and curing materials: As specified in Specification Section 03 31 00 “Cast-in-Place Concrete.”

## 2.2 MATERIALS TESTING

- A. Testing of materials shall follow the requirements as specified within their referenced specification.

## PART 3 EXECUTION

### 3.1 GENERAL

- A. The Contractor shall employ and operate equipment and vehicles in such a manner that does not damage existing site features to remain or construction site features.
- B. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

### 3.2 PROTECTION

- A. The Contractor shall be responsible for the preservation and protection of all property, and any damage or cost incurred will be at the sole expense of the Contractor. The Contractor shall implement protective measures as shown on the Drawings and take the necessary precautions to prevent damage to property during construction activities. Protection measures may include but are not limited to:
  1. Temporary fencing around sensitive areas.
  2. Protective coverings for sidewalks, curbs, and other surfaces.
  3. Proper storage of construction materials to avoid damage.

### 3.3 INSPECTION

- A. The Contractor shall conduct an onsite walk-through with the Engineer and the Owner to document any damages to property and its restoration efforts. The Contractor shall provide a minimum of 48 hours' notice to the Engineer and the Owner prior to conducting the onsite walk-through.
- B. During the scheduled onsite walk-through, the Contractor shall document damages to property and areas identified for restoration by the Engineer and the Owner. The documentation shall be provided to the Engineer and the Owner in a written report and shown graphically in the restoration plan as prescribed in the Section 1.6 “Submittals” of this specification.

### 3.4 PREPARATION

- A. The Contractor shall field verify existing materials and material sections, as well as horizontal and vertical geometry elements of the damaged property identified for restoration.
- B. The Contractor shall prepare a site restoration plan as prescribed in Section 1.6 “Submittals” of this specification and receive approval from the Engineer before commencing any restoration work.
- C. Before starting any restoration work, the Contractor shall contact Georgia 811 48 hours in advance by calling 811 or 1-800-282-7411 to have utility lines marked before conducting any mechanized digging.
- D. The Contractor shall ensure that all surfaces requiring restoration are free of debris or other deleterious objects that may reduce the effectiveness or durability of the restoration.

- E. The Contractor shall ensure that proper erosion and sediment control measures are in place prior to generating any earth disturbance. The Contractor shall receive approval from the Engineer of any erosion and sediment control measures that are required as a result of restoration work.
- F. The Contractor shall adhere to the preparation and installation requirements provided in each of the respective Specifications identified in Section 1.2 “Related Work” and Section 2.1 “Materials” of this specification.

### 3.5 RESTORATION AND REPAIR

- A. In case of any damages to property caused by the Contractor, the following restoration procedures shall apply:
  - 1. If required, the Contractor shall obtain necessary permits or testing of materials necessary to complete the restoration work prior to delivery.
  - 2. Coordinate with relevant city departments for inspections, testing, and approvals.
  - 3. On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
  - 4. Promptly repair or replace damaged property to its original condition, matching the existing materials, section, and geometry in-kind, unless directed otherwise by the Engineer and the Owner. The Contractor shall adhere to installation requirements provided in each of the respective Specifications identified in Section 1.2 “Related Work” and Section 2.1 “Materials” of this specification.
  - 5. The Contractor shall submit photographic documentation and reports for the completed restoration that follows the submittal requirements as outlined in Section 1.6 “Submittals” of this specification.

END OF SECTION 01 00 00



SECTION 01 43 00  
QUALITY ASSURANCE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.

1.2 DEFINITIONS

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

1.3 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Owner Technical Representative for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Engineer for a decision before proceeding.

#### 1.4 SUBMITTALS

- A. Testing Agency Qualifications: For testing agencies specified in the Contract Documents to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- B. Contractor's Quality Control Plan
  - 1. Quality-Control Plan, General: Submit quality-control plan within 15 days of the Date of Commencement to the Owner and Engineer in portable document format (PDF). Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.
  - 2. Testing and Inspection: In the quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
    - a. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
    - b. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
    - c. Owner-performed tests and inspections indicated in the Contract Documents.
  - 3. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
  - 4. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Engineer has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.
- C. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
  - 1. Date of issue.
  - 2. Project title and number.
  - 3. Name, address, and telephone number of testing agency.
  - 4. Dates and locations of samples and tests or inspections.
  - 5. Names of individuals conducting tests and inspections.
  - 6. Description of the Work and test and inspection method.

7. Identification of product and Specification Section.
  8. Complete test or inspection data.
  9. Test and inspection results and an interpretation of test results.
  10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
  11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
  12. Name and signature of laboratory inspector.
  13. Recommendations on retesting and reinspecting.
- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

## 1.5 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar in material, design, and extent to those indicated for this Project.
1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- F. Testing Agency Qualifications: An NRTL, an NVLAP, AASHTO, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
  2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
  3. AASHTO: AASHTO Accreditation Program (AAP) provides competency certification for testing laboratories to perform specific listed tests on construction materials.

## 1.6 QUALITY CONTROL

- A. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
  2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
  3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
  4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
  5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
  6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- B. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- C. Testing Agency Responsibilities: Cooperate with Owner Engineer, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Owner Engineer, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
  2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
  3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
  4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
  5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
  6. Do not perform any duties of the Contractor.
- D. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
  2. Incidental labor and facilities necessary to facilitate tests and inspections.
  3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
  4. Facilities for storage and field curing of test samples.

5. Delivery of samples to testing agencies.
  6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
  7. Security and protection for samples and for testing and inspecting equipment at Project site.
- E. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

## PART 2 PRODUCTS (NOT USED)

## PART 3 EXECUTION

### 3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
1. Date test or inspection was conducted.
  2. Description of the Work tested or inspected.
  3. Date test or inspection results were transmitted to Engineer.
  4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Engineer's reference during normal working hours.

### 3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 43 00

SECTION 01 50 00  
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.2 RELATED WORK

- A. Complete work in accordance with the requirements specified herein and in addition to those requirements stated in the General Terms and Conditions.

1.3 DEFINITIONS (NOT USED)

1.4 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to Owner, Engineer, and authorities having jurisdiction.
- B. Utilities from Existing System: The existing electrical infrastructure may be utilized by the Contractor at no cost but with coordination with the Owner and the City of Tucker, Georgia Department of Parks and Recreation.

1.5 SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Fire-Safety Program: Show compliance with requirements of the National Fire Protection Association (NFPA) and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

1.6 QUALITY ASSURANCE

- A. Electric Service: Comply with National Electrical Contractors Association (NECA), National Electrical Manufacturers Association (NEMA), and Underwriters Laboratory (UL) standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. The Contractor shall obtain required certifications and permits and provide copies of each to the Owner in portable document format (PDF).

1.7 QUALITY CONTROL

- A. The Contractor shall adhere to the requirements stated in the General Terms and Conditions and as specified in Section 01 43 00 "Quality Assurance."

PART 2 PRODUCTS

2.1 TEMPORARY FACILITIES

- A. Field offices: Prefabricated or mobile units at project site.
- B. Storage and fabrication sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations at project site.

- C. Toilet facility: Locate in designated staging area, or as otherwise approved by the Owner.

## 2.2 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated with class and extinguishing agent as required by locations and classes of fire exposures. The Contractor shall have fire extinguishers on the site daily.

## PART 3 EXECUTION

### 3.1 GENERAL INSTALLATION

- A. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. The Contractor shall obtain approval from the Owner prior to erecting the temporary facilities.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed.

### 3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service and connect to existing service. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sanitary Facilities: The Contractor shall provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with the requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- C. Electric Power Service: The Contractor shall provide temporary connections to provisions for temporary electrical service.
- D. Telephone Service: Contractor to provide the job superintendent with a cellular phone to use on the job site or away from the job site.

### 3.3 SUPPORT FACILITIES INSTALLATION

- A. Parking: Use area(s) designated by the Owner for construction personnel.
- B. Waste Disposal Facilities: Provide covered waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. The Owner's waste receptacles shall not be used by the Contractor.
- C. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
  - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

### 3.4 SECURITY AND PROTECTION

- A. The Contractor is solely responsible for security and protection of all temporary facilities, equipment and materials stored on site.
- B. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at the Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities caused by the Contractor. The Contractor shall adhere to the requirements specified in Section 01 00 00 "Site Restoration."
- C. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

- D. Tree and Plant Protection: Protect vegetation from damage from construction operations. Replace vegetation damaged from work in this Contract. Replace damaged trees and plants as directed by the Engineer at no cost to the Owner.
- E. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses.

3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Termination and Removal: Remove each temporary facility when need for its service has ended. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

END OF SECTION 01 50 00



SECTION 01 56 33  
CONSTRUCTION SECURITY FENCE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Work to install and maintain temporary construction security fence and gates, and removal thereof following completion of the project.

1.2 REFERENCES

A. ASTM International (ASTM)

- 1. A392 Specification for Zinc-Coated Steel Chain-Link Fence Fabric
- 2. A491 Specification for Aluminum-Coated Steel Chain-Link Fabric
- 3. A780 Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
- 4. A817 Standard Specification for Metallic-Coated Steel Wire for Chain-Link Fence Fabric and Marcellled Tension Wire
- 5. F552 Standard Terminology Relating to Chain Link Fencing
- 6. F567 Standard Practice for Installation of Chain-Link Fence
- 7. F626 Standard Specification for Fence Fittings
- 8. F900 Standard Specification for Industrial and Commercial Steel Swing Gates
- 9. F1043 Standard Specification for Strength and Protective Coatings on Steel Industrial Fence Framework
- 10. F1083 Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures
- 11. F3342 Standard Guide for Temporary Fence Applications for Construction Sites

1.3 SUBMITTALS

- A. Submit in accordance with the Terms and Conditions.
- B. Contractor Qualifications: Submit qualifications exhibiting the Contractor's company has demonstrated successful experience installing similar projects and products in accordance with ASTM F567 and have at least 5 years' experience in accordance with the provisions of this Section.
- C. Shop drawings: Site plan showing layout of fence location with dimensions, location of gates and opening sizes, cleared area, elevations of fence, gates, and footings, and details of attachments.
- D. Material samples: When required by the Owner or Engineer, provide representative samples of chain link fabric, framework, and fittings.

PART 2 PRODUCTS

2.1 TEMPORARY FENCE PANELS

- A. Temporary fence to be constructed from welded temporary fence panel systems to include:

1. Chain link fabric shall be not less than 11 ½ gauge, 2 3/8 inches opening and galvanized in good condition free from defects.
2. Fabric height to be 72 inches (6 feet).
3. If required, top rail to be not less than 1 3/8 inches outer diameter (O.D.) x 18 gauge in good condition free from defects.
4. Posts to be minimum of 2 inches O.D. and 16 gauge in good condition and free of defects.
5. Posts to be spaced not more than 10 feet center-to-center and driven to a depth of no less than 24 inches in soil or attached to temporary above-ground footings approved by the Engineer.

## 2.2 SWING GATES

- A. Galvanized steel pipe welded fabrication in compliance with ASTM F900.
- B. Gate frame members to be minimum of 1.375 inches O.D. and free of defects.
- C. Frame members spaced no greater than 8 feet center-to-center vertically and horizontally.
- D. Welded joints protected by applying zinc-rich paint in accordance with ASTM A780.
- E. Positive locking gate latch, pressed steel galvanized after fabrication.
- F. Galvanized malleable iron or heavy gauge pressed steel post and frame hinges.
- G. Provide lockable drop bar and gate holdbacks with double gates.
- H. Provide keyed lock for gate. Provide the Owner with a minimum of 2 keys to the lock for Owner access.

## 2.3 CONCRETE

- A. Concrete for gate post footings shall have a 28-day compressive strength of 2,500 psi. (17.2 MPa).

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install temporary fence per ASTM F3342 Standard Guide for Temporary Fence Applications for Construction Sites.
  1. Space posts not more than 10 feet center-to-center and driven to a depth of no less than 24 inches in soil or attached to temporary above-ground footings approved by the Engineer.
  2. Install fabric in accordance with ASTM F567, stretched taut and attached to each post.
  3. If required, install top rail in accordance with ASTM F567 in lengths not less than 21 feet.
  4. Swing Gates: Install swing gates and gateposts in compliance with ASTM F567.

END OF SECTION 01 56 33

SECTION 01 57 00  
RESERVOIR CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. The Contractor's responsibilities for maintaining reservoir level and controlling water during construction, regulatory requirements, submittals, and maintenance.
- B. Control of reservoir to reduce potential for releases into the work zone.

1.2 SYSTEM DESCRIPTION

- A. Lake Erin is formed by the natural basin and impounded by an earth embankment. Water enters the lake through surface runoff during rain events. The sunny day average daily flow rate is between 1.0 – 2.0 cubic feet per second (cfs). The crest of the existing principal spillway riser structure is at elevation 962.12 feet, with an inflow pipe that regulates and sets the normal pool elevation at elevation 955.70 feet North American Vertical Datum of 1988 (NAVD88). The Owner had operated an existing siphon system consisting of one (1) 9-inch corrugated metal pipe (CMP) conduit to maintain the reservoir at a lowered elevation of approximately 950.0 feet NAVD88, or approximately 5.7 feet below the normal pool elevation. However, the conduit has failed and has been capped with a mechanical pipe plug, thereby rendering the conduit inoperable.
- B. Under existing conditions, the dam crest has an uneven profile with its elevation ranging from approximately 968.5 feet to 969.4 feet NAVD88 and is comprised of a principal spillway and auxiliary spillway. The existing principal spillway riser structure and inflow pipe (30-inch diameter corrugated metal pipe – CMP) discharge into the principal spillway conduit (30-inch diameter reinforced concrete pipe - RCP) that drains into the masonry-lined auxiliary spillway channel at an invert elevation of 954.19 feet NAVD88. The 30-inch RCP principal spillway conduit discharges through an existing concrete end wall, abutted by the auxiliary spillway vertical training walls, and ultimately discharges into a natural stream channel, an un-named tributary to the North Fork Peachtree Creek in the Peachtree Creek watershed (HUC 0313000112). The estimated discharges through the existing principal spillway for a 50-, and 100-year, 6-hour storm event are 44, and 50, cubic feet per second (cfs), respectively, with a reservoir elevation starting at normal pool (955.70 feet NAVD88). The expected discharge through the existing principal spillway for a 1/3 Probable Maximum Precipitation (PMP) event is 320 cubic feet per second (cfs) with a reservoir elevation of 969.8 feet NAVD88.
- C. The auxiliary spillway is an open channel spillway with a vertical training wall on the right side (facing downstream) and earthen side slope on the left side with an approximate slope of 2.2-horizontal-to-one-vertical (2.2H:1V). The auxiliary spillway channel is constructed from stone masonry and has a bedrock base.
- D. Contractor reservoir level control responsibilities during construction are as follows.
  - The Contractor shall be responsible for dewatering the reservoir pool to an elevation of 941.0 NAVD88 during construction. The Contractor shall implement the temporary bypass system and cofferdam shown and described in the Construction Documents. During a 100-year storm event, the reservoir may fill up behind the temporary cofferdam to an elevation between 941.0 and 950.1 feet NAVD88 during construction.
    - 1. The Contractor is responsible for protecting all work up to a reservoir elevation of 951.0 feet NAVD88 (approximately 1 foot of freeboard relative to the 100-year storm elevation).

### 1.3 SUBMITTALS

- A. Submit in accordance with the Terms and Conditions.
- B. The Contractor shall submit to the Owner and Engineer each week a summary of the daily reservoir water surface elevation for each day the water is drawn down. Reservoir water surface elevations shall be measured at the same time each day.
- C. The Contractor shall submit a Reservoir Control Plan that includes a description of how the reservoir water surface elevation will be measured and drawn down. The plan shall include:
  - 1. Identification of the staff responsible for measuring the reservoir water surface elevation.
  - 2. Measuring equipment and methods to be used.
  - 3. Data recording and distribution procedures.
  - 4. Design of the siphon system.

### 1.4 MAINTENANCE

- A. Maintain reservoir control equipment in operating condition throughout the duration of construction. Equipment that cannot perform its intended function shall be immediately removed by the Contractor and replaced.

## PART 2 PRODUCTS

- A. All reservoir control products shall be suitable for their intended purpose and function. Equipment that is observed to not be able to perform its intended function shall be immediately removed by the Contractor and replaced.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Perform reservoir control operations so that work is performed in dry conditions, excepting only that work which is specified or approved for installation in wet conditions.

### 3.2 FIELD QUALITY CONTROL

- A. Contractor shall maintain records of operations of reservoir water surface elevation control equipment.
- B. Contractor shall report daily reservoir water surface elevation data for each day the water is drawn down to the Owner and Engineer on a weekly basis.

END OF SECTION 01 57 00

## SECTION 01 57 13

### TEMPORARY EROSION AND SEDIMENT CONTROL

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Requirements for controlling soil erosion resulting from construction operations, preventing flow of sediment from construction site, and containing construction materials (including excavation and backfill) within protected working area as to prevent damage to any stream or wetlands as indicated and in compliance with Contract Documents.

##### 1.2 REFERENCES

- A. Georgia Department of Transportation (GDOT) Office of Materials and Testing Qualified Products List
- B. Georgia Department of Transportation Sampling, Testing, and Inspection
- C. Georgia Department of Transportation Standard Specifications Construction of Transportation Systems 2021
- D. Georgia Soil and Water Conservation Commission. (2016). Manual for Erosion and Sediment Control in Georgia

##### 1.3 DEFINITIONS

- A. Crushed Stone Construction Exit: A stone-stabilized pad located as seen on the Drawings and at any point where vehicular traffic will be leaving a site onto a public right-of-way, street, roadway, or parking area. Its purpose is to reduce or eliminate transportation of soil (by motor vehicles) from the construction area onto public Right-of-Way.
- B. Sediment Barrier: Sediment Barriers are temporary structures made up of a porous material typically supported by steel or wood posts. Types of sediment barriers may include silt fence, brush piles, mulch berms, compost filter socks or other filtering material.
  - 1. Type A Silt Fence: This 36-inch-wide filter fabric shall be used on developments where the life of the project is great than or equal to six months. Type A is classified as non-sensitive (NS) application.
  - 2. Type C Silt Fence: Type C fence is 36-inches wide with wire reinforcement or equivalent. The wire reinforcement is necessary because this fabric allows almost three times the flow rate as Type A silt fence. Type C silt fence shall be used where runoff flows or velocities are particularly high or where slopes exceed a vertical height of 10 feet. Type C is classified as sensitive (S) application.
- C. Rolled Erosion Control Product (RECP): A protective covering used to prevent erosion and establish temporary or permanent vegetation on steep slopes, shorelines, or channels. A natural fiber blanket with single or double photodegradable or biodegradable nets.
- D. Silt Filter Bag: A geotextile bag through which sediment-laden water is pumped. Traps dissolved silt when pumping accumulated water from sediment basins or other areas where water may accumulate.
- E. Concrete Washout Structure: A designed structure in a designated area of a construction site, where all slurry concrete is washed and removed from construction equipment. Concrete washout prevents slurry concrete from leaving construction sites, thus preventing stormwater pollution.

- F. Storm Drain Outlet Protection: Paved and/or riprapped channel sections, placed below storm drain and other pipe outlets, also referred to as riprap outlet protection.
- G. Clear Water Diversion Pipe: A temporary pipe installed in conjunction with sandbag dikes.
- H. Sump Pit: A perforated vertical standpipe wrapped with hardware cloth and geotextile placed in an excavated pit that is backfilled with Stone. Water is pumped from the standpipe to a stable discharge area.
- I. Sandbag Dike: A temporary dike or berm constructed of sandbags that intercepts and prevents runoff from entering a disturbed area and diverts or directs the water to a controlled or stabilized drainage outlet.
- J. Tree Protection: To protect desirable trees from injury during construction activity. Barrier constructed to protected tree trunk, crown, and root system from injury.

#### 1.4 SUBMITTALS

- A. Submit in accordance with the Terms and Conditions.
- B. The Contractor shall submit to the Owner and Engineer a minimum of 14 days prior to land disturbing activities, a copy of the approval of the Notice of Intent (NOI) for coverage of the project under the National Pollutant Discharge Elimination System (NPDES) Infrastructure Construction General Permit. The Contractor shall be solely responsible for fees and compliance activities, including development of a site-specific stormwater pollution prevention plan (SWPPP), if required, associated with this permit coverage.

#### 1.5 QUALITY ASSURANCE

- A. Use acceptable procedures including installation, inspection, maintenance, and removal of temporary erosion and sediment devices, practices, and measures.
- B. Complete all required inspections required by and in accordance with the Contract Documents.
- C. Coordinate and facilitate inspections by third parties as required by project permits.
- D. Keep records of inspection and maintenance as required by the NPDES Infrastructure Construction General Permit activities and associated compliance documents.
- E. Use approved materials as provided in GDOT's Office of Materials and Testing's Qualified Products List.

### PART 2 PRODUCTS

#### 2.1 GENERAL

- A. All materials must meet be approved materials as provided in GDOT's Office of Materials and Testing's Qualified Products List and meet the requirements as stipulated in the Georgia Soil and Water Conservation Commission's Manual for Erosion and Sediment Control.

#### 2.2 CRUSHED STONE CONSTRUCTION EXIT

- A. Aggregate – shall be stone aggregate meeting National Stone, Sand, and Gravel Association (NSSGA) R-2 (1.5 to 3.5 inch stone).
- B. Geotextile selection shall be based on AASHTO M288-06 specification:
  - 1. For subgrades with a CBR greater than or equal to 3 or shear strength greater than 90 kPa, geotextile must meet requirements of section AASHTO M288-06 Section 7.3, Separation Requirements.

2. For subgrades with a CBR between 1 and 3 or sheer strength between 30 and 90 kPa, geotextile must meet requirements of section AASHTO M288-06 Section 8, Geotextile Property Requirements for Subsurface Drainage, Separation, Stabilization, and Permanent Erosion Control (Geotextile Property Requirements).

2.3 SEDIMENT BARRIER

A. Type A Silt Fence (NS):

1. Silt Fence Fabrics shall be obtained from of the Georgia Department of Transportation’s Office of Materials and Testing’s Qualified Products List (QPL-36).
2. Use either woven or nonwoven filter fabric for Type “A” and “B” fences. If using woven fabric, the fabric may have slit tape yarns in one direction (warp or fill) only.

B. Type C Silt Fence (S):

1. Silt Fence Fabrics shall be obtained from of the Georgia Department of Transportation’s Office of Materials and Testing’s Qualified Products List (QPL-36).
2. Use non-calendered woven fabric constructed with monofilament yarns only.

C. Ensure silt fence filter fabrics have the following characteristics:

1. Has strong rot-proof synthetic fibers formed into either a woven or non-woven fabric.
2. Has no treatment or coating that might significantly alter its physical properties after installation.
3. Contains stabilizers and/or inhibitors to make the filaments resistant to deterioration resulting from exposure to sunlight or heat.
4. Makes a pervious sheet of synthetic fibers oriented into a stable network so that the fibers retain their relative position with respect to each other under normal handling, installation, and service conditions.
5. Has finished fabric edges to prevent the outer yarn from pulling away from the fabric.
6. Has no defects or flaws that would significantly affect its physical and/or filtering properties.
7. Meets the following physical or dimensional requirements provided in Tables 1-3:

D. Silt Fence Post Size requirements for NS and S are provided in Table 1:

**Table 1 – Silt Fence Post Size Requirements**

Type	Min. Length	Type of Post	Size of Post
NS	4 Feet	Soft Wood	3” diameter or 2x4
		Oak	1.5” x 1.5”
		Steel	1.15 lb./ft. min.
S	4 Feet	Oak	2” x 2”
		Steel	1.15-1.25 lb./ft. min.

- E. Silt Fence Fasteners for Wood Post requirements are provided in Table 2:

**Table 2 – Silt Fence Fasteners for Wood Posts Requirements**

	<b>Gauge</b>	<b>Crown</b>	<b>Legs</b>	<b>Staples / Post</b>
Wire Staples	17 min.	3/4" Wide	1/2" Long	5 min.
	<b>Gauge</b>	<b>Length</b>	<b>Button Heads</b>	<b>Nail / Post</b>
Nails	14 min.	1"	3/4"	4 min.

- F. Silt Fence Fabric material requirements for Type A and Type C Silt Fence must comply with Section 881.2.07 of the GDOT Standard Specifications Construction of Transportation Systems 2021 and as provided in Table 3:

**Table 3 – Silt Fence Fabric Material and Testing Requirements**

<b>Type Fence</b>	<b>A</b>	<b>C</b>
Tensile Strength (pounds min.) <sup>(1)</sup> (ASTM D-4632)	Warp – 120 Fill – 100	Warp – 260 Fill – 180
Elongation (% Max.) (ASTM D-4632)	40	40
AOS (Apparent Opening Size) (Max. Sieve Size) (ASTM D-4751)	No. 30	No. 30
Flow Rate (Gal/Min/Sq. Ft.) (GDT-87)	25	70
Ultraviolet Stability <sup>(2)</sup> (ASTM D-4632 after 300 hours weathering in accordance with ASTM D-4355)	80	80
Bursting Strength (PSI Min.) (ASTM D-3786 Diaphragm Bursting Strength Tester)	175	175
Minimum Fabric Width (Inches)	36	36

<sup>1)</sup> Minimum roll average of five specimens

<sup>2)</sup> Percent of required initial minimum tensile strength

- G. Use silt fence filter fabrics evaluated by the National Transportation Product Evaluation Program (NTPEP).
- H. The fabric may be manufactured with pockets for posts, hems with cord, or with posts pre-attached using staples or button head nails. Ensure the fabric has the manufacturer's name and product trade name labeled on the fabric at a minimum of 25 ft. intervals. Ensure the fabric has a color yarn mark in the fabric 14 inches ± 0.5 inch from both top and bottom ends for Type A and C.

**2.4 ROLLED EROSION CONTROL PRODUCT (SLOPE APPLICATION)**

- A. Product – Blankets shall be nontoxic to vegetation, seed, or wildlife. Products shall be determined to be non-toxic in accordance with EPA821-R-02-012. At minimum, the plastic or biodegradable netting shall be stitched to the fibrous matrix to maximize strength and provide for ease of handling.
- B. Blanket shall meet requirements for application on 3H:1V slopes with a functional longevity of 12 months.



- C. Photodegradable: Straw blankets with a top and bottom side photo degradable net. The maximum size of the mesh should be openings of ½” X ½”. The blanket should be sewn together on 1.5” centers with degradable thread. Minimum thickness should be 0.35” and minimum density should be 0.5 pounds per square yard.
- D. Biodegradable: Straw blanket with a top and bottom side biodegradable jute net. The top side net should consist of machine direction strands that are twisted together and then interwoven with cross direction strands (leno weave). The bottom net may be leno weave or otherwise to meet requirements. The approximate size of the mesh should be openings of 0.5” X 1.0”. The blanket should be sewn together on 1.5” centers with degradable thread. Minimum thickness should be 0.25” and minimum density should be 0.5 pounds per square yard.
- E. Staples – Must be capable of holding the product in place and keeping seams closed for the entire life of the product.
- F. Stakes – Must be capable of holding the product in place for the entire life of the product.

2.5 SILT FILTER BAG

- A. The silt filter bag fabric shall be a non-woven geotextile conforming to the following properties:

Property	Minimum Value	Test Method
Weight	10 ounces/yd <sup>2</sup>	ASTM D3776
Tensile strength (minimum average of 5 specimens)	270 pounds	ASTM D4632
Puncture Resistance	150 pounds	ASTM D4833
Initial Flowrate	70 gal/min-ft <sup>2</sup>	ASTM D4491
Bursting Strength	550 psi	ASTM D3786
Permittivity	1.3 seconds <sup>-1</sup>	ASTM D4991
UV Stability, 70% of initial Tensile Strength	173 pounds	ASTM D4355
AOS Retained	100%	ASTM D4751

- B. All seams shall be sewn with a double needle machine using a high strength thread. The seams shall have a minimum average wide-width strength of 100 pounds per inch tested according to ASTM D4884.
- C. Provide a silt filter bag with an opening to accommodate a 6-inch hose.

2.6 CONCRETE WASHOUT STRUCTURE

- A. Type – “Above Grade” with Straw Bales
- B. Straw Bales – shall be of a size sufficient to construct the structure per the Drawings.
- C. Stakes – shall be wood or metal stakes measuring 1 1/8 inches deep by 1 1/8 inches wide by 48 inches long.

- D. Impermeable Liner – shall be UV resistant, free of holes, tears, or other defects with a minimum thickness of 10 mils.
- E. Staples – shall be manufactured from steel wire with a minimum diameter of 1/8 inches, a length of 8 inches and width of 2 inches.
- F. Sign – Temporary sign to accompany the temporary Concrete Washout Structure
  - 1. Sign – shall be manufactured from plywood that measures 48 inches x 24 inches and painted white. The sign shall be 6 feet from the bottom of the wood frame posts, and the bottom of the plywood shall be 3 feet above ground.
  - 2. Letters – Black lettering measuring 6 inches in height.
  - 3. Fasteners – Shall be lag screws measuring ½ inch.
  - 4. Frame Posts – Shall be manufactured from wood measuring 4 inches x 4 inches x 8 inches. The frame posts shall be embedded 3 feet in the ground.

## 2.7 STORM DRAIN OUTLET PROTECTION

- A. Lining – Durable, dense, specifically selected and graded, quarried stone, placed to prevent erosion. The apron for the storm drain outlet protection, also referred to as riprap outlet protection, shall be lined with stone riprap that conforms with the requirements set forth in the Georgia Soil and Water Conservation Commission Manual for Erosion and Sediment Control in Georgia, 2016 and the Georgia Department of Transportation Standard Specifications Construction of Transportation Systems 2021. The gradation, quality, and placement of riprap shall meet the criteria as specified in Section 35 43 35 “Riprap Slope and Scour Protection.”
- B. Geotextile Fabric - Geotextile shall be pervious sheets of plastic yarn made from a long-chain synthetic polymer, consisting of a polymer composition of at least 85 percent by weight of propylene, ethylene, amide, ester, or vinylidene chloride. Use a sheet of plastic yarn containing stabilizers and/or inhibitors added to the base plastic to make the filaments resistant to deterioration due to ultra-violet and/or heat exposure. Ensure the fabric is finished so that the filaments will retain their relative position with respect to each other. Use fabric without defects, rips, holes, or flaws. Filter fabric must only be used for temporary storm drain outlet protection. Any temporary storm drain outlet protection that is to be salvaged and reused for permanent scour or slope protection must not contain filter fabric. Any remnants or material of filter fabric must be removed prior to acceptance of the permanent scour or slope protection.
- C. Bedding – Stone, generally less than 6 inches in size, that may be placed under graded riprap stone in a layer or combination of layers, designed and installed in such a manner as to prevent loss of underlying. The bedding shall meet the criteria as specified in Section 35 43 35 “Riprap Slope and Scour Protection.”

## 2.8 CLEAR WATER DIVERSION PIPE

- A. Conduit – Dual Wall N-12 Watertight (WT) In-line Bell (IB) High-Density Polyethylene (HDPE) pipe, with a smooth interior wall and annular exterior corrugations, meeting ASTM F2648 requirements. Furnish two (2) 48-inch diameter pipes and one (1) 15-inch diameter pipe for the Portadam thru-wall connections, and one (1) 18-inch diameter pipe for the temporary bypass of the lateral channel at the downstream face of the dam. Manning’s “n” value for use in design shall be 0.013.

1. Joint Performance: Pipe shall be joined using a bell and spigot joint meeting ASTM F2648. The joint shall be watertight according to the requirements of ASTM D3212. Gaskets shall meet the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable, protective wrap to ensure the gasket is free from debris. A joint lubricant available from the manufacturer shall be used on the gasket and bell during assembly. Diameters of 12- through 60-inches shall have an exterior bell wrap installed by the manufacturer.
2. Fittings: Fittings shall conform to ASTM F2306. Bell and spigot connections shall utilize a welded bell and valley or saddle gasket meeting the watertight joint performance requirements of ASTM F2306.
3. Field Pipe and Joint Performance: To assure watertightness, field performance verification may be accomplished by testing in accordance with ASTM F2487. Appropriate safety precautions must be used when field-testing any pipe material. Contact the manufacturer for recommended leakage rates.
4. Material Properties: Material for pipe production shall be an engineered compound of virgin and recycled high-density polyethylene conforming with the minimum requirements of cell classification 424420C (ESCR Test Condition B) for 4- through 10-inch diameters, and 435420C (ESCR Test Condition B) for 12- through 60-inch diameters, as defined and described in the latest version of ASTM D3350, except that carbon black content should not exceed 4%. The design engineer shall verify compatibility with overall system including structural, hydraulic, material, and installation requirements for a given application.

## 2.9 SUMP PIT

- A. Standpipe – Corrugated metal, HDPE, or PVC pipe, greater than or equal to 12 inches or large in diameter, with 1 inch diameter perforations, spaced 6 inches on center. Bottom of the pipe must be capped with watertight seal. Set top of pipe a minimum of 12 inches above anticipated water surface elevation.
- B. Wrap – Pipe to be wrapped with ¼ inch galvanized hardware cloth and then wrapped with a non-woven geotextile that meets requirements as specified in Section 35 43 35 “Riprap Slope and Scour Protection.”
- C. Stone – Backfill excavated pit with clean ¾ to 1 ½ inch stone as specified on the design detail included in the Drawings.
- D. Suction Line to Pump – Provide flexible line to accommodate pump capacity.

## 2.10 SANDBAG DIKE

- A. Sandbags – Woven poly bags. Fill with washed, clean sand. Refer to the Drawings for elevations of the sandbag dike.
- B. Impermeable Liner – shall be UV resistant, free of holes, tears, or other defects with a minimum thickness of 10 mils.

## 2.11 TREE PROTECTION

- A. Fence – Shall be Orange Vinyl “Snow” Fence, temporary, set 4 feet in height, attached to wood stakes.
- B. Stake – Shall be 2” x 2” x 8’ wood stakes. Space stakes at intervals sufficient to maintain all fencing out of the drip line or as shown by the Engineer. Set stakes no greater than 6’ on center. Rebar is not to be used for stakes.

- C. Mulch (If required) – Shall be organic mulch set over any unprotected root zone, measuring 4 inches in depth.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

- A. Install temporary erosion and sediment control devices in accordance with the Manual. Modify installations to comply with inspection observations from the Owner, Engineer, and third-party regulatory inspectors. Additional temporary erosion and sediment control devices may be required depending on site conditions, weather conditions, and the Contractor's means and methods of construction.

#### 3.2 INSPECTION AND MAINTENANCE

- A. Inspect temporary erosion and sediment control devices in accordance with the Manual and permit requirements. Modify, repair, or replace temporary erosion and sediment control devices to maintain operability and/or to comply with inspection observations from the Owner, Engineer, and third-party regulatory inspectors. Additional temporary erosion and sediment control devices may be required depending on site conditions, weather conditions, and the Contractor's means and methods of construction.

#### 3.3 REMOVAL

- A. Once all disturbed areas are stabilized and permanent stabilization has been accepted, remove temporary erosion and sediment control devices, and permanently stabilize remaining disturbed areas per the Contract Documents.

#### 3.4 RECORD KEEPING

- A. Maintain records of inspection and maintenance of temporary erosion and sediment control devices in accordance with all related permit requirements.

END OF SECTION 01 57 13

SECTION 01 74 19  
DISPOSAL OF WASTE MATERIALS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Administrative and procedural requirements for the following.
  - 1. Definitions of nonhazardous demolition, construction, and soil waste materials.
  - 2. Salvaging nonhazardous demolition, construction, and soil waste materials.
  - 3. Disposing of nonhazardous demolition, construction, and soil waste materials.

1.2 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes but is not limited to packaging, wood, concrete, reinforcing steel, pipe, miscellaneous metalwork, concrete truck wash water, oil and other petroleum products, solvents, paints and stains, refuse, garbage, debris, sanitary waste, crank case oil, grease, paint thinner, cleaning solvents, and any other materials used in maintenance or operation of construction equipment.
- B. Waste Soil Materials: Waste that includes only those soil or rock materials which are removed or excavated from the designated structures, locations, or excavations at the site which are not suitable for use in construction as determined by the Engineer, or in excess of that needed for construction as approved by the Engineer. Sediment from sediment and erosion control facilities shall also be considered excavated waste material.
- C. Cleared Vegetation: Vegetation cleared from within the limits of site disturbance, from the staging and stockpile areas, and from temporary construction roads.
- D. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- E. Disposal: Removal off-site of demolition and construction waste, including waste soil materials, and cleared vegetation materials, and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- F. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

1.3 SUBMITTALS

- A. Submit in accordance with the Terms and Conditions.
- B. The Contractor shall submit two paper copies or one electronic copy of certifications that each disposal facility and/or property owner scheduled to receive the waste/demolished/salvaged materials are licensed to receive such materials.
- C. The Contractor shall submit two paper copies or one electronic copy of documentation indicating that the disposal facility has received the demolition/waste/salvaged materials.
- D. The Contractor shall submit a Waste Management Plan for approval that includes:
  - 1. Identification of waste materials to be removed from the site including specification of whether materials require special handling due to health hazards
  - 2. Location of temporary stockpile areas for waste materials to be removed
  - 3. Identification of off-site disposal facilities

4. Means of transportation of materials to off-site disposal facilities

#### 1.4 PERFORMANCE REQUIREMENTS

- A. General: Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert cleared vegetation and construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials.

#### 1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

### PART 2 PRODUCTS (NOT USED)

### PART 3 EXECUTION

#### 3.1 GENERAL

- A. General: Implement approved Waste Management Plan. Provide handling, containers, storage, signage, transportation, and other items as required for proper waste management during the entire duration of the Contract. All deliveries and removals of materials and equipment from the site shall occur during approved work hours.
- B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
- C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walkways, and other adjacent occupied and used facilities.
1. Designate and label specific areas on the Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.

#### 3.2 RECYCLING DEMOLITION AND CONSTRUCTION WASTE

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- C. Procedures: Provide appropriately marked containers or bins for controlling recyclable waste until removed from the Project site. Include list of acceptable and unacceptable materials at each container and bin.

#### 3.3 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, the Contractor shall remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
1. Waste materials shall be disposed of in an approved solid-waste facility or other approved facilities. It shall be the responsibility of the Contractor to make any necessary arrangements with private parties and with County officials pertinent to locations and regulations of area landfills in the vicinity of the project. Any fees or charges required to be paid for disposal of materials shall be paid by the Contractor.

2. If certain materials cannot be disposed of in the area waste disposal facility, the Contractor shall identify a suitable alternative approved waste disposal facility and shall dispose of the material at such facility at no additional cost to the Owner.
  3. Except as otherwise specified, do not allow waste materials that are to be disposed of to accumulate on-site.
  4. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn cleared vegetation or other waste materials.
- C. Disposal: Remove cleared vegetation and demolition, construction, and soil waste materials from Owner's property and legally dispose of them.

END OF SECTION 01 74 19

## SECTION 02 21 13

### LAYOUT OF WORK AND SURVEYING

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Surveys required for work.

##### 1.2 DEFINITIONS (NOT USED)

##### 1.3 SUBMITTALS

- A. Submit in accordance with the Terms and Conditions.
- B. Résumé: A résumé detailing the experience level of the Georgia-licensed land surveyor shall be submitted to Engineer.
- C. Survey Records: The Contractor shall verify and use the control points established and shown on the Drawings. As the work progresses, all subsequent changes to the survey control shall be submitted.
- D. A certificate signed by the land surveyor, stating that the elevations and locations of the Work are in conformance with Contract Documents, shall be submitted at Contract closeout.
- E. After a survey is conducted, submit survey data and field notes to the Engineer in PDF format. Electronic data (drawings in AutoCAD-compatible .DWG format and data in ASCII format) shall also be submitted.

##### 1.4 PROJECT PRIMARY SURVEY CONTROL

- A. Horizontal and vertical primary survey control for the project consists of existing benchmarks shown on the Drawings.
- B. The Contractor shall be responsible for checking the position of the reference points comprising the primary control prior to starting site work and shall notify Engineer of discrepancies found between actual and record measurements.
- C. The existing reference points shall not be disturbed without prior written approval from the Engineer. If existing reference points are disturbed during construction, new reference points shall be installed by the Contractor to control the work. The locations of the new reference points will be approved by the Engineer prior to setting the new reference points.

##### 1.5 SECONDARY CONTROL

- A. From the primary survey control shown on the Drawings, establish secondary control points necessary for the layout and construction of the Work. The secondary control shall consist of sufficient permanent points to establish the lines and grades for the various Work either directly or by offset. Layout lines for use in construction of the Work shall be established by the Contractor and taken directly from either the primary or secondary controls.
- B. The secondary control shall be tied to and closed upon the primary control.

##### 1.6 ACCURACY OF LAND BASED SURVEYS

- A. Points for cross sections shall be located to the nearest 0.05 foot horizontally and vertically.
- B. Vertical elevation surveys shall close within 0.05 foot times the square root of the length of the circuit in miles.
- C. All grade stakes shall be set to 0.02 foot.



- D. Alignment of tangents and curves shall be within 0.01 foot.
- E. Points for structures shall be set to the nearest 0.02 foot, except where operational function of special features requires closer tolerances.
- F. Survey movement monuments shall be surveyed within an accuracy of 0.01 foot vertical and 0.01 foot horizontal.
- G. Tolerances for all other Work shall be as shown or specified in the Contract Documents.
- H. Survey instruments shall be accurate and shall be subject to inspection by Engineer for proper operation.
  - 1. Electronic Distance Measuring (EDM) instruments used by the Contractor on the Site shall be checked for calibration a minimum of once per month on an established base line approved by the Engineer. Calibration results shall be kept in a log book, available for the Engineer's review, showing the date and distances measured on the base line. An EDM shall not be used if it does not meet the minimum advertised accuracy published by the manufacturer of the EDM.
  - 2. Defective instruments shall be promptly replaced, repaired, or adjusted to operate within the tolerances of the instrument manufacturer.
- I. All work not performed with the methods and equipment as submitted by the Contractor and accepted by Engineer shall be removed and replaced by the Contractor at its own expense.

#### 1.7 PROTECTION OF MONUMENTS, STAKES, AND MARKS

- A. The Contractor shall preserve and protect all survey monuments and related marks. When removal is necessary, the Contractor shall accurately reference the monuments or related marks, subject to the approval of the Engineer.
  - 1. All survey stakes, control points, monuments, benchmarks, or reference stakes, including project primary survey control points shown on the drawings, disturbed or destroyed during the work shall be replaced and reset to the satisfaction of the Engineer at the Contractor's expense.
  - 2. Primary or secondary survey control monuments removed shall be reset by the Contractor as soon as the Work requiring the removal is complete. Alternatively, other control points may be set to reestablish the control network.
  - 3. The position of monuments, control points, or other marks that are subject to movement due to the passage of equipment or other forces shall be rechecked at regular intervals, but not less than monthly.

#### 1.8 QUANTITY SURVEYS

- A. Following the completion of all the clearing and grubbing operations in an area, and before commencing stripping, the Contractor shall prepare an earthwork baseline survey consisting of, at a minimum, cross-sections at 25-foot intervals in all areas of disturbance to be used as a basis for payment for excavation and placement of earth fill materials. Excavation and fill quantities shall be calculated by either the average end area method or by using digital terrain models.
- B. Each month, the Contractor will determine the volume of excavation and earthwork accomplished and the amount of payment due for that month. The quantities shall be determined using the same cross-sections established during the earthwork baseline survey.

- C. At the point where the Work performed under each bid item is completed, the Contractor shall perform a final survey using the same cross-sections established during the earthwork baseline survey. This survey shall be used by the Contractor to calculate quantities (as described above) which will be used as the final basis of payment for the completed item.
- D. The difference in calculated quantities between the initial and final cross-sections or digital terrain models for each item will be the basis for the total payment to the Contractor for that item unless otherwise defined in the specifications. The Contractor shall submit a copy of cross-section survey data and quantity calculations to the Engineer for each monthly payment.
- E. The Engineer may perform check surveys in selected locations to verify measurements and quantities. The Contractor shall provide the Owner and Engineer access to the Work areas for survey measurements, as required.

## PART 2 PRODUCTS (NOT USED)

## PART 3 EXECUTION

### 3.1 GENERAL

- A. The Contractor will provide all materials, items, operations, or methods specified, listed, or scheduled in specifications and drawings, including all materials, labor, equipment, and incidentals necessary and required to conduct proper surveys to stake and layout the Work.
- B. The Contractor will perform all surveys for the Work including checking existing survey control reference point locations and elevations; reestablishing construction control, resetting of stakes and monuments, performing measurement for payment of completed work, and performing surveys needed for restoration of public and private improvements that have been damaged, destroyed, or relocated by the Contractor.
- C. The Contractor shall perform all surveys and staking under the direction of a professional land surveyor licensed in the State of Georgia. The surveyor performing the on-site construction staking shall have a minimum of 5 years of construction surveying and stakeout experience.
- D. The cost to the Contractor of all work and delays occasioned by giving lines and grades, or making other necessary surveys and measurements, will be considered as having been included in the unit and lump sum prices for items of Work.

### 3.2 REQUIRED SURVEYS

- A. Quantity surveys for payment including baseline surveys of existing ground and excavation surfaces.
- B. Surveys for project work limits including project boundaries, easements, right of ways, and disturbance limits.
- C. As-constructed surveys of the work, including, but not limited to:
  - 1. Principal spillway impact basin structure
  - 2. Principal spillway intake tower structure
  - 3. Principal spillway riprap outlet protection
  - 4. Pipe conduit inverts
  - 5. Riprap channel protection for downstream lateral channel
  - 6. Riprap Slope Protection along upstream face of dam
  - 7. New piezometers

8. Embankment excavations and final survey grades
  9. Filter drain and toe drain conduits, zones (sand and stone), and cleanouts
  10. Buried conduit pipe bends, junctions, changes in grades
- D. As-constructed surveys shall capture elevations and horizontal coordinates for all major elements of each structure including corner points, inverts, attachment points, joints, edges, recesses, protrusions, changes in materials, etc.
- E. All other surveys required for construction to plan elevations and locations and to provide as-constructed information for record documents.

END OF SECTION 02 21 13

## SECTION 02 41 13

### SELECTIVE DEMOLITION

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Selective demolition of existing features and items designated for removal.
- B. Protection of existing structures and features designated to remain.
- C. Removal and relocation of items.

##### 1.2 DEFINITIONS

- A. Demolish, Demolition, or Remove: Remove and dispose of designated existing equipment, materials, and ancillary features and components.
- B. Protect: Leave designated existing equipment, materials, and ancillary features and components in place and protect from damage.

##### 1.3 SUBMITTALS

- A. Submit in accordance with the Terms and Conditions.
- B. Demolition Plan including:
  - 1. Schedule of demolition, including removals, salvage and replacement in conjunction with the progress schedule.
  - 2. Proposed methods of demolition including removals, salvage, and replacement; and equipment to be used.
  - 3. Copies of authorizations and permits required to perform demolition work.
- C. Permits, Licenses, and Certificates: Copies of permits, licenses, certifications, inspection reports and any other documents if required by Federal, State, and Local agencies.
- D. After demolition is complete, if requested by the Engineer, submit reports describing type of demolition materials, and the locations, quantities, and methods of disposal.

##### 1.4 QUALITY ASSURANCE

- A. General Applicability of Codes, Regulations, and Standards: Except to the extent that more explicit or more stringent requirements are written directly into the contract documents, all applicable codes, regulations, and standards have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the contract documents, or as if published copies are bound herewith.

#### PART 2 PRODUCTS (NOT USED)

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. The extent of demolition work shown on the Drawings is based on site surveys and observations. The specific extent of demolition for the various items will be determined by the Engineer in the field.
- B. Notify the Owner and Engineer a minimum seven (7) days prior to beginning work in this specification Section.
- C. Provide temporary barricades and other protection as required to protect personnel from demolition activities and to protect existing vegetation, facilities, equipment, and fixtures to remain.
- D. Erect and maintain dustproof and weatherproof partitions and closures as required.
- E. Provide required shoring, bracing, and supports.
- F. Equipment and Materials Designated for Salvage:
  - 1. Do not remove and salvage features and materials without approval of the Engineer.
  - 2. Store and maintain salvaged equipment and materials in same condition as when removed.
- G. Contractor and Engineer will document and record the condition of features and materials prior to removal.

### 3.2 DEMOLITION

- A. Remove items to be demolished to the limits noted on the Drawings.
- B. Remove piping, including valves and fittings, where shown on the Drawings.
- C. Remove existing stone masonry training walls along the auxiliary spillway, where shown on the Drawings.
- D. Conduct demolition operations and debris removal in a manner ensuring minimum interference with roads, structures, and other adjacent features and facilities.
- E. Drawings define the extent of demolition. Immediately notify the Engineer of damage to structures and features not identified for demolition or beyond the limits of demolition as shown on the Drawings or as determined by the Engineer.
- F. Damage beyond the limits of demolition will be repaired or replaced using materials and methods appropriate for the particular location, as determined by the Engineer, at the Contractor's sole cost and expense.
- G. Remove materials to conform to new elevations, profiles, and sizes. Comply with specified tolerances and finishes.

- H. Saw cut or otherwise isolate materials to be removed to minimize damage to adjacent surfaces.
- I. Remove concrete and stone masonry in sections that can be maneuvered and controlled by the Contractor's labor forces and equipment without causing damage to the site or endangering on-site staff.
- J. Protect materials and equipment designated for reuse, relocation, or reinstallation.
- K. Protect existing structures and features to remain from damage.
- L. Use water sprinkling, temporary enclosures, and other methods to limit dust. The Contractor shall not allow excessive amounts of dust to blow offsite, particularly toward the adjacent Henderson Park portion of the property.
- M. Saw Cutting:
  - 1. Cut openings in concrete structures with full-depth saw cut edges and core drill corners to prevent over-cutting.
  - 2. Saw cut asphalt pavement at removal ends.
- N. Assume all concrete to be demolished contains steel reinforcement.
  - 1. Where concrete faces leave the ends of reinforcement exposed, protect reinforcement ends from corrosion using one of the following methods as approved by the Engineer:
    - a. Cut back reinforcing steel to a minimum of one inch below concrete face and patch in accordance with Specification Section 03 01 30 "Concrete Repair."
    - b. Coat exposed ends of reinforcement with approved epoxy paint.
  - 2. Repair damaged concrete surfaces as directed by the Engineer at the Contractor's sole cost and expense.
- O. Comply with Specification Section 01 74 19 "Disposal of Waste Materials" for disposal of selectively demolished and removed materials and items.
- P. Blasting is not allowed for demolition or any other construction activity.

END OF SECTION 02 41 13

## SECTION 03 01 30

### CONCRETE REPAIR

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. General provisions for preparing concrete surfaces and furnishing and placing concrete repair materials in damaged areas of concrete when approved by the Engineer.

##### 1.2 SUMMARY

- A. Report all damage to the Engineer promptly upon discovery.
- B. Damage to newly placed concrete and damage to existing concrete caused by construction are the Contractor's responsibility and shall be repaired or replaced as directed by the Engineer at no additional cost to the Owner.
- C. Since repair types in most cases cannot be accurately determined in advance, the Engineer will assess damaged concrete and prescribe the method of repair and materials to be used. The Engineer's written approval is required before starting any concrete repairs.

##### 1.3 REFERENCES

- A. American Concrete Institute (ACI)
  - 1. ACI 546R Concrete Repair Guide
- B. ASTM International (ASTM)
  - 1. ASTM C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field
  - 2. ASTM C33 Standard Specification for Concrete Aggregates
  - 3. ASTM C150 Standard Specification for Portland Cement
  - 4. ASTM C171 Standard Specification for Sheet Materials for Curing Concrete
  - 5. ASTM C309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
  - 6. ASTM C1107 Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)
- C. American Association of State Highway and Transportation Officials (AASHTO)
  - 1. AASHTO M182 Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats
- D. U.S. Army Corps of Engineers (USACE)

1. EM 1110-2-2002 Evaluation and Repair of Concrete Structures, 30 June 1995
- E. U.S. Department of the Interior, Bureau of Reclamation (USBR)
  1. N\A Guide to Concrete Repair, Second Edition, 2015
  2. USBR M-47 Standard Specifications for Repair of Concrete, August 2015 (Part 2, Appendix 1 of “Guide to Concrete Repair”)

#### 1.4 SUBMITTALS

- A. Submit in accordance with the Terms and Conditions.
- B. Product Data:
  1. Indicate product standards, physical and chemical characteristics, technical specifications, limitations, placement instructions, maintenance instructions, and general recommendations regarding repair materials.
  2. Manufacturer’s certificates for products supplied or proposed.
- C. Equipment Data: Submit data for equipment to be used for saw cutting, removing, and cleaning concrete.
- D. Schedule and Plan of Repairs: Submit the proposed schedule and method of repairs. Include a description of the proposed equipment for mixing and applying concrete and other repair materials, the proposed mix design including all admixtures, the procedure for preparing the concrete surface prior to repair, and the method of repair.
- E. Repair Record Documents: Accurately record locations of repairs, modifications, and type of repair. Provide photos of pre- and post-repair conditions.

#### 1.5 QUALITY ASSURANCE AND QUALITY CONTROL

- A. Contractor quality assurance and quality control shall be in accordance with the Terms and Conditions.
- B. Mockups
  1. Provide sample placement of each type of typical patch. The location of the sample shall be as directed by the Engineer.
  2. Prepare sample of each type of patching procedure.
  3. Sample of mockup may remain as part of the Work if satisfactory repair is attained, as directed by the Engineer.
- C. Delivery, Storage, and Handling
  1. Deliver, store, protect, and handle products to prevent damage to the products, and provide safety to the workers.



2. Comply with instructions for storage, shelf-life limitations, and handling as specified by manufacturers.

## PART 2 PRODUCTS

### 2.1 GENERAL

- A. Repair materials shall be as selected by the Engineer for a particular repair and may include some or all the products and materials listed below.

### 2.2 REPAIR MATERIALS

- A. Manufactured Materials: Suitable for the repair and site conditions as determined by the Engineer.
- B. Portland Cement: As specified in Specification Section 03 30 00 "Cast-in-Place Concrete."
- C. Water: As specified in Specification Section 03 30 00 "Cast-in-Place Concrete", for all types of repairs.
- D. Aggregates: Conforming to ASTM C33.
- E. Dry Pack Grout
  1. Two parts Type II cement, ASTM C33 fine aggregate, and clean water, or
  2. Pre-packaged standard ASTM C1107, non-metallic, non-shrink grout.
- F. Crack Repair: Submit proposed materials and instructions for Sikadur or equivalent system designed for concrete crack repair.

### 2.3 ACCESSORY MATERIALS

- A. Curing Materials
  1. Liquid membrane-forming type: ASTM C309, Type 1, Class A or B.
  2. Curing paper, polyethylene film, or polyethylene-coated burlap complying with ASTM C171.
  3. Absorptive burlap cloth made from Jute or Kenaf, approximately 9 ounces per square yard, complying with AASHTO M182, Class 3 or 4.
  4. Tarpaulins: FS K-P-146.

## PART 3 EXECUTION

### 3.1 GENERAL

- A. The Engineer will delineate the type of repair to be used and the extents of repair areas.
- B. Prepare concrete surfaces and apply repair materials in accordance with this Section or manufacturer's instructions, whichever is more stringent as determined by the Engineer.

## 3.2 PREPARATION

### A. Removal

1. Minimum depth of removal and repair is 2 inches.
2. Remove damaged, deteriorated, loosened, or unbonded portions of existing concrete by water blasting, bush hammering, jack hammering, chipping hammer, or other Engineer-approved equipment or methods that avoid or minimize micro-fracturing or other damage to concrete outside the defined area of repair. Remove damaged concrete to a sound concrete surface.
3. Concrete removal processes involving the use of jack hammers in excess of 30 pounds, dry sandblasting, or scabblers shall not be used without approval by the Engineer.
4. Repair micro-fractured surfaces using contained shotblasting, wet sandblasting, or water blasting to remove any micro-fractured surfaces resulting from the initial removal process.

### B. Cleaning

1. Clean repair surface after removal of concrete with pressure washer (3000 psi minimum) to remove loose particles and dirt. Remove any contamination, including oil, solvent, dirt accumulation, or foreign material by additional wet sandblasting and air-water jet cleanup.
2. Unless otherwise recommended by the repair material manufacturer, prepare the surfaces to receive repair materials as a construction joint as directed by the Engineer.
3. After the excavated concrete surface has been prepared and cleaned, keep the surface in a clean condition until the repair has been completed.

C. Saw Cut Edges: Unless otherwise directed by the Engineer, saw cut perimeters of repair areas perpendicular to the concrete surface to a minimum depth of 1-inch. Feather-edge repairs to concrete will not be permitted. Core drill corners to prevent over-cutting.

D. Reinforcing Steel: Remove all loose scale, rust, corrosion byproducts, or concrete from exposed reinforcing steel. Reinforcing steel exposed for more than one-third of its perimeter circumference shall be completely exposed to provide 1-inch minimum clearance between the underside of the reinforcement and the excavated surface. Remove extensively damaged or deteriorated reinforcing steel and replace with adhesive dowels as directed by the Engineer.

## 3.3 PLACING, FINISHING, AND CURING

- A. Place repair materials to the full depth of repair and such that the repaired surface matches the original structure dimensions.
- B. Prepare surfaces to receive repair materials by wetting to a saturated-surface-dry condition and remove standing water.

- C. Finish and cure repair materials in accordance with the manufacturer's instructions and as determined by the Engineer.

3.4 CRACK REPAIR

- A. Place materials in accordance with the manufacturer's written instructions and as directed by the Engineer.

END OF SECTION 03 01 30

## SECTION 03 11 13

### STRUCTURAL CAST-IN-PLACE CONCRETE FORMING

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. General provisions for formwork for cast-in-place concrete with shoring, bracing, and anchorage.
- B. General provisions for form accessories.
- C. General provisions for form stripping.

##### 1.2 REFERENCES

- A. American Concrete Institute (ACI)
  - 1. ACI 117 Specification for Tolerances for Concrete Construction and Materials
  - 2. ACI 301-16 Specification for Structural Concrete
  - 3. ACI 347-14(21) Guide to Formwork for Concrete
  - 4. ACI SP-4 Formwork for Concrete
- B. APA – The Engineered Wood Association
  - 1. PS 1-19 Structural Plywood

##### 1.3 DESIGN REQUIREMENTS

- A. Design, engineer, and construct formwork, shoring, and bracing to conform to design and code requirements; resultant concrete to conform to required shapes, lines, and dimensions.
- B. All formwork is to be designed and stamped by a licensed professional engineer in the State of Georgia

##### 1.4 QUALITY CONTROL

- A. Perform Work in accordance with ACI 301 and the recommendations of ACI 347.
- B. Maintain one copy of each document on site.
- C. Tolerances shall be as necessary to provide completed concrete structure within the tolerances specified in ACI 117.

##### 1.5 REGULATORY REQUIREMENTS

- A. Conform to applicable Local, State, and Federal building code requirements.

## 1.6 SUBMITTALS

- A. Submit in accordance with the Terms and Conditions.
- B. At least 14 calendar days prior to forming, submit forming plans, procedures, support system, and product data for forming concrete structures. The formwork drawings shall be stamped and sealed by a licensed professional engineer in the State of Georgia.
- C. Information on formwork design and construction shall be submitted when specified in other specification sections.

## PART 2 PRODUCTS

### 2.1 FORM MATERIALS

- A. Plywood: Concrete form plywood, exterior grade, mill-oiled and edge-sealed as specified herein and in accordance with APA PS-1. High-density overlaid or provided with an equivalent smooth form liner as the minimum form material for surfaces indicated to receive smooth form finish or any rubbed finish.
- B. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight-fitting, stiffened to support weight of concrete without deflection that is detrimental to structural tolerances and appearance of finished concrete surface.
- C. Lumber: Fir species; No. 2 grade or better; with grade stamp clearly visible.
- D. Steel: Minimum 16-gauge sheet, well-matched, tight-fitting, stiffened to support weight of concrete without deflection that is detrimental to structural tolerances and appearance of finished surfaces.

### 2.2 FORMWORK ACCESSORIES

- A. Form Ties: Removable snap-off type, galvanized metal, fixed-length, cone type, with waterproofing washer, free of defects that could leave holes larger than 1-¼ inch (32 mm) in concrete surface.
- B. Form Release Agent: Colorless, material which will not stain concrete, absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.
- C. Corners: Chamfered, rigid plastic or wood strip, 1 inch by 1 inch size, unless otherwise noted on the Drawings, maximum practical lengths.
- D. Nails, Spikes, Lag Bolts, Through Bolts, and Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.
- E. Joint Filler: Dense, closed-cell, foam rubber approved by the Engineer.

## PART 3 EXECUTION

### 3.1 GENERAL

- A. Construct formwork for cast-in place concrete with necessary shoring, bracing, and anchorage to maintain stability. The formwork shall include the openings for other work, form accessories, and form stripping.

### 3.2 DESIGN

- A. Design, engineering and construction of formwork shall be the responsibility of the Contractor.
- B. Design, support, brace, and maintain formwork to safely support vertical and lateral loads that might be applied until such loads can be supported by the concrete structure. Vertical and lateral loads must be carried to the ground by the formwork system until the in-place concrete has attained adequate strength.
- C. Design formwork in accordance with ACI.
- D. Design formwork for anticipated live loads, dead loads, and repeated and reduced stresses induced by external form vibrators.
- E. Comply with tolerances specified in Section 03 30 00 "Cast-in-Place Concrete."
- F. Design as a complete system with consideration given to the effects of cementitious materials and mixture additives such as fly ash, cement type, plasticizers, accelerators, retarders, air entrainment and others.
- G. Monitor adequacy of formwork design and construction prior to and during concrete placement.
- H. Design formwork to prevent damage to existing structures.

### 3.3 INSPECTION

- A. Verify lines, levels, and centers before proceeding with formwork. Ensure that dimensions agree with Drawings.
- B. Obtain Engineer approval for formwork before concrete placement. Engineer acceptance does not relieve the Contractor of responsibility for design or erection deficiencies.

### 3.4 EARTH FORMS

- A. Hand-trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

### 3.5 ERECTION - FORMWORK

- A. Erect formwork, shoring, and bracing to achieve design requirements in accordance with requirements of ACI 301.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

- D. Align joints and make watertight to prevent leakage of mortar. Keep form joints to a minimum.
- E. Provide chamfer strips on all external corners, unless indicated otherwise.

### 3.6 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply form release agent prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. After form release agent is applied to form, the concrete shall be placed within 14 calendar days. If concrete is not placed within 14 calendar days, the forms shall be removed, and form release agent reapplied.
- D. Do not apply form release agent where concrete surfaces are scheduled to receive special finishes which may be affected by the agent such as crystal forming waterproofing. Soak contact surfaces of untreated forms with clean water. Keep surfaces wet prior to placing concrete.

### 3.7 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in or pass through concrete work.
- B. Locate and set in place items which will be cast directly into concrete. Provide accommodations to prevent floatation of these items during concrete placement and curing.
- C. Coordinate Work of other specification sections in forming and placing openings, sleeves, bolts, anchors, and other inserts.
- D. Install accessories in accordance with manufacturer's instructions, straight, level, and plumb unless indicated otherwise on the Drawings. Secure all embedded items before placing concrete. Ensure that items are not disturbed during concrete placement. Fill voids with readily-removable material to prevent entry of concrete.
- E. Install waterstops continuous without displacing reinforcement. Heat seal joints watertight per manufacturer's instructions.
- F. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- G. Close temporary openings with tight-fitting panels, flush with the inside face of the forms and neatly-fitted so that joints will not be apparent in exposed concrete surfaces.

### 3.8 FORM CLEANING

- A. Clean and remove foreign matter within forms as erection proceeds.
- B. Clean formed cavities of debris prior to placing concrete.

- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
- D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms unless formwork and concrete construction proceed within a heated enclosure. Use compressed air or other means to remove foreign matter.

### 3.9 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 301.

### 3.10 FIELD QUALITY CONTROL

- A. Inspect erected formwork, shoring, and bracing to ensure that Work is in accordance with formwork design and that supports, fastenings, wedges, ties, and items are secure.

### 3.11 FORM REMOVAL

- A. Notify the Engineer at least 48 hours prior to removal of forms.
- B. Do not remove formwork until at least 48 hours after the concrete placement is completed.
- C. Remove forms in a manner which will not damage concrete.
- D. Do not wedge pry bars, hammers or tools against finish concrete surfaces scheduled for exposure to view.
- E. It is the Contractor's responsibility to limit construction loads at all times to those which can be carried safely by the developed strength of the concrete structure at time of loading, and by the formwork and shoring in-place at time of loading.
- F. Store removed forms in a manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

END OF SECTION 03 11 13



## SECTION 03 15 00

### CONCRETE JOINTS AND PVC WATERSTOPS

#### PART 1 GENERAL

##### 1.1 DESCRIPTION OF WORK

- A. The Work includes forming construction and control joints in concrete structures, the tooling or chamfering of exposed edges of concrete, and furnishing and installing PVC materials in joints where shown on the Drawings.

##### 1.2 REFERENCES

- A. American Society of Testing and Materials International (ASTM)
1. ASTM D 638 Standard Test Method for Tensile Properties of Plastic
  2. ASTM D 746 Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact
  3. ASTM D 747 Standard Test Method for Apparent Bending Modulus of Plastics by Means of a Cantilever Beam
  4. ASTM D 1203 Standard Test Methods for Volatile Loss from Plastics Using Activated Carbon Methods
- B. U.S. Army Corps of Engineers (USACOE)
1. EM 1110-2-2102 Water Stops and Other Preformed Joint Materials for Civil Works Structures
  2. COE CRD-C-572 Polyvinylchloride Waterstop
- C. American Concrete Institute (ACI)
1. ACI 224.3R Joints in Concrete Construction.
  2. ACI 318-19(22) Building Code Requirements for Structural Concrete
  3. ACI 350-20 Code Requirements for Environmental Engineering Concrete Structures
- D. International Concrete Repair Institute (ICRI)
1. ICRI 0372 Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays

##### 1.3 SUBMITTALS

- A. Submit layout for joints.

- B. Approval Samples of Waterstops:
  - 1. 2-foot-long sample of each size and type of waterstop to be used in work.
- C. Certifications of Waterstops:
  - 1. Manufacturer's certification for PVC compound used to fabricate PVC waterstop. Include physical property test data on compound from tests performed by manufacturer or other laboratory within 18 months before submittal.
  - 2. Sampling certification that samples are representative of waterstop to be used in work.
- D. Instructions for Waterstops:
  - 1. Manufacturer's recommendations for installing and splicing waterstop.
- E. Waterstop Shop Drawings:
  - 1. Detailed waterstop layout drawings for approval at least 14 calendar days prior to installation of PVC waterstop. Indicate field and shop welded connections and all changes in direction or areas requiring special placement. Provide detail how waterstops will be secured to prevent movement during concrete placement.

#### 1.4 CONTRACTOR QUALITY CONTROL

- A. Perform concrete work in accordance with ACI 318, ACI 350, and ACI 224.
- B. Do not add, relocate, or omit joints without approval of Engineer.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Follow manufacturer's instructions.
- B. Keep waterstop out of direct sunlight and prevent contact with dirt, oil, and water.

#### 1.6 DEFINITIONS (NOTE: THE FOLLOWING LANGUAGE REGARDING CONCRETE JOINTS TAKES PRECEDENCE OVER THE LANGUAGE IN THE REFERENCED ACI DOCUMENT ENTITLED "JOINTS IN CONCRETE CONSTRUCTION.")

- A. Construction Joints (CJ):
  - 1. Construction joints are joints which are purposely placed in concrete to facilitate construction; to reduce initial shrinkage stresses and cracks; to allow time for the installation of embedded metalwork; or to allow for subsequent placing of other concrete.
  - 2. Bond is required at construction joints regardless of whether or not reinforcement is continuous across the joint.
- B. Contraction Joints (CRJ):

1. Contraction joints are joints placed in concrete to provide for volumetric shrinkage of a monolithic unit or movement between monolithic units.
  2. Contraction joints are constructed so no bond exists between concrete surfaces forming the joint
  3. Except as provided for dowels, reinforcement is never continuous across a contraction joint.
- C. Control Joints (CTJ):
1. Control joints are joints placed in concrete to provide for control of initial shrinkage stresses and cracks of monolithic units.
  2. Control joints are constructed the same as contraction joints, with the exception that reinforcement is continuous across control joints.
- D. Expansion Joints (EJ):
1. Expansion joints are joints provided to allow for expansion and contraction between two adjacent concrete members.
  2. Joints are filled with sponge rubber joint filler.

## PART 2 PRODUCTS

### 2.1 PVC WATERSTOPS

- A. Polyvinyl Chloride (PVC) Waterstop:
1. Provide flexible PVC waterstop to the dimensions shown on the Drawings. Provide waterstop as manufactured by Greenstreak, Va. 3400 Tree Court Industrial Boulevard, St. Louis, MO 63122, telephone (800) 352-9504, or equal, in the following styles as applicable:
    - a. Style 705 (6-inch ribbed with centerbulb).
- B. PVC Compound:
1. Domestic virgin PVC with additional resins, plasticizers, stabilizers, or other materials required to meet specified requirements.
  2. Do not use reclaimed PVC or manufacturer's scrap.
- C. Meet physical characteristic requirements specified in Table 1.

Table 1 - PVC Waterstop Physical Characteristics

Property	Test Method	Requirement
Tensile test, minimum	ASTM D 638, speed D, specimen type IV	2,000 lbs/in <sup>2</sup>
Ultimate elongation, minimum	ASTM D 638, speed D, specimen type IV	300 percent
Stiffness in flexure, minimum	ASTM D 747	600 lbs/in <sup>2</sup>
Low temperature brittleness at -35 degrees F	ASTM D 746	No cracking or chipping
Volatile loss, change in weight, maximum	ASTM D 1203, method A, 0.08-inch thick specimen	0.50 percent
Tensile strength after accelerated extraction test, percent of tensile strength before extraction test, minimum	COE CRD-C-572	1,600 lbs/in <sup>2</sup> , 80 percent
Ultimate elongation after accelerated extraction test, minimum	COE CRD-C-572	280 percent
Change in weight after effect of alkalis test	COE CRD-C-572	+0.25 percent -0.10 percent
Change in Shore durometer hardness after effect of alkalis test	COE CRD-C-572	+/- 5

- D. Prepare test specimens in accordance with COE CRD-C-572.
- E. Ties for PVC Waterstop: “Hog Rings” or grommets for each edge at 12-inches maximum spacing.

## 2.2 HYDROPHILIC WATERSTOP

- A. Self-Expanding Rubber Strip Waterstops: Manufactured rectangular or trapezoidal strip, bentonite-free hydrophilic polymer modified chloroprene rubber, for adhesive bonding to concrete or other materials, 3/8 by 3/4 inch.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the followings:
    - a. Adeka Ultra Seal/OCM, Inc.; Adeka Ultra Seal.
    - b. Greenstreak; Hydrotite
    - c. Vinylex Corp.; Swellseal

- B. Adhesive: Cyanacrylate adhesive or other approved adhesive recommended by waterstop manufacturer for application of waterstop to concrete or other substrate as required.

### 2.3 BOND BREAKER FOR JOINTS

- A. Use a curing compound, or other approved bond breaker. The curing compound shall conform to the requirements of Section 03 30 00 "Cast-In-Place Concrete."

## PART 3 EXECUTION

### 3.1 INSTALLING PVC WATERSTOPS

- A. Before starting installation of waterstops, furnish the Engineer with the manufacturer's recommendations for installing and making splices in the waterstops.
- B. Install waterstops at locations shown on the Drawings.
- C. Provide and install all attachment materials, including epoxy, batten bars, and anchors for special waterstops fabricated for attachment to existing structures.
- D. Install waterstops in accordance with these Specifications and manufacturer's written installation instructions and recommendations.
- E. Install waterstops so as to form a continuous watertight diaphragm in the joint unless otherwise shown on the Drawings. Vertical waterstops shall extend to 6-inches below the top of walls or floors, unless otherwise shown or specified.
- F. Provide additional vibration to concrete surrounding waterstops, over and above that used for adjacent concrete placement, to ensure complete embedment of waterstops in the concrete.
- G. Install all waterstops with half of the width of the waterstop embedded in the concrete on each side of the joint, unless otherwise shown or specified.
- H. To eliminate faulty installation that may result in joint leakage, take particular care so that waterstops are correctly positioned and secured during installation.
- I. Take adequate precautions to completely protect waterstops during progress of the Work.
- J. Provide pre-molded waterstop of maximum practicable length to minimize the number of joints.
- K. Use only factory made waterstop fabrications for intersections, changes of direction, and transitions.
- L. Remove curing compound and other foreign material from waterstops in all joints before placing concrete.

### 3.2 SPLICING PVC WATERSTOP

- A. Splice waterstops at joints in waterstop sections and at intersections of waterstops.

- B. Fabricate splices of waterstops with workers who have demonstrated to the satisfaction of the Engineer that they are sufficiently skilled to fabricate the required splices.
- C. Only straight butt splices using heat welding are permitted for field splicing of waterstops unless specifically detailed otherwise. Lapping of waterstop, use of adhesives, or solvents is not allowed.
- D. Reform waterstops at splices with a remolding iron with ribs to match the pattern of the waterstop.
- E. Allow minimum of 10 minutes before new splice is pulled or strained in any way.
- F. After allowing joint to cool, bend completed joints at a sharp angle to test. Cut out and reweld joints that separate under this test.
- G. Finished splices: Provide cross-section dense and free of porosity with tensile strength of not less than 80% of non-spliced materials.

### 3.3 CONCRETE JOINTS

#### A. Construction Joints:

1. Locate construction joints where shown on Drawings or approved by the Engineer in writing. Show proposed locations of construction joints on the placement Drawings submitted under Section 03 30 00 "Cast-In-Place Concrete." Relocation, addition, or elimination of construction joints is subject to approval by the Engineer.
2. Install waterstop in control joints where shown on the Drawings.
3. Locate horizontal joints in walls at the tops of footings or grade slabs. Place haunches at the same time as slabs.
4. Prepare construction joint surfaces for bonding by sandblasting, steel shot blasting, high-pressure water jetting (6,000 psi minimum), or other method approved by the Engineer to thoroughly clean the surface. Remove all laitance, loose or defective concrete, coatings, sand, curing compound, and other foreign material to expose coarse aggregate uniformly, free of laitance, loose aggregate, or damaged concrete. Roughen concrete to produce minimum roughness profile of 1/4 inch. Conduct surface preparation in a manner sufficient to keep from undercutting the edges of the larger particles of aggregate.
5. Thoroughly moisten surfaces of construction joints to be covered with fresh concrete to saturated surface dry condition and remove standing water leaving the surface damp just before concrete placement.
6. The language in these specifications regarding construction joints takes precedence over the language in the referenced American Concrete Institute Document entitled "Joints in Concrete Construction".

#### B. Contraction Joints:

1. Construct contraction joints so that there is no bond between the concrete surfaces forming the joint.
2. Install waterstop in control joints where shown on the Drawings.
3. Construct joints by forming the concrete on one side of the joint and allowing it to set before concrete is placed on the other side of the joint. Coat the surface of the concrete first placed at the contraction joint with curing compound, or other approved bond breaker, before the concrete on the other side of the joint is placed. Protect reinforcement and waterstop from application of curing compound so that reinforcement and waterstop does not become coated with curing compound. The curing compound shall conform to the requirements of Section 03 30 00 "Cast-In-Place Concrete."
4. The language in these specifications regarding contraction joints takes precedence over the language in the referenced American Concrete Institute Document entitled "Joints in Concrete Construction".

C. Control joints:

1. Construct control joints using the same procedures as contraction joints. Coat the surface of the concrete first placed at the contraction joint with curing compound, or other approved bond breaker, before the concrete on the other side of the joint is placed. Protect reinforcement and waterstop from application of curing compound so that reinforcement and waterstop does not become coated with curing compound. The curing compound shall be as specified in Section 03 30 00 "Cast-In-Place Concrete."
2. Waterstop shall be installed in control joints where shown on the Drawings.
3. The language in these specifications regarding control joints takes precedence over the language in the referenced American Concrete Institute Document entitled "Joints in Concrete Construction".

END OF SECTION 03 15 00

## SECTION 03 20 00

### CONCRETE REINFORCING

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. General provisions for reinforcing steel bars, dowels, and related accessories for cast-in-place concrete.

##### 1.2 REFERENCES

- A. ASTM International (ASTM)
  - 1. ASTM A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- B. American Concrete Institute (ACI)
  - 1. ACI 301-16 Specifications for Structural Concrete
  - 2. ACI 315R-18 Guide to Presenting Reinforcing Steel Design Details
  - 3. ACI 318-19(22) Building Code Requirements for Structural Concrete
  - 4. ACI 350-20 Code Requirements for Environmental Engineering Concrete Structures
- C. Concrete Reinforcing Steel Institute (CRSI)
  - 1. Manual of Standard Practice
  - 2. Placing Reinforcing Bars
  - 3. Reinforcing Bar Detailing

##### 1.3 SUBMITTALS

- A. Submit in accordance with the Terms and Conditions.
- B. Reinforcement Placement Drawings: Submit reinforcement placement drawings for approval at least 14 calendar days prior to fabrication. Indicate bar sizes; spacings; locations and quantities of reinforcing steel and wire fabric; bending and cutting schedules; and supporting and spacing devices. Show locations of splices. Conform to Drawing structural notes and the CRSI “Reinforcing Bar Detailing” manual. Locate reinforcing splices at points of minimum stress.
- C. Certified copies of mill test reports of reinforcement material analyses.



## 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store reinforcement of different sizes and shapes in separate piles or racks raised above the ground to avoid rusting.
- B. Protect from contaminants such as grease, oil, and dirt.
- C. Provide identification after bundles are broken and tags removed.

## PART 2 PRODUCTS

### 2.1 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615, 60 ksi yield grade, deformed carbon steel bars.

### 2.2 ACCESSORY MATERIALS

- A. Tie Wire: Minimum 16-gauge annealed type.
- B. Chairs, Bolsters, Bar Supports, and Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions, in accordance with the current ACI detailing manual or CRSI "Manual of Standard Practice". Use of concrete block, rocks, or other items for reinforcement support will not be allowed.

### 2.3 FABRICATION

- A. Fabricate concrete reinforcing in accordance with ACI 315.
- B. Locate reinforcing splices at point of minimum stress. Indicate location of splices on placement drawings.
- C. Welding reinforcing bars is not permitted.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Before placing concrete, clean reinforcement of loose rust, loose mill scale, dirt, grease, and other substances which could impair the bond with concrete. Remove rust by vigorous rubbing with burlap cloth or wire brushing.
- B. Accommodate formed openings while maintaining required clearance.
- C. Place, support, and secure reinforcement against displacement. Do not deviate from required positions as shown on the Drawings or the Contractor's approved reinforcing steel placement drawings.
- D. Place reinforcement in accordance with the Drawings, the Contractor's reinforcing steel placement drawings, and the CRSI "Placing Reinforcing Bars".
- E. See Drawings for structural notes and for reinforcement cover requirements.

- F. Splice reinforcing bars by lapping and securely wiring together. Splices at locations other than those indicated are subject to written approval by the Engineer and shall conform to the requirements of ACI 318. Do not use mechanical splices. Do not weld or tack weld reinforcing bars.
- G. Place and secure embedded metalwork and conduit so as to not interfere with reinforcement installation.
- H. Field bending of reinforcement is not allowed unless approved by the Engineer in writing.

### 3.2 QUALITY CONTROL

- A. Place reinforcement with clear distance of 1-inch, minimum, between reinforcement and anchor bolts, form ties, or other embedded metalwork unless otherwise shown on the Drawings.
- B. Tolerances:
  - 1. Maintain concrete cover over reinforcement within ½-inch of specified cover where specified cover is greater than 2½-inches.
  - 2. Maintain concrete cover over reinforcement within ¼-inch of specified cover where specified cover is 2½-inches or less.
  - 3. Maintain spacing of reinforcing bars within 1 inch of required spacing.

### 3.3 INSPECTION

- A. Perform concrete reinforcement work in accordance with the CRSI “Manual of Standard Practice”.
- B. Notify the Engineer when reinforcing steel is in place and provide at least 48 hours for the Engineer to inspect the reinforcing steel prior to placement of concrete. Concrete placed without inspection and approval by the Engineer may be subject to rejection and removal at no additional cost to the Owner.
- C. The Engineer’s inspection of steel reinforcing prior to concrete placement will not relieve the Contractor from responsibility to conform to the Drawings and Specifications.

END OF SECTION 03 20 00

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. General provisions for cast-in-place structural, backfill concrete, and mud mat concrete at locations shown on the Drawings or directed by the Engineer.

1.2 REFERENCES

A. American Concrete Institute (ACI)

- 1. ACI 117 Specification for Tolerances for Concrete Construction and Materials (ACI 117) and Commentary (ACI 117-10 R2015)
- 2. ACI 301-16 Specifications for Structural Concrete
- 3. ACI 304-00 Guide for Measuring, Mixing, Transporting, and Placing Concrete
- 4. ACI 305.1 Specification for Hot Weather Concreting
- 5. ACI 306.1 Standard Specification for Cold Weather Concreting
- 6. ACI 306.R Guide to Cold Weather Concreting
- 7. ACI 308.1-23 Standard Specification for External Curing of Cast-in-Place Concrete
- 8. ACI 309-05 Guide for Consolidation of Concrete
- 9. ACI 318-19(22) Building Code Requirements for Structural Concrete
- 10. ACI 350-20 Code Requirements for Environmental Engineering Concrete Structures

B. ASTM International (ASTM)

- 1. ASTM C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field
- 2. ASTM C33 Standard Specification for Concrete Aggregates
- 3. ASTM C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

4. ASTM C42 Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
5. ASTM C94 Standard Specification for Ready-Mixed Concrete
6. ASTM C114 Standard Test Methods for Chemical Analysis of Hydraulic Cement
7. ASTM C138 Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
8. ASTM C143 Standard Test Method for Slump of Hydraulic-Cement Concrete
9. ASTM C150 Standard Specification for Portland Cement
10. ASTM C171 Standard Specification for Sheet Materials for Curing Concrete
11. ASTM C172 Standard Practice for Sampling Freshly Mixed Concrete
12. ASTM C231 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
13. ASTM C260 Standard Specification for Air-Entraining Admixtures for Concrete
14. ASTM C309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
15. ASTM C441 Standard Test Method for Effectiveness of Pozzolans or Ground Blast-Furnace Slag in Preventing Excessive Expansion of Concrete Due to the Alkali-Silica Reaction
16. ASTM C494 Standard Specification for Chemical Admixtures for Concrete
17. ASTM C618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
18. ASTM C1017 Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
19. ASTM C1064 Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
20. ASTM C1260 Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)

21. ASTM C1567 Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
  22. ASTM C1602 Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
  23. ASTM D1751 Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non extruding and Resilient Bituminous Types)
  24. ASTM D1752 Standard Specification for Preformed Sponge Rubber, Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction
- C. American Association of State Highway and Transportation Officials (AASHTO)
1. AASHTO M182 Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats

### 1.3 DEFINITIONS

- A. Curing: Maintaining a satisfactory moisture content and temperature in concrete during its early stages so that the desired properties may develop.
- B. Hot Weather: When air temperature has risen to or is expected to rise above, 85°F during the protection period.
- C. Cold Weather: When air temperature is fallen to or is expected to fall below 40°F during the protection period.
- D. Defective Concrete: Surface defects that include honeycomb, rock pockets, indentations, cracks 0.15-inch wide and larger, and cracks that leak in water-holding structures, spalls, chips, embedded debris, lift lines, sand lines, bleed lines, leakage from form joints, fins, and other projections, form pop outs, texture irregularities, and stains that cannot be removed by cleaning and concrete not conforming to required lines, levels, details, elevations, dimensions, tolerances or specified requirements.

### 1.4 SUBMITTALS

- A. Submit in accordance with the Terms and Conditions.
- B. Material Approval Data
  1. Mix Design: For each concrete mix design, submit proposed mix designs in accordance with ACI 301 for review and approval.
  2. Submit the name and manufacturer of each cementitious material, aggregate source, and admixture.

- a. The Engineer reserves the right to require submission of manufacturer's test data and certification of compliance with specifications.
  - b. The Engineer reserves the right to require submission of samples of concrete materials for testing before or during use in concrete construction.
3. Cementitious materials certifications and test reports:
- a. Submit the manufacturer's certification and test reports for each lot from which shipments are drawn.
    - 1) Certify materials were tested during production or transfer in accordance with specified reference specification.
    - 2) Submittal of certification and test reports shall not relieve Contractor of responsibility for furnishing materials meeting specified requirement.

C. Concrete Placement Drawings:

- 1. Submit drawings for each individual concrete placement. An individual concrete placement is defined as a portion of concrete Work placed in one continuous operation between specified lines or joints.
  - a. Show locations, dimensions, blockouts, openings, recesses, waterstops, and finishes. Identify construction joints, control joints, contraction joints and expansion joints.
  - b. Show details of items embedded in or associated with placement except reinforcing steel.
  - c. Include a separate drawing showing placement sequence.
  - d. Place a title block with Contractor's name, contract title and number, placement identification, and identifying drawing number in lower right hand corner of each drawing.
  - e. List reference drawings from which details shown on placement drawing were obtained on each drawing.
  - f. Reference related steel reinforcement drawings associated with placement on each drawing.

D. Submit Contractor's Concrete Placement Schedule including:

- 1. Complete, detailed concrete placement schedule showing the Contractor's plan for placement of individual features, units, and other elements of concrete work.
- 2. Detail as necessary to show location, sequence, and date of concrete placements scheduled for each item of concrete work.
- 3. Detail drawings and placement of reinforcement and embedded items.

- E. Cold Weather Placement Plans: The Contractor shall be required to provide cold weather protection of concrete for this project, if concrete placement is proposed during cold weather, as defined in this specification and by ACI 306.1. Submit specific proposed plans to cure concrete during cold weather, including work sequence, protective measures, and monitoring methods/reporting.
- F. Concrete Curing Plan: The Contractor shall provide cold weather protection for this project if concrete is anticipated to be placed during winter months. Submit specific proposed plans to cure concrete during cold weather, including work sequence, protective measures, and monitoring methods, and documentation of monitoring.
- G. Hot Weather Placement Plans: The Contractor shall provide specific proposed plans detailing proposed plans to place concrete during hot weather, including work sequence, protective measures, and monitoring methods/reporting. Plans that do not contain sufficient detail indicating specifically how concrete will be protected against temperate extremes and damage will be rejected.
- H. Submit all batch tickets.
- I. Submit all test results.

## 1.5 QUALITY ASSURANCE AND QUALITY CONTROL

- A. Include provisions for hot and cold weather concrete (if conditions warrant).
- B. Perform Work in accordance with provisions of all applicable ACI standards.
- C. Obtain materials from same source throughout the Work.
- D. Project Record Documents: Accurately record as-built concrete dimensions, and tolerances and locations of embedded utilities and components on placement drawings.
- E. Sequencing and Scheduling
  - 1. Notify the Engineer at least 48 hours prior to commencing concrete Work.
  - 2. Allow the Engineer to perform an immediate inspection of concrete surfaces upon removal of forms.
  - 3. Notify the Engineer upon discovery of any honeycombing, foreign-embedded items, and defective concrete.

## PART 2 PRODUCTS

### 2.1 CONCRETE MATERIALS

- A. Cement: ASTM C150 Portland Cement, Type II:
  - 1. Meet equivalent alkalis requirements of ASTM C150 – Table 2.
  - 2. Meet false-set requirement of ASTM C150 – Table 4.

- B. Pozzolan: ASTM C618, Class F, Except:
1. Sulfur trioxide, maximum: 4.0 percent.
  2. Loss on ignition, maximum: 2.5 percent.
  3. Test for effectiveness in controlling alkali-silica reaction under optional physical requirements in Table 2 of ASTM C618. Use low-alkali cement for test.
  4. Does not decrease sulfate resistance of concrete by use of pozzolan.
  5. Demonstrate pozzolan will have an “R” factor less than 2.5.
    - a.  $R = (C-5)/F$
    - b. C: Calcium oxide content of pozzolan in percent determined in accordance with ASTM C114.
    - c. F: Ferric oxide content of pozzolan in percent determined in accordance with ASTM C114.
  6. Pozzolan when tested in accordance with ASTM C441 shall conform to the following: 65 percent minimum reduction in mortar expansion at 14 days, and 0.02 percent maximum mortar expansion at 14 days. Expansion shall be less than control sample expansion.
  7. Pozzolan content shall be 20 percent plus or minus 5 percent by weight of the total cementitious materials.
  8. Pozzolan and cement shall be stored and batched separately.
- C. Aggregates:
1. Fine aggregate: ASTM C33.
  2. Coarse aggregate ASTM C33, Size No. 57 or 67.
  3. Fine and coarse aggregate shall not be of a carbonate-based rock. Coarse and fine aggregates shall not contain any materials that are deleteriously reactive with the alkalis in the cement in an amount sufficient to cause excessive expansion of mortar or concrete, in accordance with ASTM C1260 and ASTM C1567. The amount of coal and lignite in the fine aggregate shall be less than 0.5 percent.
- D. Water: Water for concrete shall be clean and free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances that may be deleterious to concrete or reinforcement in accordance with ASTM C1602, including optional requirements of Table 2.



## 2.2 ADMIXTURES

- A. Air Entraining Admixture:
  - 1. Comply with ASTM C260.
  - 2. Use a neutralized vinsol resin formulation for air-entraining admixture used with ASTM C494, Type F or G; and ASTM C1017, Type I or II chemical admixtures.
- B. Other Admixtures: Use only when approved and at no additional cost to the Owner. Conform to ASTM C494:
  - 1. Accelerators: Approval does not relax cold-weather placement requirements. Calcium chloride is prohibited.
  - 2. Set-retarders or stabilizers: Approval does not relax hot-weather placement requirements.
  - 3. Water reducers: Type A, D, E, F or G, to achieve workability without exceeding specified water/cement ratio and slump.
  - 4. Mineral admixtures to be used or furnished under this Specification shall be certified to comply with this Specification by the supplier. Certification shall include test results on Specifications, source, and location.

## 2.3 CURING MATERIALS

- A. Water: ASTM C1602, including optional requirements of Table 2.
- B. Curing Compound: ASTM C309.
- C. Polyethylene Film: ASTM C171.

## 2.4 STRUCTURAL CONCRETE MIX

- A. Mix and deliver concrete in accordance with ASTM C94.
- B. Select proportions for normal weight concrete in accordance with ACI 301 and ACI 350.
- C. Provide concrete to the following criteria at point of placement. Concrete mix shall meet all specified requirements. Failure to meet any one specified requirement shall be sufficient cause for rejection.
- D. Provide concrete to the following criteria:
  - 1. Compressive Strength (28 days): minimum 5,000 psi
  - 2. Slump: In accordance with ASTM C143 - 3 inches  $\pm$ 1 inch at placement. For concrete with ASTM C1017, Type I or II chemical admixtures, use slump appropriate for placing conditions, with a maximum slump of 8 inches.

3. Entrained Air: 4.5% to 7.5% at point of placement in accordance with ASTM C231.
  4. Maximum water/cementitious material ratio shall be as noted on the Drawings for the specific concrete mix
  5. Concrete temperature at placing: 50 to 85 degrees F.
- E. Use accelerating admixtures in cold weather only when approved by the Engineer. Use of admixtures will not relax cold weather placement requirements.
  - F. Use of calcium chloride is not permitted.
  - G. Use set-retarding admixtures during hot weather only when approved by the Engineer.
  - H. Use set-controlling admixtures to increase allowable concrete delivery and placement restrictions in accordance with applicable provisions of this Section only when approved by the Engineer.
  - I. Add other approved admixtures (water reducer/superplasticizer, etc.) in accordance with the manufacturer's recommendations.
  - J. If a superplasticizer is used, the admixture shall be added to the concrete trucks at the site and the following requirements shall be followed:
    1. The manufacturer's recommendations for dosage, mixing, and use.
    2. A calibrated field dispenser shall be used. Records of dosage for each concrete truck shall be recorded by the Contractor and provided to the Engineer.
    3. Each truck shall be mixed after dosing with the minimum number of drum rotations in accordance with the requirements of ACI 304 and the admixture manufacturer.
    4. Field concrete tests (air content, temperature, and slump) shall be performed on each truck before and after adding the admixture.
  - K. Concrete mix shall meet all specified requirements. Failure to meeting any one specified requirement shall be sufficient cause for rejection.

## 2.5 BACKFILL CONCRETE AND MUD MAT CONCRETE

- A. Unreinforced concrete complying with the requirements of Concrete Mix in paragraph 2.4 in this Section with the following exceptions:
  1. Compressive Strength (28 days): 3000 psi
  2. Entrained Air: 0 to 10 %.
  3. Maximum water/cementitious material ratio: 0.50.
- B. Mud mat is used for leveling foundations. Backfill concrete is used to backfill structures in tight, restricted areas. Install a mud mat only after receiving approval from the Engineer.

## 2.6 CONCRETE CONSOLIDATION EQUIPMENT

- A. Consolidation equipment shall be flexible, electric, or pneumatic-drive immersion-type vibrators with an operating speed of 7000 rpm when immersed in concrete.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that joint locations conform to the approved placement drawings.
- B. Verify requirements for concrete cover over reinforcement are met.
- C. Verify that anchors, seats, plates, reinforcement, embeds, openings, water stops, and/or other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.
- D. Verify appropriate mix design for designated placement.
- E. Engineer inspection and approval of foundations is required prior to any concrete being placed. Verify with the Engineer that all surfaces on which concrete is to be placed has been inspected and is adequate for concrete placement.
- F. Do not place concrete without approval from the Engineer. Use Concrete Placement Form attached to this Section.

### 3.2 PREPARATION

- A. Remove standing water, ice, frost, mud, and debris from foundation, forms, and reinforcement surfaces to be covered by concrete.
- B. Prepare soil foundations to be free from frost or ice.
- C. Thoroughly moisten surfaces of absorptive foundations to be covered with concrete so that moisture will not be drawn from fresh concrete.
- D. Remove hardened concrete, wood chips, and other debris from the interior of forms.
- E. Place form release agent or wet forms just prior to placing concrete. Form release agent or any other deleterious material is not acceptable on concrete surfaces.

### 3.3 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304, ACI 309 and ACI 318.
- B. Notify the Engineer a minimum of 48 hours prior to commencement of concrete placement operations. The Engineer shall inspect all surfaces on which concrete is to be placed.

- C. No concrete shall be placed until all formwork, installation of items to be embedded, and preparation of surfaces involved in the placement have been approved by the Engineer. Formwork and foundation surfaces on which cast-in-place concrete is placed shall be moistened and kept moist until overlying concrete is placed except where form release agent is used.
- D. Place concrete in as nearly a continuous operation as practical and in a manner to produce a concrete mass with sufficient continuity and continuance so that it shall harden and act as a monolithic mass with no discontinuous joints or potential places of separation or weakness.
- E. Deposit concrete as close as practicable to its final position. Concrete shall be placed by methods that do not cause segregation. Do not drop concrete more than 3 feet.
- F. Concrete shall be placed in near-horizontal layers; the depth of each layer shall not exceed 20 inches. Place mixture on prepared foundation or previously completed concrete materials with spreading equipment that prevents segregation and that produces layers of widths and thicknesses as necessary for compaction to the required dimensions. Place each successive layer as soon as practicable after the preceding layer is completed.
- G. Consolidate concrete in accordance with ACI 309. Do not place vibrator against reinforcement or forms or use vibrator to transport concrete within forms. Have one extra vibrator and one extra generator on site at all times during placement of concrete to be used in the event of breakdown of primary equipment. Operate vibrator to penetrate rapidly to the bottom of the layer and at least 6 inches into the preceding layer. Manipulate in an up-and-down motion, generally for 5 to 15 seconds, to knit the two layers together.
- H. Provide sufficient concrete placing capacity and equipment to deliver and place concrete without undue delay; do not permit cold joints to occur. Discharge concrete into forms within 90 minutes following the first introduction of water and cement or cement and aggregates, whichever occurs first. If the air temperature is 85° F or higher, the time limit specified above shall be reduced to 60 minutes unless the Engineer's approval has been obtained for means to maintain acceptable concrete quality without such time reduction.
- I. Ensure reinforcement, inserts, embedded parts, and waterstops are not disturbed during concrete placement or consolidation.
- J. Cast-in-place concrete shall not be placed during heavy rain (more than 0.3 inch per hour or 0.03 inch in 6 minutes as defined by the Weather Bureau Glossary of Meteorology). If unusual adverse weather such as heavy rain, severe cold, heavy snow, high wind, or other adverse weather occurs, or is forecast to occur during placement, an interruption in placing operations may be approved or directed. All placed concrete materials shall be fully consolidated before stopping Work. Allow for construction schedule risk and added expense that could occur as a result of adverse weather. Weather delays shall receive no additional compensation.
- K. Do not use concrete which has been subjected to more than 250 total revolutions of any combination of mixing and agitating equipment following the first introduction of aggregates to the mixer.
- L. Do not retemper concrete.

- M. Maintain records of placed concrete items. Record truck number, date, start and stop times, location of placed concrete, quantity, air temperature, concrete placement temperature, slump, air content, admixture quantities, test samples collected and times, and cast test cylinder numbers.
- N. Contractor may place concrete by pumping, at Contractor's option. Appropriate mix design provisions must be included in Contractor's approved concrete submittal before any concrete is placed by pumping methods.
- O. Wait at least 5 days between adjacent placements of sections of structures with joints, including walls and slabs and before placing structural concrete over backfill concrete, unless otherwise approved by the Engineer.

### 3.4 CONCRETE FINISHING

- A. Finish concrete surfaces on the project as follows.
- B. Formed Surfaces: Follow provisions of ACI 301 Surface Finish-3.0. Fill cracks by epoxy injection for submerged structures.
- C. Unformed Surfaces:
  - 1. Exposed: Follow provisions of ACI 301 Trowel Finish using a steel trowel, and the following:
    - a. Finish by screeding and floating with straightedges to bring surfaces to required finish elevation.
    - b. While concrete is still green but sufficiently hardened to bear a person's weight without deep imprint, wood float to true, even plane without visible coarse aggregate.
    - c. Use sufficient pressure on wood floats to bring moisture to surface.
    - d. After surface moisture has disappeared, hand trowel concrete to produce smooth, impervious surface, free from trowel marks.
    - e. Burnish surface with an additional troweling.
    - f. Final troweling to produce ringing sound from trowel.
    - g. Do not use dry cement or additional water during troweling, nor excessively trowel.
  - 2. Unexposed (Buried): Follow provisions of ACI 301 Float Finish, and the following:
    - a. Finish slabs by screeding with straightedges to bring surface to required finish plane.
    - b. Wood float finish to compact and seal surface.

- c. Remove laitance and leave surface clean.
  - d. Coordinate with other finish procedures.
- D. Broomed Finish: Provide where determined by the Engineer.
  - 1. First provide a monolithic finish as specified above, except immediately after steel troweling, then brush surface with a stiff bristle brush.
  - 2. Brush in parallel strokes at right angles to the forms.
- E. Exposed Edges:
  - 1. Chamfer edges of permanently exposed concrete, except slabs and top edges of walls, with a 45 degree bevel 1 inch by 1 inch unless otherwise shown on the Drawings.
  - 2. Tool exposed edges of slabs and top edges of walls to a radius of ¼ inch unless shown otherwise on the Drawings.
- F. Tolerances for Concrete Construction: Tolerances are defined as allowable variations from specified lines and grades, and dimensions and as the allowable magnitude of the surface irregularities. Allowable variations from specified lines, grades, and dimension shall be in accordance with ACI 117 and ACI 301.

### 3.5 CURING AND PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. If a clear membrane curing compound is planned to be used, submit proposed product information to Engineer for approval.
- C. Cure and protect concrete for a minimum of 7 days as described in ACI 308.1.
- D. Maintain concrete with minimal moisture loss at acceptable curing temperatures for the period necessary for proper hydration of cement and hardening of concrete. Maintain concrete at a minimum temperature of 50° F without excessive heating or excessive moisture loss for a minimum of 7 days. Provide and remove protection to control rate of temperature change per day (as required to prevent temperature cracking).

### 3.6 FIELD QUALITY CONTROL

- A. Collect and complete the batch ticket (delivery ticket) at the placement site with each load of concrete and deliver all batch tickets to the Engineer on a daily basis. Concrete delivered without a batch ticket containing complete information as specified shall be rejected. Provide Engineer access to the batch tickets at any time during the placement. Each batch ticket shall include at a minimum the following information:
  - 1. Supplier's name and date
  - 2. Truck number

3. Project number and location
  4. Concrete class designation and item number
  5. Cubic yards batched
  6. Time batched
  7. Mix design number
  8. Type, brand, and amount of each admixture
  9. Type, brand, and amount of cement and pozzolan
  10. Mass (weights) of fine and coarse aggregates
  11. Moisture content of fine and coarse aggregate
  12. Gallons of batch water (including ice)
- B. Add the following information to the batch ticket at the placement site:
1. Gallons of water added by truck operator plus quantity of concrete in the truck each time water is added
  2. Admixture additions to loads at the site including type, brand, and amount
  3. Number of revolutions of drum at mixing speed (for truck mixed concrete)
  4. Discharge time
  5. Location of batch in placement
  6. Water-cement ratio
- C. The Contractor will be allowed to add water to the batched concrete once at the site, based upon concrete supplier approval and direction, and provided that the specified water to cement ratio is not exceeded and the amount of water withheld at the batch plant or amount of water allowed for addition is on the delivery ticket.
- D. Maintain records of placed concrete items. Record truck number, date, start and stop times, location of placed concrete, quantity, air temperature, concrete placement temperature, slump, air content, admixture quantities, test samples collected and times, and cast test cylinder numbers.
- E. Perform Work in accordance with ACI 301.
- F. Acquire cement from same source for all Work.
- G. Acquire fly ash from same source for all Work.
- H. Acquire aggregate from same source for all Work.

- I. Conform to ACI 305.1 when concreting during hot weather.
- J. Conform to ACI 306.1 and 306R when concreting during cold weather.
- K. Do not place concrete directly on soil, bedrock, or existing horizontal concrete surface without approval by the Engineer that the foundation has been prepared acceptably for concrete placement.
- L. Quality Control Reporting
  - 1. Record quality test results on the form at the end of this Section and submit to the Engineer.
  - 2. Provide test results to the Engineer within 24 hours for field testing, and within 48 hours of laboratory testing to the Engineer.

### 3.7 CONCRETE MIX TESTING

- A. Conduct quality control inspection and testing in accordance with the Standards specified in this Section using qualified personnel and an independent third-party testing agency certified to perform the tests described in this section.
- B. Provide access and samples for the Engineer's independent quality assurance testing if requested.
- C. Sampling Fresh Concrete
  - 1. Test Method: ASTM C172.
- D. Concrete Cylinders
  - 1. Test Method: ASTM C31 and ASTM C39.
  - 2. Frequency: One set of at least 6 concrete test cylinders (6 inch by 12 inch) for each 50 or less cubic yards of concrete, at least once each day of concrete placement for each mix if different mixes are placed in the same day. The specified set of 6 cylinders does not include cylinders required for cold weather, or any additional cylinders for early breaks or other purposes. Contractor may collect additional cylinders if desired.
  - 3. Unless otherwise approved, test each set of 6 cylinders for compressive strength as follows:
    - a. 2 cylinders at 7 days.
    - b. 2 cylinders at 28 days.
    - c. 2 hold cylinders, to be retained for possible testing in the event the 28-day tests fall below the required strength.



4. Collect at least two additional test cylinders during cold weather concreting to be cured on site maintained in the same conditions as the concrete it represents up to the time it is tested.
- E. Slump
1. Test Method: ASTM C143.
  2. Frequency: One per cylinder set, and at least one per truck for each mix.
  3. Perform additional tests when concrete consistency appears to change.
- F. Air Content, Unit Weight, and Yield
1. Test Method: ASTM C231 and C138.
  2. Frequency: One per cylinder set, and at least one per truck for each mix.
- G. Temperature
1. Test Method: ASTM C1064.
  2. Frequency: One per cylinder set, and at least one test hourly and one test per truck when air temperature is 50 deg F and below and when 80 degrees F and above.
- H. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42 or by other methods as directed by Engineer. Additional tests shall be paid for by the Contractor at no additional expense to the Owner. Concrete in the area represented by a core test will be considered adequate if the average strength of the cores is equal to at least 90% of the specified strength  $f'_c$  and not a single core is less than 85% of the specified strength  $f'_c$ .

### 3.8 PATCHING

- A. Allow the Engineer to inspect concrete surfaces immediately upon removal of forms.
- B. Honeycombing or embedded debris in concrete is not acceptable. Notify the Engineer upon discovery, and repair as determined by the Engineer.
- C. Patch imperfections as directed by the Engineer.

### 3.9 DEFECTIVE CONCRETE

- A. Where concrete is considered deficient, the Engineer may require additional testing to be made at no additional expense to the Owner. If additional tests do not indicate concrete meets the requirements, Contractor may be required to remove and replace deficient concrete as directed by Engineer.

- B. Additional Tests: The Contractor's independent test firm shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by the Engineer. Testing to determine adequacy of concrete may include cored cylinders in accordance with ASTM C42 or by other methods as directed by the Engineer. Conduct additional tests at no additional expense to the Owner.
- C. Nondestructive Testing: Impact hammer, sonoscope, or other non-destructive device may be permitted by the Engineer but will not be used as sole basis for approval or rejection of concrete.
- D. Repair hardened concrete that is not within specified tolerances to bring it within tolerance. Such repair shall be accomplished in a manner approved by the Engineer. Concrete repair to bring concrete within tolerances shall be done only after consultation with the Engineer regarding the repair method. The Engineer shall be notified as to the time when repair shall be performed.
- E. Repair concrete that is exposed to public view in a manner that shall result in a concrete surface with a uniform appearance. Limit grinding depth on concrete surfaces exposed to view such that no aggregate particles are exposed more than 1/6 inch in cross section at the finished surface. Where grinding has caused or shall cause exposure of aggregate particles greater than 1/6 inch in cross section at the finished surface, concrete shall be repaired by removing and replacing a portion of the concrete per Section 03 01 30 "Concrete Repair" at no additional cost to the Owner.
- F. When concrete placements result in hardened concrete that does not meet specified tolerances, the Contractor shall, upon request, submit to the Engineer an outline of all preventative actions, such as modifications to forms, modified procedure for setting screeds, and different finishing techniques, to be implemented by the Contractor to avoid repeated failures. The Engineer reserves the right to delay concrete placements until the Contractor implements such preventative actions that are approved by the Engineer.

### 3.10 PROTECTION

- A. Protect finished Work under provisions of ACI 301 and as specified herein.
- B. Remove formwork in accordance with the requirements in Specification Section 03 11 13 "Structural Cast-in-Place Concrete Forming."

# CONCRETE PLACEMENT FORM

PROJECT _____	DATE _____				
LOCATION _____	DAY _____	SUN	MON	TUE	WED
FEATURE _____	DAY _____	THU	FRI	SAT	
STATION _____	WEATHER	Clear	P. Cloudy	Cloudy	Fog
CONTRACTOR _____	TEMP.	0-32° F	32-50° F	50-75° F	75-100° F
Pumper Used (Yes/No) _____	WIND	Calm	Breeze	Moderate	High
	WIND DIR.	North	South	East	West
	PRECIP.	Rain	Snow	Light	Moderate

CHECKOUT INFORMATION				
CHECKOUT ITEM	CONTRACTOR	RPR/ENGINEER	Date	Time
Subgrade Preparation				
Dewatering				
Form Lines, Grades and Dimensions				
Formwork Ties and Bracing				
Reinforcing Steel				
Chamfer				
Embedded Items				
Drain Piping				
Blockouts				
Waterstops				
Placement Equipment				
Concrete Protection				
Drains Voided				
Other (List)				
Note: Initial each item that is applicable; put N/A if an item does not apply. All of the shall be inspected and approved before ordering concrete				
Inspected and Approved		_____		
		Contractor Representative and Date		
No Exceptions		_____		
		Resident Project Representative or Engineer and Date		

CONCRETE MIX AND VOLUME								
MIX	CONCRETE MIX DESIGNATION	VOLUME ORDERED (CY)	VOLUME WASTED (CY)	VOLUME SPILLED (CY)	OUT OF SPEC (CY)	OVER ORDER (CY)	VOLUME WASTED (CY)	TOTAL VOLUME PLACED (CY)
Mix 1								
Mix 2								
Mix 3								

CONCRETE TESTING INFORMATION									
TRUCK #	VOLUME (CY)	TRUCK ARRIVE TIME	PLACE START TIME	PLACE END TIME	WATER ADDED (gallons)	TEMP (°F/°C)	SLUMP (inches)	AIR CONTENT (%)	COMMENTS

END OF SECTION 03 30 00

SECTION 05 50 00

METAL FABRICATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. General provisions for metal fabrications as shown on the Drawings and as specified herein including intake structure debris screens and trash racks, metal bar grating, guardrails, animal guards, and other miscellaneous metals.

1.2 REFERENCES

- A. While each is not specifically called out in this section, these references are considered applicable to the work covered by this section.
- B. American Institute of Steel Construction (AISC)
  - 1. Code of Standard Practice for Steel Buildings and Bridges
- C. ASTM International (ASTM)
  - 1. ASTM A36 Standard Specification for Carbon Structural Steel
  - 2. ASTM A53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
  - 3. ASTM A123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
  - 4. ASTM A500 Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
  - 5. ASTM A501 Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
  - 6. ASTM F436 Standard Specification for Hardened Steel Washers
  - 7. ASTM F563 Standard Specification for Carbons and Alloy Steel Nuts
  - 8. ASTM F593 Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
  - 9. ASTM F594 Standard Specification for Stainless Steel Nuts
- D. American National Standards Institute (ANSI)
  - 1. ANSI Z49.1 Safety in Welding, Cutting, and Allied Processes
- E. American Welding Society (AWS)

1. AWS B2.1 Specification for Welding Procedure and Performance Qualification (2021)
2. AWS D1.1 Structural Welding Code - Steel
3. AWS D1.2 Structural Welding Code - Aluminum

### 1.3 SUBMITTALS

- A. Submit in accordance with the Terms and Conditions.
- B. Submit Shop Drawings and product data for all fabricated or manufactured items.
  1. Indicate materials, profiles, sizes, connection attachments, reinforcing, anchorage, hardware, size, and type of fasteners and accessories.
  2. Include assembly drawings, sections, elevations, and details where applicable.
  3. Indicate welded connections using standard AWS welding symbols; indicate net weld lengths and proposed field welds.
  4. Submit proposed location of all field welds. Approval required from Engineer for all field welds.
- C. Submit welder certifications of qualification showing date of qualification; qualification grade and rating; and notarized signature of inspector.
- D. Before delivery of materials, provide:
  1. Certified laboratory test reports of materials.
  2. Manufacturer's installation instructions for manufactured items.
  3. Anchors: Manufacturer's data sheets, handling and installation instructions; and International Code Council Evaluation Service (ICC-ES) reports.

### 1.4 QUALITY ASSURANCE

- A. Qualifications for welding work:
  1. Performed by welders and welding procedures certified to requirements of AWS D1.1 or D1.2 as applicable.
  2. When welder or welding procedures certification tests are required, testing shall be performed by independent testing agency accepted by Engineer.
- B. Field measurements: Take field measurements prior to fabrication to ensure proper fitting of the work. Allow for trimming and fitting wherever the taking of field measurements before fabrication might delay the work.

### 1.5 JOB CONDITIONS, STORAGE AND HANDLING

- A. Store materials in a dry area off the ground and floor. Do not leave materials exposed to the weather.

## PART 2 PRODUCTS

### 2.1 GENERAL

- A. Verify critical dimensions at the jobsite before product fabrication begins. Field fabrication will not be permitted.

### 2.2 MATERIALS

- A. Carbon Steel:

1. Pipe or Pipe Sleeves: ASTM A53, Schedule 80, black or galvanized.
2. Plates, Shapes and Bars: Carbon steel, ASTM A36.
3. Tubing: ASTM A500, Grade B; ASTM A501, Grade B.

### 2.3 FASTENERS, ANCHORS, AND STUDS

- A. Carbon Steel Fasteners

1. High Strength Bolts for Steel Members: ASTM A325
2. Steel Washers: ASTM F436

- B. Adhesive Anchors:

1. Epoxy adhesive shall be Hilti HIT-RE 500 or approved equivalent

- C. Stainless Steel Screw Anchors

- a. Anchors: Stainless steel AISI Type 316.
- b. Nuts and Washers: ASTM F593/594.
- c. Manufacturer and Product: Hilti, Inc., Tulsa, OK; Screw Anchor System (KH-EZ SS316) or approved equal.
- d. Diameter as shown on the Drawings unless otherwise specified.
- e. Length as required to provide minimum depth of embedment shown.
- f. Clean and free of grease, oil, or other deleterious material.

- D. Anti-seizing Lubricant: Use on all stainless steel threads. Containing substantial amounts of molybdenum disulfide, graphite, mica, talc, or copper. Loc Tite Co., Permatex or approved equal.

### 2.4 FABRICATION

- A. Fabricate items with joints tightly fitted and secured.

- B. Fit and shop assemble in largest practical sections for delivery to site and ready to be set in-place.
- C. Remove burrs from all exposed cut edges, remove spatter, and grind exposed welds to match adjacent surface.
- D. Hot-dip galvanize the completed piece per ASTM A123. Ship and handle in manner to avoid damage to zinc coating.
- E. Supply all components required for anchoring metal fabrications. Fabricate anchorage and related components of same material and finish as metal fabrication, except where specifically noted otherwise.

## PART 3 EXECUTION

### 3.1 GENERAL PREPARATION

- A. Upon receipt of assembly at job site, inspect all materials for shipping damage. Replace damaged items at no additional cost to Owner.
- B. Examine surfaces for defects which would impair installation.
- C. Obtain Engineer's approval before site cutting, field welding, or making nonscheduled adjustments.
- D. Clean steel items to bare metal where site welding is scheduled.
- E. Provide for erection loads with temporary bracing; keep Work in alignment.

### 3.2 GENERAL INSTALLATION

- A. Install items in accordance with manufacturer's published instructions and as shown on the Drawings.
- B. Perform anchor installation in accordance with manufacturers recommendation.
- C. Install items plumb and level, accurately fitted, and free from distortion or defects.
- D. Perform field welding in accordance with AWS D1.1.
- E. Field repair of damaged galvanized coatings:
  - 1. Clean and repair Zinc coating that has been burned by welding, abraded, or otherwise damaged after installation. Clean damage area by wire brushing and removing all traces of welding flux and loose or cracked zinc coating.
  - 2. Coat surfaces using zinc-rich paint.

### 3.3 DISSIMILAR METALS

- A. Where dissimilar metals are in contact, protect surfaces with a coating or isolation barrier/washer to prevent galvanic or corrosive action. Submit product data for isolation barrier for approval.

END OF SECTION 05 50 00



SECTION 05 51 33

METAL LADDER

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. General provisions for the manufactured, fixed, vertical metal access ladder as shown on the Drawings and as specified herein.

1.2 REFERENCES

- A. While each is not specifically called out in this section, these references are considered applicable to the work covered by this section.

- B. American National Standards Institute (ANSI)

- 1. ANSI A14.3 Ladders, Fixed, Safety Requirements

- C. American Society for Testing and Materials (ASTM)

- 1. ASTM A 36 Standard Specification for Carbon Structural Steel
  - 2. ASTM A 53 Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless.
  - 3. ASTM A 123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  - 4. ASTM A 153 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
  - 5. ASTM A325 Standard Specification for High Strength bolts for Structural Steel Joints.
  - 6. ASTM A500 Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
  - 7. ASTM F 593 Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs

- D. American Welding Society (AWS)

- 1. AWS A2.4 Standard Symbols for Welding, Brazing, and Nondestructive Examination
  - 2. AWS D1.1 Structural Welding Code - Steel

- E. Occupational Safety and Health Administration of the United States (OSHA)

- 1. OSHA 1910.23 Fixed Ladders
  - 2. OSHA 1910.28 Duty to have Fall Protection and Falling Object Protection

### 1.3 PERFORMANCE/DESIGN CRITERIA

- A. Steel ladders shall conform to 29 CFR 1910.23 and Section 5 of ALI A14.3.
- B. Vertical ladders shall be designed to withstand a minimum of two loads of 250 pounds each, concentrated between any two consecutive attachments. The number and spacing of additional loads shall be in accordance with the anticipated usage of the ladder. Individual steps or rungs shall be designed to support a load of 250 pounds applied at any point.

### 1.4 SUBMITTALS

- A. Submit in accordance with the Terms and Conditions.
- B. Shop drawings showing clearly the location, size and details of all members.
  - 1. Indicate materials, dimensions, connection attachments, anchorage, size and type of fasteners, holes, finishes, and accessories for ladders.
  - 2. Reference materials of construction by ASTM designation and grade.
  - 3. Indicate welds including length and size of all shop and field welds by symbols conforming to AWS standards.
- C. Submit product data for all pre-manufactured items including specifications, load tables, anchor details, and installation details.
- D. Submit letter certifying that ladders are designed and detailed to meet the requirements of standards, building codes, specifications and design criteria herein described.
- E. Before delivery of materials, provide:
  - 1. Manufacturer's data sheets on each product to be used.
  - 2. Preparation instructions and recommendations.
  - 3. Storage and handling requirements and recommendations.
  - 4. Manufacturer's installation instructions for manufactured items.

### 1.5 QUALITY ASSURANCE

- A. Obtain/verify measurements and elevations prior to preparation of shop drawings and fabrications.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum of five years documented experience.
- C. Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.

### 1.6 JOB CONDITIONS, STORAGE AND HANDLING

- A. Store and handle in strict compliance with manufacturer's written instructions and recommendations.

- B. Store materials in a dry area off the ground and floor. Do not leave materials exposed to the weather and excessive temperature.

## PART 2 PRODUCTS

### 2.1 GENERAL

- A. Fabricate ladders as shown in the drawings. Ladders shall be welded steel construction with lockable guard door and galvanized after fabrication as indicated in the contract drawings.
- B. Provide termination at the top of the intake tower service deck slab as shown on the drawings.
- C. Size: As shown on Contract Drawings.
- D. Minimum diameter of rungs shall be 3/4-inch. The distance between rungs, cleats, and steps shall not exceed 12 inches and shall be uniform throughout the length of the ladder.
- E. The minimum clear length of rungs or cleats shall be 16 inches.
- F. The surface of the rungs shall be knurled, dimpled or otherwise treated to minimize slipping.
- G. Mounting: Anchor mounted as recommended by manufacturer
- H. Provide a high security ladder guard at the location shown on the drawing (field verify). Equip covers with hinges on one side and locking clasp on the other side.

### 2.2 MATERIALS

- A. Steel plates, shapes, pipe and castings shall conform to the following ASTM specifications:
  - 1. Structural steel rolled wide flange shapes (W shapes): ASTM A992
  - 2. Structural steel shapes (angles and channels), bars, and plates: ASTM A36
  - 3. Steel pipe: ASTM A53, Grade B.
  - 4. Cold-rolled or hot-rolled carbon steel sheets: ASTM A1008 or ASTM A1011
  - 5. Hollow structural steel (HSS) tubing: ASTM A500, Grade B.
  - 6. Castings: ASTM A47 (Grade 32510) or ASTM A48 (Class 30)
  - 7. Nuts, bolts and washers: ASTM A325
- B. Welding Electrodes:
  - 1. Welding electrodes for structural steel shall conform to AWS A5.5. Use electrodes in the E-70 series.
- C. Galvanizing: ASTM A123, Zn w/0.5 percent minimum Ni.
- D. Galvanizing, hardware: ASTM A153, Zn w/0.5 percent minimum Ni.

### 2.3 FABRICATION

- A. General:
  - 1. Fabricate true to shape, size and tolerances as indicated and specified.

2. Straighten work bent by shearing or punching.
3. Dress exposed edges and ends of metal smooth, with no sharp edges and with corners slightly rounded.
4. Provide sufficient quantity and size of anchors for the proper fastening of the work.
5. Fabricate details and connection assemblies in accordance with drawings, with projecting corners clipped and filler pieces welded flush.
6. Provide clips, lugs, brackets, straps, plates, bolts, nuts, washers, and similar items, for fabrication and erection.
7. Use connections of type and design required by forces to be resisted, and to provide secure fastening.
8. Fit work together in fabrication shop and deliver complete, or in parts, ready to be set in place.

B. Welding:

1. Grind exposed edges of welds to a 1/8-inch minimum radius. Grind burrs, jagged edges and surface defects smooth.
2. Prepare welds and adjacent areas such that there are no undercutting or reverse ridges on the weld bead and no sharp peaks or ridges along the weld bead.
3. Grind embedded pieces of electrode or wire flush with adjacent surface of weld bead.

### PART 3 EXECUTION

#### 3.1 GENERAL PREPARATION

- A. Upon receipt of assembly at job site, inspect all materials for shipping damage. Replace damaged items at no additional cost to Owner.
- B. Examine surfaces for defects which would impair installation.

#### 3.2 GENERAL INSTALLATION

- A. Install items in accordance with manufacturer's published instructions, shop drawings, and as shown on the Drawings.
- B. Perform anchor installation in accordance with manufacturers recommendation.
- C. After Installation Ladder Inspection: Verify proper, secure, and safe installation.
- D. Install items plumb and level, accurately fitted, and free from distortion or defects.

#### 3.3 CLEANING AND PROTECTION

- A. Clean products in accordance with manufacturers recommendations.
- B. Repair or replace metal with damaged galvanized surfaces at no additional cost to the Owner.

END OF SECTION 05 51 33

SECTION 31 11 00  
CLEARING AND GRUBBING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Protecting existing vegetation to remain.
- B. Removing existing vegetation.
- C. Clearing and grubbing.

1.2 DEFINITIONS

- A. Topsoil: See Section 31 14 13 “Stripping and Stockpiling Topsoil.”
- B. Subsoil: All soil beneath the topsoil layer of the soil profile and typified by the lack of organic matter and soil organisms.
- C. 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.
- D. Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and indicated on Drawings.
- E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.3 MATERIAL OWNERSHIP

- A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain the Owner's property, cleared materials shall become the Contractor's property and shall be removed from the Project site.

1.4 INFORMATIONAL SUBMITTALS

- A. Submit in accordance with the Terms and Conditions.
- B. Existing Conditions: Submit documentation of existing trees and plantings, adjoining construction, and site improvements to establish preconstruction conditions that might be misconstrued as damage caused by site clearing. Documentation may include but is not limited to photos, video, sketches, surveys, and/or other information documenting the existing conditions.
- C. Utility Location Ticket: Submit document that all member companies have marked utilities in the Project area. Notify Georgia 811 a minimum of 2 business days prior to commencing work to have utilities marked.
- D. Record Drawings: Submit record drawings identifying and accurately showing locations of subsurface utilities and other subsurface structural, electrical, and mechanical conditions.

## 1.5 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from the Owner and authorities having jurisdiction.
  - 2. Provide alternate routes around closed or obstructed traffic ways if required by the Owner or authorities having jurisdiction.
- B. Utility Locator Service: Do not commence work until utilities have been marked and a completed Georgia 811 ticket has been submitted to the Engineer.
- C. Do not commence site clearing operations until temporary erosion and sedimentation control and plant-protection measures are in place.
- D. Do not direct vehicle or equipment exhausts toward vegetated areas to remain.
- E. Prohibit heat sources, flames, ignition sources, and smoking within 50 feet of vegetated areas to remain.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- 1. Satisfactory Soil Material: Requirements for the different types of satisfactory soil material which may be used as fill are specified in Specification Section 31 23 00 "Earthwork." Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Protect existing site features to remain from damage during construction.
  - 1. Restore damaged features to their original condition, as acceptable to Owner.

### 3.2 EXISTING UTILITIES

- A. Have utilities located using the Georgia 811 utility locator service.
- B. Notify the Owner and Engineer immediately if underground utilities are located in the work area. Do not proceed with work until approved by the Owner and Engineer.
- C. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by the Owner or others unless permitted under the following conditions, and then only after arranging to provide temporary utility services according to the requirements indicated:
  - 1. Notify the Engineer and the Owner not less than 7 days in advance of proposed utility interruptions.
  - 2. Do not proceed with utility interruptions without the Owner 's written permission.

### 3.3 TEMPORARY EROSION AND SEDIMENT CONTROL (E&SC)

- A. Provide temporary E&SC measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties, waterways, and walkways, in accordance with the Drawings, Stormwater Pollution Prevention Plan (SWPPP) provided by the Contractor, and requirements of authorities having jurisdiction.

- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- C. Inspect, maintain, and repair E&SC measures during construction until permanent vegetation has been established. See Section 01 57 13 “Temporary Erosion and Sediment Control.”
- D. Remove temporary E&SC measures upon completion of work and restore and stabilize areas disturbed during removal.

### 3.4 TREE AND PLANT PROTECTION

- A. Repair or replace trees, shrubs, and other vegetation indicated to remain that are damaged by construction operations, in a manner approved by Engineer.

### 3.5 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation as shown on the Drawings and to permit installation of new construction.
  - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
  - 2. Grind stumps and remove roots, obstructions, and debris to a depth of 18 inches below exposed subgrade. Stumps and root balls removed from the dam as determined by the Engineer shall be removed to a point where only roots with a diameter of 1 inch or less remain.
  - 3. Use only hand methods for grubbing within protection zones.
- B. Fill depressions caused by clearing and grubbing operations with soil material approved by the Engineer unless further excavation or earthwork is indicated.
  - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches and compact each layer to a density equal to adjacent original ground. Fill material placed on the dam as determined by the Engineer shall be placed in accordance with Section 31 23 00 “Earthwork.”

### 3.6 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade features as indicated and necessary to facilitate new construction as shown on the Drawings and per Specification Section 02 41 13 “Selective Demolition.”

### 3.7 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off of the Owner's property, as specified in Specification Section 01 74 19 “Disposal of Waste Materials.”

END OF SECTION 31 11 00

SECTION 31 14 13  
STRIPPING AND STOCKPILING TOPSOIL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Provisions for removing topsoil within the limits of site disturbance as shown on the Drawings.
- B. Provisions for stockpiling topsoil in the staging and stockpile areas shown on the Drawings.

1.2 DEFINITIONS

- A. Topsoil: Surface soil that is dark brown silty or clayey sand/sandy clay or silt with organic matter. Topsoil shall be free of subsoil, noxious weed seed or reproductive vegetation, heavy clay, hard clods, toxic substances, or other material which would be detrimental to plant growth.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 GENERAL

- A. Excavate topsoil from areas as needed for construction necessary to complete the improvements indicated on the Drawings. Strip only areas within the limits of site disturbance shown as needed to complete the work.
- B. Remove roots larger than 1 inch, rocks larger than 2 inches, debris, grass layers, and weeds prior to stockpiling of the topsoil, unless determined otherwise by the Engineer.
- C. Stockpile topsoil in area(s) designated on the Drawings. Protect topsoil stockpiles from wind and water erosion.

3.2 DISPOSAL

- A. Remove and dispose of at an off-site facility excess topsoil and the grass, weeds, roots, and rocks from all areas requiring stripping, in accordance with the requirements of Section 01 74 19 "Disposal of Waste Materials" and applicable local, state, or federal rules and regulations.

END OF SECTION 31 14 13



## SECTION 31 23 00

### EARTHWORK

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Provisions for excavations incidental or required for construction of the proposed work.
- B. Provisions for furnishing, placing, and compacting fill materials incidental or required for construction of the proposed work.

##### 1.2 REFERENCES AND DEFINITIONS

###### A. References – ASTM International (ASTM)

ASTM C33/C33M	Standard Specification for Concrete Aggregates
ASTM C117	Standard Test Method for Materials Finer than 75- $\mu$ m (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D6913/D6913M	Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis
ASTM D7928	Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis
ASTM D698	Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft <sup>3</sup> )
ASTM D1140	Standard Test Methods for Determining the Amount of Material Finer than 75- $\mu$ m (No. 200) Sieve in Soils by Washing
ASTM D1556/D1556M	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft <sup>3</sup> )
ASTM D2216	Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D2487	Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D2488	Standard Practice for Description and Identification of Soils (Visual-Manual Procedures)
ASTM D6938	Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D4253	Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
ASTM D4254	Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density

ASTM D4318

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

B. Additional References:

Standard Specifications Construction of Transportation Systems (Georgia Department of Transportation), current version

C. Definitions

1. Fines: Soil particles passing the No. 200 sieve.
2. Borrow: Material excavated on the site or obtained from offsite areas approved by the Owner.
3. Well-graded: A mixture of particle sizes that has no specific concentration, or lack thereof, of one or more sizes. A material type that, when compacted, produces a strong and relatively incompressible soil mass with a minimum of voids.
4. Coverage: One coverage is defined as the result of successive passes by a piece of compaction equipment, which by means of sufficient overlap, will ensure that all areas of the layer or lift being compacted have been subjected to one pass of the compaction equipment. Adequate compaction will likely require several coverages.
5. Optimum Moisture Content: That moisture content which will result in a maximum dry unit weight of the soil resulting from the ASTM D698 laboratory compaction test.
6. Percent Compaction: The percent compaction in-place shall be calculated as the ratio (in percent) of the in-place dry density to the estimated maximum dry density, in accordance with ASTM D698 of the representative fill material at the location of the in-place density test.
7. Proof Rolling: Rolling or compacting a soil surface with approved equipment for the purpose of detecting soft or loose areas.
8. Relative Density: The relative density in-place shall be calculated as the ratio of the difference between the maximum and measured void ratios to the difference between maximum and minimum void ratios, or by using the equation:

$$R_d(\%) = [\gamma_{d,\max} (\gamma_{d,\text{measured}} - \gamma_{d,\min})] / [\gamma_{d,\text{measured}} (\gamma_{d,\max} - \gamma_{d,\min})] * 100, \text{ where } \gamma_d \text{ is dry density}$$

9. Unsuitable materials: Materials that contain waste, debris, roots, organic matter, frozen matter, or any other materials determined by the Engineer to not meet the specifications for the required fill.

### 1.3 QUALITY CONTROL AND QUALITY ASSURANCE

- A. The Contractor shall employ a surveyor registered in the State of Georgia to determine existing, intermediate, and final grades of excavation and fill quantities.
- B. Tolerances: Final grades shall be within two inches of specified grades but not less than the specified grades. Regardless of tolerance, minimum freeboard and positive drainage towards the reservoir shall be maintained for the crest of the embankment.
- C. The Contractor shall hire an independent third-party testing company to provide quality control observation and testing of the soil excavation, fill placement, and compaction.
- D. The Owner shall review the work of the quality control subcontractor and may provide quality assurance testing.

### 1.4 SUBMITTALS

- A. Submit in accordance with the Terms and Conditions.

- B. Submit an Earthwork Plan at least 30 days in advance, prior to beginning earthwork, including both excavation and fill describing all facets of work. Include the source and description of filling materials, required laboratory test results of all fill materials, placement and compaction methods, grubbing methods, and field surveys. The Earthwork Plan shall, at a minimum, include all the following:
1. Schedule for earthwork activities.
  2. Detailed description of the sequencing and operations necessary for construction of the features described in this Section.
  3. Proposed excavation method(s) to be used.
  4. Proposed excavation slopes.
  5. Operations necessary to construct the east and west toe drains, as well as the filter diaphragm, including descriptions of methods used to place the filter materials to avoid segregation and contamination, and methods to ensure specified compaction is achieved. Indicate interrelationships to other operations including subgrade preparation, dewatering, and adjacent fill placement.
  6. Methods of construction to be used to perform the construction safely.
  7. Borrow source(s) for imported offsite materials and proposed method(s) of sampling on-site and off-site source(s) for acceptance.
  8. Equipment proposed for soil excavation, transport, processing, placement, compaction, and moisture control, including equipment catalog cut sheets with weights, dimensions, and operating data.
  9. Stockpiling and placement plan for soils and filter materials describing handling and transport of on-site and off-site materials including proposed haul routes and methods proposed for placement and compaction.
  10. Plan to obtain, convey, and store construction water, including proposed water source.
  11. Methods for processing, including means and methods of moisture conditioning in advance of material placement and compaction.
  12. Methods for protecting Work, to include temporary excavation dewatering, drainage, moisture conditioning, and frost protection measures.
  13. Measures to keep filter and drain materials from becoming contaminated with soil or other materials during stockpiling, transportation, placement, and construction activities.
- C. Samples: Submit samples of on-site excavated materials and off-site materials for Engineer's approval. Samples shall be provided at least 30 days prior to fill placement. For imported material, submit samples and laboratory tests results 30 days prior to shipment of the material to the site. Submit required laboratory analyses for each imported material used. The contractor shall arrange for the Engineer to visit the borrow sites, if requested, and provide equipment with operator to sample materials.
- D. Submit gradation, Atterberg limits, USCS classification, and ASTM D698 moisture density compaction curve test reports for all imported earthwork materials and on-site excavated materials suitable for use as fill. Any time the Contractor changes the source and/or stockpile from which materials are obtained, additional gradation, and moisture density compaction curve test reports (or Minimum and Maximum Index Density test reports) for these new sources shall

be required. The Contractor shall include costs for all testing in the bid price. No additional compensation will be allowed for testing.

- E. Certified truckload weight bills: Submit certified truckload weight bills at the time of delivery of all materials to site.

#### 1.5 RELATED WORK

- A. Perform dewatering of required excavations in accordance with Section 31 23 19 “Dewatering.”
- B. Perform stripping of topsoil in accordance with Section 31 14 13 “Stripping and Stockpiling Topsoil.”

#### 1.6 PROTECTION

- A. Comply with all safety requirements of OSHA.
- B. Protect existing survey monuments and other existing structures and facilities to remain. Damage to existing structures and facilities by the Contractor shall be repaired at the expense of and by the Contractor, at no cost to the Owner, and to the satisfaction of the Engineer.

#### 1.7 EXISTING SITE CONDITIONS

- A. Soft, wet, soils may be encountered in the excavations. The Contractor shall use equipment and methods appropriate for these conditions. Adequate dewatering methods shall be utilized to ensure that excavations remain dry for the entirety of the work to be performed within the excavations. If water is encountered in an excavation, the excavation is to be immediately stopped and backfilled until the area is properly dewatered in accordance with the specifications. In no circumstances will construction be allowed in saturated soils below the groundwater table. See Section 31 23 19 “Dewatering.”
- B. Exploratory investigations may not completely characterize all conditions that may exist in the excavations and that may be encountered during construction. Therefore, final excavated lines and grades will be determined in the field by the Engineer.

### PART 2 - PRODUCTS

#### 2.1 EMBANKMENT FILL

- A. Embankment fill shall consist of a suitable, well-graded soil mixture, and:
  - 1. Shall have a minimum fines content (passing No. 200 sieve) greater than or equal to 20 percent.
  - 2. Shall have a maximum particle size of 4-inches.
  - 3. Shall have a Unified Soil Classification (USCS Classification) of SM, SC, GM, GC, CL, or ML.
  - 4. Shall not have a USCS Classification of CH, MH, OL, OH, PT, SW-SM, SP-SC, or SW-SC.
  - 5. In tight spaces and against structures where only small compaction equipment can be used, the maximum particle size shall be limited to 2-inches.
- B. It is anticipated that most of the excavated on-site materials will meet or can be processed to meet the requirements for Embankment fill. Existing CH soils encountered in the embankment excavations, as observed by the Contractor’s quality control agency or the Engineer may not be reused as fill or processed for reuse as fill.
- C. Embankment fill shall be used for:

1. Earth sections of the dam embankment.
  2. Site grading.
- D. Embankment fill shall be laboratory-tested by the Contractor’s independent testing firm and approved by the Engineer before use.
- E. A list of required material Quality Control testing for Embankment Fill is presented in Table 1. The tests shall be conducted by the Contractor’s independent testing firm at the frequencies designated unless otherwise directed by the Engineer. These tests are for determining the suitability of the material for use as embankment fill.

**Table 1 - Embankment Fill Approval Testing**

Test	Test Method (Current Version)	Test Frequency
USCS Classification	ASTM D2487	Minimum 2 tests per classification <sup>(2)</sup>
Gradation with No. 200 wash and hydrometer	ASTM D6913, D7928, and D1140 <sup>(1)</sup>	
Moisture content	ASTM D2216	
Atterberg limits	ASTM D4318	
Laboratory Moisture-Density (Standard Proctor)	ASTM D698	Minimum 2 tests per material classification <sup>(3)</sup>

**Notes:**

- <sup>(1)</sup> ASTM D1140 No. 200 wash not required if No. 200 wash is performed as a part of the ASTM D6913 gradation test.
- <sup>(2)</sup> Material classification tests, including gradation and Atterberg limits for embankment fill from on-site sources shall be conducted on initial excavated soil stockpiled on site, taken from differing areas of the stockpile.
- <sup>(3)</sup> Samples for Proctor testing shall be obtained from material mixed and stockpiled on site and selected after material classification testing to represent the variation in material types.

**2.2 FILTER SAND**

- A. Imported from approved off-site sources, meeting the requirements for ASTM C33 fine aggregate or Georgia Department of Transportation Standard Specifications Construction of Transportation Systems Section 801 Fine Aggregate (GDOT 801, size 10 NS), and graded within the following limits as presented in Table 2:

**Table 2 - Filter Sand Gradation**

U.S. Standard Sieve	% Passing by Weight	
	ASTM C33 Fine Aggregate <sup>(2)</sup>	GDOT 801 10 NS Sand (Table 801.2.02)
3/8"	100	100
No. 4	95 - 100	95 - 100
No. 8	80 - 100	No requirement
No. 16	50 - 85	45 - 95
No. 30	25 - 60	No requirement
No. 50	5 - 30	5 - 30
No. 100	0 - 10	0 - 10
No. 200	0 - 5 <sup>(1)</sup>	0 - 3

**Notes:**

<sup>(1)</sup> The ASTM C33 requirement for the No. 200 sieve has multiple acceptable percentages depending on use and has therefore been modified for this specification.

<sup>(2)</sup> The material shall meet the gradation requirements in-place after compaction and any particle breakage that may occur after transportation and compaction.

- B. If ASTM C33 Fine Aggregate / Sand is used, the adjacent drain stone may be either ASTM C33 No. 8 Coarse Aggregate or GDOT 800 No. 8 Coarse Aggregate.
- C. Filter sand shall be imported, natural (not manufactured), processed (not bank run), granular material.
- D. Sources for Filter Sand shall be proposed by Contractor and shall be tested by the Contractor and approved by the Engineer before use. The contractor shall arrange for the Engineer to visit the borrow site and provide equipment with operator to sample the material and provide the Engineer with a 100-pound sample.

Required material QC testing for Filter Sand is presented in Table 3 below. The tests shall be conducted by the Contractor's independent testing firm at the frequencies designated unless otherwise directed by the Engineer. These tests are for determining the suitability of the material for use in the east and west toe drains, as well as the filter diaphragm.

**Table 3 - Filter Sand and Drain Stone Approval Testing**

Test	Test Method (Current Version)	Test Frequency
Classification	ASTM D2487	Minimum 4 tests per source
Gradation with No. 200 Wash and Hydrometer	ASTM D6913 and D1140 <sup>(1)</sup>	
Laboratory Moisture-Density (Relative Density)	ASTM D4253 and D4254	Minimum 2 tests per ASTM test method per material classification

**Notes:**

<sup>(1)</sup> ASTM D1140 No. 200 wash not required if No. 200 wash is performed as a part of the ASTM D6913 gradation test.

2.3 DRAIN STONE

- A. Imported from approved off-site sources, meeting the requirements for ASTM C33 No. 8 coarse aggregate or GDOT 800 No. 8 coarse aggregate, and graded within the following limits as presented in Table 4:

**Table 4 - Drain Stone Gradation**

ASTM C33 No. 8 Coarse Aggregate		GDOT 800 No. 8 Stone (Table 800.1)	
U.S. Standard Sieve	% Passing by Weight	U.S. Standard Sieve	% Passing by Weight
1/2 inch	100	1/2 inch	100
3/8 inch	85 - 100	3/8 inch	85 - 100
No. 4	10 - 30	No. 4	10 - 40
No. 8	0 - 10	No. 8	0 - 10
No. 16	0 - 5	No. 16	0 - 5
No. 200	0 - 3 <sup>(1)</sup>	No. 200	0 - 3 <sup>(1)</sup>

**Notes:**

<sup>(1)</sup> The above-specified gradation requirements were modified from the standard gradations. The ASTM C33 and GDOT 800 specifications do not include a requirement for the No. 200 sieve; a requirement for this sieve size has been added for this specification.

<sup>(2)</sup> The material shall meet the gradation requirements in-place after compaction and any particle breakage that may occur after transportation and compaction.

- B. If ASTM C33 Fine Aggregate / Sand is used, the adjacent drain stone may be either ASTM C33 No. 8 Coarse Aggregate or GDOT 800 No. 8 Coarse Aggregate.
- C. Required material QC testing for drain stone is presented in Table 3. The tests shall be conducted by the Contractor's independent testing firm at the frequencies designated unless otherwise directed by the Engineer. These tests are for determining the suitability of the material for use in the toe drains and filter diaphragm drains.

## 2.4 COMPACTION EQUIPMENT

- A. General - Compaction equipment shall conform to the manufacturer's specifications and shall be maintained in good working condition at all times. Operate and maintain compaction equipment in accordance with the manufacturer's instructions and recommendations.
- B. Equipment for compaction of embankment fill shall be self-propelled, segmented pad or sheepsfoot roller or smooth drum roller dependent on the classification of the material being placed and must be approved by the Engineer. The roller shall have a minimum static operating weight of 25,000 pounds.
- C. Special Compaction: Use hand operated power tampers/plate compactors having a minimum static weight of 300 pounds and a minimum dynamic force of 1,000 pounds, or other special compaction equipment acceptable to the Engineer to obtain the compaction specified. Use special compaction equipment where other compactors specified in this Section cannot operate effectively.
- D. Filter Sand and Drain Stone Compaction Equipment: Hand-operated vibrating plate compactors having a minimum static weight of 300 pounds and a minimum dynamic force of 1,000 pounds, or other compaction equipment acceptable to the Engineer. All compaction equipment used for filter sand and drain stone should be maintained clean and shall be restricted to operation only on the filter sand and drain stone zones. Other compaction equipment may be approved if demonstrated by the Contractor to achieve suitable results. Proposed compaction equipment for filter sand and drain stone must be submitted in the Earthwork Plan.
- E. All equipment and tools used in the performance of the Work are subject to review by the Engineer before work is started.
- F. Provide compaction equipment appropriate for the material types to obtain the densities specified.
- G. Provide hand-operated compaction equipment in areas closer than 2 feet from structures and pipes (for special compaction).
- H. Provide equipment for applying water of a type and quality adequate for the work, free of leaks and equipped with a distributor bar or other approved device, to ensure uniform application.
- I. Provide equipment for mixing, aerating, and moisture conditioning fill materials, such as blades, discs, or other approved equipment.

## PART 3 - EXECUTION

### 3.1 GENERAL EXCAVATION REQUIREMENTS

- A. Identify required excavation limits, levels, contours, and datum needed to perform the work or as shown on the Drawings.
- B. Verify locations of buried underground utilities and pipes and overhead utilities prior to excavations. Repair any utilities or pipes damaged during construction at the expense of and by the Contractor and at no cost to the Owner.
- C. Excavate to the lines and grades as shown on the Drawings.
- D. Any damage to the Work caused by the Contractor's operations including disturbance of the material beyond the required excavation shall be repaired at the expense of and by the Contractor and at no cost to the Owner. All repairs shall be in accordance with this Section as directed by the Engineer, and at the expense of and by the Contractor and at no cost to the Owner.



- E. The Contractor shall assume all responsibility for deductions and conclusions as to the nature of the materials to be excavated and the difficulties of making and maintaining the required excavations.
  - F. The Engineer reserves the right, during the progress of the Work, to vary the slopes, grades, or the dimensions of the excavations from those specified herein. Where the Engineer determines that foundation material is unsuitable through no fault of the Contractor, additional excavation will be ordered in writing and payment will be made in accordance with the Terms and Conditions.
  - G. Take all necessary precautions, including dewatering in accordance with Section 31 23 19 “Dewatering” to preserve the material below and beyond the established lines of all excavations. Any damage to the Work or the foundations due to the Contractor's operations shall be repaired as directed by the Engineer at the expense of and by the Contractor and at no cost to the Owner.
  - H. Unless approved by the Engineer, all excavations shall be in the dry and in accordance with Section 31 23 19 “Dewatering.”
  - I. Do not excavate in frozen materials, except with approval of the Engineer.
  - J. Side slopes of all earth excavations shall conform with all safety requirements of OSHA.
  - K. Contractor shall notify the Engineer as soon as possible of any unusual soil conditions, soil conditions that vary from test borings, or unsuitable soils of questionable bearing capacity.
  - L. Dispose of excavated materials which are excess or deemed unsuitable at an approved off-site location, in accordance with all Federal, State and Local regulations and as specified in Section 01 74 19 “Disposal of Waste Materials.”
  - M. Do not waste any excavated material without the approval of the Engineer.
  - N. Excavated material will not be deemed “unsuitable” due to moisture content, but rather will be moisture conditioned as necessary for use as fill.
  - O. If slumping, heaving, or any other evidence of instability is observed during excavation, immediately report evidence of instability to the Engineer, whether it is observed during working or non-working hours.
  - P. The Contractor shall be prepared to temporarily backfill any unstable excavation to stabilize the area, if directed to do so by the Engineer.
- 3.2 EXCAVATED MATERIAL SUITABLE FOR FILL
- A. Stockpile excavated materials that are acceptable for use as embankment fill materials as defined by Section 2.1, above.
  - B. Transport excavated materials suitable for use as fill to designated or mutually agreeable stockpile areas.
  - C. Re-use all suitable materials from required excavations in the permanent construction.
  - D. Perform operations so that the excavations will yield as much suitable material for construction purposes as practicable.
  - E. Separate suitable materials for construction purposes from materials to be wasted; and minimize handling by placing suitable materials directly in the designated final locations, if possible and practical. Dispose of all unsuitable material offsite.

- F. Excavated materials that are acceptable for use as fill but are too wet for immediate compaction shall be dried and aerated until the moisture content is reduced sufficiently to permit them to be placed in the fill.

### 3.3 STRIPPING

- A. Remove all vegetation, roots, and organic soil from the area of proposed fill placement.
- B. Suitable topsoil removed in the stripping operation shall be stockpiled, protected, and reused as topsoil on the new slopes as specified in Section 31 14 13 "Stripping and Stockpiling Topsoil". Dispose of all unsuitable material offsite.

### 3.4 SOIL FOUNDATION PREPARATION

- A. Should the excavation be carried below the lines and grades specified on the Drawings, or should the bottom of the soil excavation be disturbed because of the Contractor's operations, refill to the proper elevation with compacted embankment fill material meeting the requirements specified herein at the expense of and by the Contractor and at no cost to the Owner.
- B. Notify Engineer two days prior to beginning fill placement and proof roll with the Engineer present. In areas where proof rolling is not practical, the Engineer may allow for visual inspection and probing for verification. For areas identified by the Engineer as unsuitable foundation, remove this material to the depths established by the Engineer.

### 3.5 FIELD QUALITY CONTROL

- A. The Engineer will conduct visual inspections of excavation bottoms and foundation subgrades. Subgrades shall be approved by the Engineer. Soft or yielding areas, as determined by the Engineer, shall be excavated and backfilled as determined by the Engineer.

### 3.6 EXAMINATION PRIOR TO FILL PLACEMENT

- A. Prior to placing materials in any section of the embankment, verify that the foundation has been cleared, stripped, and dewatered. The area shall be cut to grade and proof rolled or probed with a soil probe by Engineer for stability. Proof rolling shall be performed at the direction of the Engineer.
- B. Materials of the foundation that are considered unstable due to excessive moisture should be scarified to a depth of 6 inches, dried to the required moisture content, and recompact so that the surface materials will bond with the first layer of the fill.
- C. Do not place frozen materials or place fill on frozen ground.

### 3.7 PREPARATION

- A. The compacted surface of any layer of fill which is too wet or too dry should be dried or moistened and compacted before the next layer is placed.
- B. Protect the prepared subgrade before fill placement. If the subgrade has deteriorated in the opinion of the Engineer, re-compact to the satisfaction of the Engineer.
- C. Prior to placement of any soil against existing or cut slopes, the slopes shall be benched at a maximum average slope of 2H:1V. The minimum bench width is 16 inches, and the maximum bench height is 16 inches.

### 3.8 FILTER SAND AND DRAIN STONE

- A. Notify the Engineer at least 48 hours prior to placement of filter sand and drain stone or performance of any testing.

- B. The foundation subgrade should be smooth cut and examined by the Engineer before placement of initial filter sand.
- C. Thoroughly wet filter sand immediately before compaction using moisture application procedures as approved by the Engineer. Moisture conditioning is not required for drain stone. The moisture content of the filter sand and drain stone shall be distributed uniformly throughout each layer of material prior to and during compaction.
- D. Install filter sand and drain stone materials in loose lifts not exceeding 8 inches in thickness prior to compaction for full size compaction equipment and 5 inches in thickness prior to compaction for smaller walk-behind compaction equipment.
- E. Compact with a smooth drum vibratory roller or hand-operated tamper to achieve a relative density of at least 50 percent and not more than 70 percent. A test section must be performed, either separate from the work or part of the work, to demonstrate the proposed placement, watering, and compaction methods to achieve suitable compaction results (in-place density testing and gradation results). Visual observation of compaction may be deemed acceptable by the Engineer in confined areas on a case-by-case basis. Hand-operated equipment is required within two feet of all structures. The Contractor may utilize temporary shoring devices to establish vertical filter sand and drain stone sections of the east and west toe drains, as well as the filter diaphragm.
- F. Coordinate filter sand and drain stone material installation with underdrain conduit system construction including outfalls and cleanouts.
- G. Once the toe drain construction is complete to satisfaction of the Engineer, embankment fill shall be placed over and adjacent to filter sand in conjunction with the filter diaphragm drain installation. Embankment fill shall be advanced not more than one (1) lift behind the filter sand for the filter diaphragm.
- H. Filter sand and drain stone shall be tested for gradation and density in-situ according to Table 5.

**Table 5 - Filter Sand and Drain Stone In-Situ Testing**

Test	Test Method (Current Version)	Test Frequency
Gradation with No. 200 Wash and Hydrometer	ASTM D6913 and D1140 <sup>(1)</sup>	One (1) test for every 100 cubic yards of sand placed and compacted if the total quantity to be placed per installation is over 500 cubic yards. One (1) test for every 50 cubic yards of sand placed if the total quantity to be placed per installation is under 500 cubic yards. The test shall be performed on compacted material.  If any change is noted in placement methods, an additional test will be performed at no cost to the Owner.
In-place Density	ASTM D6938	Minimum of one (1) test for every 100 cubic yards of filter sand or drain stone placed and compacted. This test should be performed in conjunction with the gradation testing described above.

**Notes:**

<sup>(1)</sup> ASTM D1140 No. 200 wash not required if No. 200 wash is performed as part of the ASTM D6913 gradation test.

**3.9 EMBANKMENT FILL PLACEMENT**

- A. Notify the Engineer in writing at least 48 hours prior to placement of fill and performance of any testing.
- B. Grade the slopes of the new fill to match the proposed slopes of the dam. Grades shall be smooth. Grading shall be performed to the satisfaction of the Engineer.
- C. The moisture content of the fill material prior to placement and during compaction shall be distributed uniformly throughout each layer of material. Moisture conditioning shall be accomplished in borrow areas or stockpiles prior to placement to the extent practical.
- D. Materials too dry for compaction shall be pre-wetted. Additional water, if required, shall be added to the material on the embankment prior to compaction by uniform sprinkling and shall be mixed uniformly throughout the entire lift thickness using discs.
- E. Materials too wet for compaction shall be dried to the proper moisture content before compaction.
- F. The distribution and gradation of materials throughout the filling zone shall be free from lenses, pockets, streaks, or layers of material differing substantially in texture or gradation from the surrounding material. Perform placing operations so that the materials, when compacted, will be blended sufficiently to secure a high degree of compaction, uniformity, and stability. The surface of each fill lift should be roughened using the segmented pad/sheepsfoot roller prior to placing the next fill lift to promote bonding of the individual lifts and preclude formation of preferred seepage planes in the embankment.
- G. Spread materials in horizontal layers in loose lifts not exceeding 8 inches in thickness for full size compaction equipment and 4 inches in thickness for smaller walk-behind compaction equipment.

- H. The moisture content for filling materials, at the time of compaction, shall be between 2 percent below and 2 percent above optimum moisture content (ASTM D698).
  - I. Compact fill to an average of 98 percent (95 percent minimum individual test results) of the maximum dry density (ASTM D698) or to a compaction level deemed acceptable by the Engineer, based on visual observation and inspection. The Contractor shall keep a running total of all field density test results for a given material and track the average compaction percentage.
  - J. In tight spaces and against structures where only small compaction equipment can be used, the maximum loose lift thickness shall be limited to 4-inches and the maximum particle size shall be limited to 2-inches.
  - K. Quality Control (QC) testing of the compacted fill shall be performed by a third-party testing firm hired by the Contractor. Perform one in-situ moisture/density test per 250 cy of material placed using methods specified in Table 5. At least one moisture/density test must be performed for each day of fill placement regardless of the quantity of material placed.
  - L. Quality Assurance (QA) testing may be performed by the Engineer. The Contractor shall assist the Engineer in performing QA testing by providing access to the area of testing and by aiding in the collection of samples.
- 3.10 PROTECTION OF SLOPES
- A. Protect the new slopes to the extent necessary for preventing erosion. If erosion such as gullies or rivulets occurs, repair to a smooth and uniform slope.
- 3.11 CLEANING
- A. After the completion of construction, remove excess materials, debris, and other foreign materials from construction operation areas and dispose of them away from the sites of the Work or at designated areas.
  - B. Clean up construction roads resulting from the Contractor's operations, including smoothing and grading of the ground surface to eliminate ruts for erosion prevention and the trimming and smoothing of eroded or caved slopes of cuts or embankments to a stable condition.

END OF SECTION 31 23 00

SECTION 31 23 19  
DEWATERING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Provisions for dewatering excavations and removing temporary dewatering systems.

1.2 SYSTEM DESCRIPTION

Shallow groundwater is anticipated in all excavations within the toe of the dam and for excavations to install the proposed principal spillway, which shall be controlled to facilitate construction in dry conditions. The Contractor is responsible for maintaining a dry construction area during the process of construction.

A. Design Requirements

- 1. Maintain excavations, fill placement areas, and other parts of the Work free from water.

B. Performance Requirements

- 1. Dewater by lowering and keeping groundwater level at least 2 feet below the general bottom of excavations. If site conditions or other sections warrant, the Engineer may require the groundwater level to be at least 3 feet below the general bottom of excavations. The system shall have sufficient capacity to accomplish the desired result, allowing for normal variation in soil properties and foundation conditions. The Contractor shall use means necessary to lower the groundwater table and maintain a dry excavation by means including, but not limited to, deep or shallow well points, wells, ditches, sumps, and pumps.
- 2. No upward, vertical, nor lateral flow of groundwater into a cut area will be permitted at any time. If groundwater is encountered in an excavation, the excavation shall be immediately backfilled, and dewatering measures put in place.
- 3. Dewater in a manner that will prevent loss of fines, will maintain stability of any excavated slopes and bottom of excavations, and will allow the Work to be performed in dry conditions.
- 4. Methods of dewatering and controlling groundwater, including designs and implementations, are the full responsibility of the Contractor.

1.3 MAINTENANCE

- A. Maintain adequate dewatering equipment to remove surface water and groundwater entering excavations.
- B. Operate the dewatering system and maintain each excavation in a dry condition until the Work is completed to the extent that no damage will result from encroachment of water.

1.4 SUBMITTALS

- A. Submit in accordance with the Terms and Conditions.
- B. Submit a Dewatering Work Plan for approval prior to start of dewatering activities, describing all facets of the work to adequately dewater excavations and maintain groundwater levels at least 2 feet below the general bottom of excavations. The plan should include, at a minimum, the following:

1. Designer qualifications: The designer shall be a registered Professional Engineer in the State of Georgia with a minimum of 5 years of relevant experience.
2. Locations of proposed dewatering activities (intake and discharge points, equipment staging, etc.).
3. Proposed equipment catalog cuts (pumps, conduit, intake structures, erosion prevention at discharge points).
4. Methods for preventing loss of fines by dewatering operations.
5. Methods for dewatering following rain events.
6. Methods for dewatering sediment-laden water.

## PART 2 PRODUCTS (NOT USED)

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that adjacent facilities and Work will not be damaged by dewatering operations.

### 3.2 PREPARATION

- A. Layout and install dewatering equipment in such a manner as to avoid interference with access or construction activity.
- B. Provide protection for critical parts from accidental damage or freezing.
- C. Erect signs and barricades to isolate hazardous areas.

### 3.3 INSTALLATION

- A. Perform dewatering operations so that below-grade Work is performed or installed in dry conditions, unless otherwise specified or approved for installation in wet conditions.
- B. Dewatering systems shall be installed in accordance with the approved Dewatering Work Plan. If changes are necessary to meet requirements of this specification, a new plan shall be submitted.

### 3.4 FIELD QUALITY CONTROL

- A. Repair damage caused by dewatering operations at no cost to the Owner.
- B. Inspect, maintain, and promptly repair damage to dewatering facilities.

### 3.5 CLEANING

- A. After having served their purpose, relocate and/or remove dewatering facilities so as not to interfere with the operation of the Work.
- B. Return disturbed and adjacent areas to the condition existing prior to the start of Work.

END OF SECTION 31 23 19

## SECTION 31 52 00

### COFFERDAM

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. General provisions for furnishing all labor, materials, tools, equipment, and incidentals necessary to install temporary Portadam cofferdam structure.

##### 1.2 RELATED SECTIONS

- A. 01 57 00 "Reservoir Control"
- B. 01 57 13 "Temporary Erosion and Sediment Control"
- C. 31 23 19 "Dewatering"

##### 1.3 SYSTEM DESCRIPTION

- A. The Contractor is responsible for maintaining reservoir level control requirements and duties as specified in Specification 01 57 00 "Reservoir Control."
- B. Temporary, portable cofferdam that uses steel support frame with continuous-reinforced vinyl liner membrane to provide means of water diversion or retention.

##### 1.4 SUBMITTALS

- A. Submit in accordance with the General Terms and Conditions.
- B. Product Data: Submit manufacturer's product data, including installation and removal instructions.
- C. Shop Drawings: Submit manufacturer's shop drawings, including plans, elevations, sections, and details, indicating layout, dimensions, and materials.
- D. Reservoir Control Plan: As specified in Section 01 57 00 "Reservoir Control."
- E. Engineering calculations: Submit engineering calculations that are signed and sealed by a registered Professional Engineer in the State of Georgia with a minimum of 5 years of relevant experience and show that the temporary cofferdam would be stable under full hydraulic head (water surface elevation at the top of cofferdam).

##### 1.5 MAINTENANCE

- A. Maintain reservoir control equipment in operating condition throughout the duration of construction. Equipment that cannot perform its intended function shall be immediately removed by the Contractor and replaced.
  - 1. Notify the Engineer immediately of any equipment that cannot perform its function to maintain the reservoir water level.

##### 1.6 QUALITY CONTROL

- A. Notify the Engineer and Owner 48 hours in advance of installation of the temporary cofferdam.
- B. Notify the Engineer and Owner 48 hours in advance of removal of the temporary cofferdam.
- C. Manufacturer's Field Services: Manufacturer's representative shall provide technical assistance and guidance for the installation and removal of temporary cofferdam.



## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site with load lists clearly identifying product components and manufacturer.
- B. Storage: Store materials in accordance with manufacturer's instructions.
- C. Handling: Protect materials during handling, installation, and removal to prevent damage.

## PART 2 PRODUCTS

- A. All reservoir control products shall be suitable for their intended purpose and function. Equipment that is observed to not be able to perform its intended function shall be immediately removed by the Contractor and replaced.

### 2.2 COFFERDAM

- A. Temporary Cofferdam: Portadam system by Portadam, Inc. or approved equivalent.
  - 1. Steel Support Frame: Tubular, welded steel structural support members.
  - 2. Liner: Impervious, inert, flexible fabric membrane.
    - a. Upper Portion Positioned Against Steel Support Frame: Nylon-reinforced PVC liner.
    - b. Lower Portion: Polyethylene bed sealing apron with heavy chain on outside perimeter to assist with sinking liner.
    - c. Vertical Height of Steel Support Frame: 10 feet, as indicated on the Drawings.

### 2.3 ACCESSORIES

- A. Sandbags: Woven poly bags. Fill with washed, clean sand.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Examine area to receive temporary cofferdam.
  - 1. Notify the Engineer and the Owner of conditions that would adversely affect installation or removal.
  - 2. Do not begin installation or removal until unacceptable conditions are corrected.
- B. Evaluate foundation consistencies relating to load bearing capacity before installation, based on anticipated water depth (hydraulic loading).

### 3.2 SURFACE PREPARATION

- A. Prepare riverbed surfaces in accordance with manufacturer's instructions.

### 3.3 INSTALLATION

- A. Perform reservoir control operations so that work is performed in dry conditions, excepting only that work which is specified or approved for installation in wet conditions.
- B. Install temporary cofferdam in accordance with manufacturer's instructions at locations indicated on the Drawings. Provide clearance in all directions sufficient to perform work in the dewatered area downstream of the temporary cofferdam.

- C. Steel Support Frame: Install steel support frame in accordance with manufacturer's instructions.
- D. Liner: Install liner in accordance with manufacturer's instructions.

3.4 REMOVAL

- A. Remove temporary cofferdam in accordance with manufacturer's instructions.

END OF SECTION 31 52 00

SECTION 32 15 00  
AGGREGATE SURFACING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Provisions for the aggregate surface required for construction of the proposed pedestrian trail along the crest of the dam.
- B. Provisions include furnishing, placing, and compacting aggregate materials required for construction of the proposed trail along the crest of the dam.

1.2 RELATED WORK

- A. Specification 31 23 00 "Earthwork."

1.3 REFERENCES AND DEFINITIONS

- A. Georgia Department of Transportation (GDOT) Standard Specifications Construction of Transportation Systems 2021

- B. ASTM International (ASTM)

ASTM C33	Standard Specification for Concrete Aggregate
ASTM C117	Standard Test Method for Materials Finer than 75- $\mu$ m (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D698	Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft <sup>3</sup> )
ASTM D1140	Standard Test Methods for Determining the Amount of Material Finer than 75- $\mu$ m (No. 200) Sieve in Soils by Washing
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D6913/D6913M	Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis
ASTM D7928	Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis

- C. AASHTO Definitions

- 1. Fines: Soil particles passing the No. 200 sieve.
- 2. Borrow: Material excavated on the site or obtained from offsite areas approved by the Owner.
- 3. Well-graded: A mixture of particle sizes that has no specific concentration, or lack thereof, of one or more sizes. A material type that, when compacted, produces a strong and relatively incompressible soil mass with a minimum of voids.

4. Coverage: One coverage is defined as the result of successive passes by a piece of compaction equipment, which by means of sufficient overlap, will ensure that all areas of the layer or lift being compacted have been subjected to one pass of the compaction equipment. Adequate compaction will likely require several coverages.
5. Optimum Moisture Content: That moisture content which will result in a maximum dry unit weight of the soil resulting from the ASTM D698 laboratory compaction test.
6. Percent Compaction: The percent compaction in-place shall be calculated as the ratio (in percent) of the in-place dry density to the estimated maximum dry density, in accordance with ASTM D698 of the representative fill material at the location of the in-place density test.
7. Proof Rolling: Rolling or compacting a soil surface with approved equipment for the purpose of detecting soft or loose areas.
8. Relative Density: The relative density in-place shall be calculated as the ratio of the difference between the maximum and measured void ratios to the difference between maximum and minimum void ratios, or by using the equation:  

$$R_d(\%) = [\gamma_{d,max} (\gamma_{d,measured} - \gamma_{d,min})] / [\gamma_{d,measured} (\gamma_{d,max} - \gamma_{d,min})] * 100$$
, where  $\gamma_d$  is dry density
9. Unsuitable materials: Materials that contain waste, debris, roots, organic matter, frozen matter, or any other materials determined by the Engineer to not meet the specifications for the required fill.

#### 1.4 QUALITY CONTROL AND QUALITY ASSURANCE

- A. Tolerances: Final grades shall be within two inches of specified grades but not less than the specified grades. Regardless of tolerance, minimum freeboard and positive drainage towards the reservoir shall be maintained for the crest of the embankment.
- B. Contractor to adhere to the requirements stated in the General Terms and Conditions and as specified in Section 01 43 00 "Quality Assurance."
- C. Contractor to adhere to the requirements as specified in Section 31 23 00 "Earthwork."

#### 1.5 SUBMITALS

- A. Submit in accordance with the Terms and Conditions.
- B. Submit a Trail Plan prior to commencing Work, including placement of the aggregate surface course on subgrade and describing all facets of work. Include the source and description of surface course materials, required laboratory test results of all materials, and placement and compaction methods. The Trail Plan shall, at a minimum, include all the following:
  1. Schedule for installation activities.
  2. Detailed description of the sequencing, methods, and operations necessary for construction of the features described in this Section.
  3. Indicate interrelationships to other operations including subgrade preparation, dewatering, and adjacent fill placement.
  4. Methods of construction to be used to perform the construction safely.
  5. Source(s) for imported offsite materials and proposed method(s) of sampling on-site and off-site source(s) for acceptance.

6. Equipment proposed for transport, processing, placement, compaction, and moisture control, including equipment catalog cut sheets with weights, dimensions, and operating data.
  7. Stockpiling and placement plan for materials describing handling and transport of on-site and off-site materials including proposed haul routes and methods proposed for placement and compaction.
  8. Measures to keep materials from becoming contaminated with soil or other materials during stockpiling, transportation, placement, and construction activities.
- C. Samples: Submit samples of source materials for Engineer’s approval. For imported material, submit samples and laboratory tests results 30 days prior to shipment of the material to the site. Submit required laboratory analyses for each imported material used. The Contractor shall arrange for the Engineer to visit the source sites, if requested, and provide equipment with operator to sample materials.
- D. Submit gradation test reports for all imported materials and on-site excavated materials suitable for use as fill. Any time the Contractor changes the source and/or stockpile from which materials are obtained, additional gradation test reports for these new sources shall be required. The Contractor shall include costs for all testing in the bid price. No additional compensation will be allowed for testing.
- E. Certified truckload weight bills: Submit certified truckload weight bills at the time of delivery of all materials to site.
- F. Any supplemental excavation or fill materials required to complete the construction of the trail shall adhere to the submittal requirements as specified in Section 31 23 00 “Earthwork.”

1.6 PROTECTION

- A. Comply with all safety requirements of OSHA.
- B. Protect existing survey monuments and other existing structures and facilities to remain. Damage to existing structures and facilities by the Contractor shall be repaired at the expense of and by the Contractor, at no cost to the Owner, and to the satisfaction of the Engineer.

PART 2 - PRODUCTS

2.1 TRAIL SURFACE AGGREGATE (TSA)

- A. The trail’s surface aggregate shall consist of a suitable, well-graded, crushed stone, imported from approved off-site sources,
- B. All components of the aggregate mix, including fines passing the #200 sieve, are to be derived by crushing parent rock material that meets specifications in Table 1 below, as approved by the Engineer:

**Table 1 – Aggregate Property Specifications**

<b>Aggregate Specification Requirements</b>		
<b>Property</b>	<b>Test Method</b>	<b>Requirement</b>
Hardness	AASHTO T96	40% max loss, 1000 revolutions
pH	ASTM D8262	Between pH 6 and pH 12.45
Plasticity	ASTM D4318	Not to exceed Plasticity Index (PI) of 6

C. The TSA shall be graded within the limits as provided in Table 2.

**Table 2 – Crushed Stone Gradation**

<b>Trail Surface Aggregate <sup>(1)</sup></b>	
<b>U.S. Standard Sieve</b>	<b>% Passing by Weight</b>
1/2 inch	100
3/8 inch	96 - 100
No. 4	75 - 90
No. 8	55 - 75
No. 16	35-50
No. 200	12 – 20

D. Alternatively, the TSA can be a blend of 1 part AASHTO #8, 4 parts AASHTO #10, and 1 part minus #200 aggregate fines.

E. Required material QC testing for crushed stone is presented in Table 3. The tests shall be conducted by the Contractor’s independent testing firm at the frequencies designated unless otherwise directed by the Engineer. These tests are for determining the suitability of the material.

**Table 3 - Crushed Stone Approval Testing**

<b>Test</b>	<b>Test Method (Current Version)</b>	<b>Test Frequency <sup>(1)</sup></b>
Sieve Analysis of Fine and Coarse Aggregates	ASTM D6913/ASTM D7928	Minimum 4 tests per source
Plasticity	ASTM D4318	Minimum 1 tests per source

1) If the test is not performed correctly, contractor using the services of an independent testing laboratory will perform additional test or testing to obtain approval of the Engineer.

## 2.2 EMBANKMENT FILL

- F. Any embankment fill material necessary for completion of the trail surface shall meet the requirements, procedures, and testing as specified in Section 31 23 00 "Earthwork."

## 2.3 COMPACTION EQUIPMENT

- A. General - Compaction equipment shall conform to the manufacturer's specifications and shall be maintained in good working condition at all times. Operate and maintain compaction equipment in accordance with the manufacturer's instructions and recommendations.
- B. Equipment for compaction of materials shall follow the requirements and procedures as specified in Section 31 23 00 "Earthwork."

## PART 3 - EXECUTION

### 3.1 GENERAL EXCAVATION REQUIREMENTS

- A. General excavation procedures shall adhere to the requirements and procedures as specified in Section 31 23 00 "Earthwork."

### 3.2 EXCAVATED MATERIAL SUITABLE FOR FILL

- A. Procedures for use of excavated material suitable for fill shall adhere to the requirements and procedures as specified in Section 31 23 00 "Earthwork."

### 3.3 STRIPPING

- A. Remove all vegetation, roots, and organic soil from the area of proposed trail placement.
- B. Suitable topsoil removed in the stripping operation shall be stockpiled, protected, and reused as topsoil on the new slopes as specified in Section 31 14 13 "Stripping and Stockpiling Topsoil". Dispose of all unsuitable material offsite.

### 3.4 SUBGRADE PREPARATION

- C. Notify Engineer two days prior to beginning trail placement and proof roll with Engineer present. In areas where proof rolling is not practical, Engineer may allow for visual inspection and probing for verification. For areas identified by the Engineer as unsuitable foundation, remove this material to the depths established by the Engineer.

### 3.5 FIELD QUALITY CONTROL

- A. The Engineer will conduct visual inspections of subgrades. Subgrades shall be approved by the Engineer. Soft or yielding areas, as determined by the Engineer, shall be excavated and backfilled as determined by the Engineer.

### 3.6 EXAMINATION PRIOR TO TRAIL PLACEMENT

- A. Prior to placing materials in any section of the embankment, the area shall be cut to grade and proof rolled or probed with a soil probe by Engineer for stability. Proof rolling shall be performed at the direction of the Engineer.
- B. Materials of the subgrade that are considered unstable due to excessive moisture should be scarified to a depth of 6 inches, dried to the required moisture content, and recompacted so that the surface materials will bond with the first layer of the surface course.
- C. Do not place frozen materials or place trail materials on frozen ground.

### 3.7 PREPARATION

- D. Protect the prepared subgrade before trail placement. If the subgrade has deteriorated in the opinion of the Engineer, re-compact to the satisfaction of the Engineer.

3.8 TRAIL AGGREGATE SURFACING

- A. Notify the Engineer at least 48 hours prior to placement of trail aggregate surfacing or performance of any testing.
- B. The subgrade should be smooth cut and examined by the Engineer before placement of initial surface course.
- C. Install the surface aggregate course to the dimensions and locations shown on the Drawings.
- D. The surface aggregate course shall be installed in loose lifts not exceeding 8 inches in thickness for full size compaction equipment and 5 inches in thickness for smaller walk-behind compaction equipment.
- E. Compact with a smooth drum vibratory roller or hand-operated tamper to achieve a relative compaction of at least 90 percent of standard Proctor test. A test section must be performed, either separate from the work or part of the work, to demonstrate the proposed placement, watering, and compaction methods to achieve suitable compaction results (in-place density testing and gradation results). Visual observation of compaction may be deemed acceptable by the Engineer in confined areas on a case-by-case basis. Hand-operated equipment is required within two feet of all structures.
- F. TSA shall be tested for gradation and density in-situ according to Table .

**Table 4 - Crushed Stone In-Situ Testing**

Test	Test Method (Current Version)	Test Frequency
Gradation with No. 200 Wash and Hydrometer	ASTM D6913 and D1140 <sup>(1)</sup>	One (1) test for every 100 cubic yards of TSA placed and compacted if the total quantity to be placed per installation is over 500 cubic yards. One (1) test for every 50 cubic yards of TSA placed if the total quantity to be placed per installation is under 500 cubic yards. The test shall be performed on compacted material.  If any change is noted in placement methods, an additional test will be performed at no cost to the Owner.
In-place Density	ASTM D6938	Minimum of one (1) test for every 100 cubic yards of crushed stone placed and compacted. This test should be performed in conjunction with the gradation testing described above.  Minimum of one (1) test for every 100 linear feet of crushed stone placed and compacted.

**Notes:**

3.9 EMBANKMENT FILL PLACEMENT

- A. If additional embankment fill is required as a result of construction of the Trail, notify the Engineer in writing at least 48 hours prior to placement of fill and performance of any testing.



- B. Embankment fill procedures shall adhere to the requirements and procedures as specified in Section 31 23 00 “Earthwork.”

3.10 PROTECTION OF SLOPES

- A. Protect the new slopes to the extent necessary for preventing erosion. If erosion such as gullies or rivulets occurs, repair to a smooth and uniform slope.

3.11 CLEANING

- A. After the completion of construction, remove excess materials, debris, and other foreign materials from construction operation areas and dispose of them away from the sites of the Work or at designated areas.
- B. Clean up construction roads resulting from the Contractor’s operations, including smoothing and grading of the ground surface to eliminate ruts for erosion prevention and the trimming and smoothing of eroded or caved slopes of cuts or embankments to a stable condition.

END OF SECTION 32 15 00

SECTION 32 31 13

CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Provisions for furnishing and installing permanent vinyl-coated chain link fencing at the locations shown on the Drawings.

1.2 REFERENCES

A. ASTM International (ASTM)

- 1. ASTM A36 Standard Specification for Carbon Structural Steel
- 2. ASTM A123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- 3. ASTM A153 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- 4. ASTM A780 Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
- 5. ASTM A824 Standard Specification for Metallic-Coated Steel Marcellled Tension Wire for Use With Chain Link Fence
- 6. ASTM F567 Standard Practice for Installation of Chain Link Fence
- 7. ASTM F626 Standard Specification for Fence Fittings
- 8. ASTM F668 Standard Specification for Polyvinyl Chloride (PVC), Polyolefin and Other Polymer-Coated Steel Chain Link Fence Fabric
- 9. ASTM F1043 Standard Specification for Strength and Protective Coatings on Steel Industrial Fence Framework
- 10. ASTM F1083 Standard Specification for Pipe, Steel, Hot Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures
- 11. ASTM F1553 Standard Guide for Specifying Chain Link Fence

B. Chain Link Fence Manufactures Institute (CLFMI)

- 1. CLFMI-PM0610 Product Manual

1.3 SUBMITTALS

- A. Submit in accordance with the Terms and Conditions.

- B. Material Certification: Submit certifications that materials conform to the requirements specified in Part 2.
- C. Shop Drawings: Submit the following:
  - 1. Site plan showing layout of fence locations with dimensions.
  - 2. Fence detailed Drawings.
  - 3. Attachment details.
- D. Installation Plan: Submit installation plan for the installation of the fence to the Engineer at least 21 days prior to the anticipated commencement of the Work. At a minimum include the following:
  - 1. Materials and methods for constructing fencing.
  - 2. Material and methods for installing posts and fabric; attaching gate; installing tension wire, and bracing.
  - 3. Methods for installing the fence posts.
- E. At least 14 days prior to beginning fence construction, submit manufacturer and installer qualifications.
- F. Welder Certifications: Submit in accordance with Section 05 50 00 "Metal Fabrications."

#### 1.4 QUALITY ASSURANCE AND QUALITY CONTROL

- A. Standards of Manufacture: Comply with the standards of the Chain Link Fence Manufacturer's Institute Product Manual and applicable referenced ASTM standards.
- B. Manufacturer: Company operating in the United States having U.S. manufacturing facility/facilities specializing in manufacturing chain link fence products with at least 5 years' experience.
- C. Provide chain link fabric and chain link fence as a complete unit produced by a single manufacturer, including necessary erection accessories, fittings, and fastenings.
- D. Fence contractor: Company with demonstrated successful experience installing similar projects and products in accordance with ASTM F567 and have at least 5 years' experience.
- E. Welders: Welders must be qualified in accordance with Section 05 50 00 "Metal Fabrications."

- F. Delivery, Storage, and Handling:
  - 1. Handle and store chain link fence materials in accordance with the manufacturer's recommendations.
  - 2. Remove immediately from the site any chain link fence material damaged during delivery, storage, or handling.

## PART 2 PRODUCTS

### 2.1 CHAIN LINK FABRIC

- A. Height: As shown on the Drawings.
- B. Fabric: Vinyl-coated galvanized steel, woven in 2-inch diamond mesh.
- C. Wire Thickness: 9 gauge (0.144 to 0.148 inches).
- D. Vinyl Coating (permanent fence installations only): 0.02 inches thick (minimum) of plasticized, **BLACK IN COLOR** polyvinyl chloride (PVC) Class 2B, fused and bonded in accordance with ASTM F668, applied by the fusion method over a thermoset plastic bonding agent. The bond shall exhibit equal or greater strength than the cohesive strength of the vinyl. All cut ends shall be factory-coated with vinyl. Vinyl Coating color t
- E. Selvage: Top and bottom edges knuckled, both sides.

### 2.2 INDUSTRIAL FENCE FRAMING

- A. Round steel pipe and rail: ASTM F1043 Group IA Table 3 Heavy Industrial Fence Framework, schedule 40 galvanized pipe per ASTM F1083.
  - 1. Strength Requirement: Heavy industrial according to ASTM F1043.
  - 2. Post Diameter and Thickness: According to ASTM F1043.
    - a. Line Post: 2.375-inch outside diameter, 3.65 pounds per linear foot.
    - b. End, Corner and Pull Post: 2.875 inches, 5.79 pounds per linear foot.
    - c. Top, Brace, Bottom, and Intermediate Rails: 1.660 inch outside diameter, 2.27 pounds per linear foot.
    - d. Swing Gate Post: Size according to ASTM F900. Minimum 2.875-inch diameter, 3.11-lb/ft. weight.
- B. Vinyl Coating (permanent fence installations only): All structural shapes shall be vinyl-clad and galvanized in accordance with ASTM A123. All vinyl-clad materials shall be fusion-bonded in accordance with ASTM F668 Class 2B.

### 2.3 TENSION WIRE

- A. Vinyl Coated Steel Wire: Type II, Marcellled No. 7 gage, 0.177-inch diameter complying with ASTM A824.
- B. Vinyl Coating: 0.02 inches thick (minimum) of plasticized, **BLACK IN COLOR** polyvinyl chloride (PVC) Class 2B, fused and bonded in accordance with ASTM F668 applied by the fusion method over a thermoset plastic bonding agent. The bond shall exhibit equal or greater strength than the cohesive strength of the vinyl.

## 2.4 FITTINGS

- A. All fittings shall be vinyl-clad and galvanized in accordance with ASTM A153. All vinyl-clad materials shall be fusion-bonded in accordance with ASTM F668 Class 2B.
- B. Terminal Post Caps, Line Post Loop Tops, Rail and Brace Ends, Boulevard Clamps, and Rail Sleeves: ASTM F626, pressed steel galvanized after fabrication having a minimum zinc coating of 1.20 oz/ft<sup>2</sup>.
- C. Truss Rod Assembly: ASTM F626, 3/8 in. (9.53 mm) diameter steel truss rod with a pressed steel tightener, minimum zinc coating of 1.2 oz/ft<sup>2</sup>. Assembly capable of withstanding a tension of 2,000 lbs.
- D. Tension Bars: ASTM F626. Galvanized steel one-piece length 2 inches less than the fabric height, minimum zinc coating 1.2 oz. /ft<sup>2</sup>. Bars for 2 inch and 1 ¾ inch mesh: minimum cross section of 3/16 in. by 3/4 in.
- E. Ties or Clips: ASTM F626, 9-gage steel. Attach fabric to all line posts, top rail, and tension wire per CLFMI 2445.
- F. Tie Wire and Hog Rings: ASTM F626 Galvanized steel wire, minimum zinc coating 1.20 oz/ft<sup>2</sup> 9 gauge (0.148 inch).

## 2.5 MISCELLANEOUS METAL WORK

- A. Steel Attachment Plates: Carbon steel, ASTM A36, hot dip galvanized.
- B. Stainless Steel Epoxy/Adhesive Anchors: In accordance with Section 05 50 00 “Metal Fabrications.”

## PART 3 EXECUTION

### 3.1 FENCE INSTALLATION

- A. Install fence in accordance with ASTM F567, the Drawings, and manufacturer’s written instructions as approved by the Engineer.

### 3.2 FRAMEWORK INSTALLATION

- A. Mounting Plates:
  - 1. Install mounting plates on structure walls with stainless steel epoxy anchors and in accordance with Section 05 50 00 “Metal Fabrications.”

2. Trim and miter post bottoms as necessary so that when welded to the mounting plates, the fence posts will be plumb and in alignment. Stainless steel washers may be used as shims to level and adjust plates. Such shimming shall be limited to 1/8–inch.
- B. Top rail: Unless otherwise shown or approved, install 21-foot-long rails continuous through the line post or barb arm loop top. Splice rail using top rail sleeves minimum 6 inches long. Secure the rail to the terminal post by a brace band and rail end. Field-cut and secure the bottom rail or intermediate rail to the line posts using boulevard bands or rail ends and brace bands.
- C. Terminal posts: End, corner, pull and gate posts shall be braced and trussed for fence 6 ft. (1.8 m) and higher and for fences 5 ft. (1.5 m) in height not having a top rail. The horizontal brace rail and diagonal truss rod shall be installed in accordance with ASTM F567.
- D. Tension Wires: Install along the bottom of the fence line and attach to the terminal posts of each stretch of the fence. Install bottom tension wires within the bottom 4 inches of the installed fabric, and on fence without top rail within 4 inches of the top. Pull tension wires taut and free of slack.

### 3.3 CHAIN LINK FABRIC

- A. Install chain link fabric on the outside of the poles and top rails.
- B. Attach fabric to the terminal post by threading the tension bar through the fabric; secure the tension bar to the terminal post with tension bands and 5/16-inch galvanized carriage bolts spaced no greater than 12 inches on center.
- C. Pull fabric taut to provide a smooth uniform appearance free from slack.
- D. Attach fabric to the line post with tie wires spaced no greater than 12 inches on center and attach to rail spaced no greater than 18 inches on center. Attach fabric to the tension wire with hog rings spaced no greater than 18 inches apart.
- E. Wrap tie wire 360 degrees around the post or rail and twist the two ends together three full turns.
- F. Cut off and bend excess wire to prevent injury. Install fabric with ground clearance of no more than 1 inch unless otherwise approved.

### 3.4 NUTS AND BOLTS

- A. Bolts: Install galvanized carriage bolts used for fittings with the head on the secure side of the fence. Peen or crimp all bolts to prevent removal of the nut.

END OF SECTION 32 31 13

SECTION 32 91 19  
TOPSOIL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Provisions for furnishing and placing topsoil.

1.2 DEFINITIONS

- A. Topsoil – Material observed to be dark brown silty or clayey sand/sandy clay or silt with organic matter. Topsoil shall be free of subsoil, noxious weed seed or reproductive vegetation, heavy clay, hard clods, toxic substances, or other material which would be detrimental to plant growth.

1.3 REFERENCES

- A. Georgia Georgia Department of Transportation's (GDOT) Standard Specifications Construction of Transportation Systems 2021
- B. ASTM International (ASTM)
  - 1. D6913 Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis
  - 2. D2976 Standard Test Methods for pH of Peat Materials
  - 3. D4972 Standard Test Methods for pH of Soils
  - 4. G51 Standard Test Methods for Measuring pH of Soil for use in Corrosion Testing
- C. American Association of State Highway and Transportation Officials (AASHTO)
  - 1. T267 Standard Method of Test for Determination of Organic Soil Content in Soils by Loss on Ignition
  - 2. T289 Standard Method of Test for Determining pH of Soil for Use in Corrosion Testing

1.4 SUBMITTALS

- A. Submit in accordance with the Terms and Conditions.
- B. Soil Testing Laboratory Qualifications: An independent laboratory recognized by the State Department of Agriculture, with experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

- C. Topsoil Test Results – Submit written report from laboratory of topsoil laboratory test results for the organic matter, pH value, and gradation per ASTM D6913. Tests shall be performed and certified by a certified soils testing laboratory. One set of test results shall be provided for each topsoil stockpile source to be used on the project.
  - a. A minimum of three representative samples shall be taken from varied locations of proposed topsoil.
  - b. Report suitability of tested soil for turf growth and provide recommendations for soil treatments and soil amendments to be incorporated.
  - c. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem minerals are present, provide additional recommendations for corrective action.

## 1.5 QUALITY ASSURANCE

- A. Topsoil used on this project shall be tested and approved before placement.
- B. Secure approval before acquiring topsoil to be furnished or delivering topsoil to the project site.
- C. After placing the plant topsoil, replace material lost by erosion at no expense to the Owner.

## PART 2 PRODUCTS

### 2.1 TOPSOIL

- A. Source: Except as modified in this Section, furnish plant topsoil material according to Georgia Department of Transportation’s Standard Specifications Construction of Transportation Systems 2021 Section 106.
  - 1. Plant Topsoil Obtained from the Work: The requirements of Subsection 104.06, Right in and Use of Material Found on the Work are in effect for plant topsoil obtained from the work.
    - a) Obtain the quantity of plant topsoil called for on the plans.
    - b) Use plant topsoil material present on the Project as long as the topsoil meets the specifications applying to the Item and is approved by the Engineer.
    - c) Excavate for topsoil only within the construction limits of the project. Obtain topsoil from embankment areas, excavation areas, or borrow excavation pits.
    - d) When obtaining plant topsoil from borrow excavation pits, cross section the excavated areas a second time before beginning regular excavation.
  - 2. Plant Topsoil Furnished by the Contractor: When insufficient material is obtainable from the work, obtain additional topsoil offsite. The Contract Price will include the costs necessary to locate, purchase, and deliver the required amount of acceptable material to the Work.



- B. Provide topsoil conforming to the following requirements as stipulated in the Georgia Department of Transportation's Standard Specifications Construction of Transportation Systems 2021 Section 893.2.01:
3. Plant topsoil obtained from well-drained, arable land, but not from fields where tobacco grew in the last three years, or where Johnson grass or kudzu is present.
  4. Friable, loamy soil with between 2 and 30 percent organic matter. Determine the percentage by measuring the loss on ignition of oven-dried samples ignited at 1,200 °F (650 °C).
  5. Reasonably free from subsoil, heavy or stiff clay, coarse sand, and other deleterious substances.
  6. Has no toxic amounts of acid or alkaline elements.
  7. Can sustain healthy plant life.
  8. Meets the grade requirements of the Georgia Department of Transportation's Standard Specifications Construction of Transportation Systems 2021 Subsection 814.2.01.A.8.
  9. The Owner reserves the right to inspect all plant topsoil during the planting period. The Owner will reject any material that does not meet the specifications.
  10. Do not use frozen, muddy, or nonfriable topsoil.
  11. Before delivering any topsoil to the job site, clear stones larger than 2 in. (50 mm) size and roots, sticks, brush, coarse litter, and other substances that would interfere with mixing, planting, and maintenance.
  12. Entirely free of any objectionable foreign material including invasive exotic plants listed under the Georgia Department of Natural Resources, Wildlife Resources Division's current list of "Invasive Species of Concern in Georgia" provided in Appendix A of the Georgia Invasive Species Strategy plan or in the "Invasive Species Lists" provided by the Georgia Invasive Species Council (GISC).

## PART 3 EXECUTION

### 3.1 DELIVERY, STORAGE, AND HANDLING

- A. Give the engineer at least 24 hours' notice before delivering any stock to the job site.
- B. Send an invoice with each shipment that shows the sizes and varieties of material included.
- C. Pack stock for shipment to properly protect against drying, freezing, breaking, or other injury.
- D. For the purpose of measurement, the Contractor may haul plant topsoil in any type of vehicle, provided the vehicle when loaded to capacity and traveling over public roads and streets meets the provisions of the Georgia Department of Transportation's Standard Specifications for Construction of Transportation Systems 2021 subsection 107.14, Load Restrictions. When using pans or scrapers, the capacity will be the manufacturer's rated capacity.

### 3.2 PLACING TOPSOIL

- A. Unless otherwise specified in the plans, uniformly spread plant topsoil to at least 2 in. (50 mm) loose depth.
- B. Erosion Control: Only use plant topsoil on slopes where the gradient is 3:1 or flatter. To reduce loss of plant topsoil by erosion, place the soil shortly before and in conjunction with grassing operations. Place topsoil and complete grassing within specified seasonal limits.
- C. Spreading Procedure: Before applying plant topsoil, scarify the designated areas 6 in. to 8 in. deep. Mix the plant topsoil, lime when required, and the first application fertilizer with the underlying soil when preparing the soil for grassing. Spread and smooth the topsoil uniformly.
- D. Plant Topsoil Obtained from The Work:
  - a. Stockpiling: When obtaining topsoil from the work site, strip and stockpile the topsoil in suitable locations in advance of grading operations. Just before grassing, remove the plant topsoil from the stockpile and spread it over the designated areas. If grassing is started before grading operations are finished, if feasible, haul the topsoil from undisturbed areas before grading begins directly to the areas designated for the topsoil, eliminating the cost of stockpiling and removing the stockpile.
  - b. Surplus Material: When stockpiling more material than specified in the Contract, use the surplus material as additional plant topsoil material if directed by the Engineer. After constructing the Item, use the surplus material left in the stockpiles to maintain the Item or to fill washes that occur within a reasonable haul distance. Otherwise, remove or dress down the remaining material as directed by the Engineer, without additional compensation.
- E. Plant Topsoil Furnished by Contractor: When locating, obtaining, and paying for plant topsoil from pits outside the right-of-way, excavate the topsoil and haul it directly to the designated areas just before the planting begins. Notify the Engineer, according to Section 3.1 of this Specification, Delivery, Storage, and Handling, of the source of the material. The Engineer will inspect the topsoil. If the material is suitable, the Engineer will specify the permissible excavation depth. If the permissible excavation depth is exceeded, the material obtained from the areas will be rejected.
- F. Perform topsoil spreading operations only during dry weather.
- G. Smooth out unsightly variations, bumps, ridges, and depressions which will hold water. Remove stones, litter, or other objectionable material. Finished surfaces shall conform to the lines and grades indicated on the Drawings or as directed by the Engineer.

END OF SECTION 32 91 19

SECTION 32 92 00  
TURF AND GRASSES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Provisions for turfgrass establishment by seeding, turf renovation, and erosion-control material(s).

1.2 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- C. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- D. Planting Soil: Existing on-site soil, imported soil, or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- E. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- F. Subsoil: All soil beneath the top layer of the soil profile and typified by the lack of organic matter and soil organisms.
- G. Surface Soil: Soil that is present at the top layer of existing soil profile at the project site. In undisturbed areas the surface soil is typically topsoil, but in disturbed areas the surface soil can be subsoil.

1.3 INFORMATIONAL SUBMITTALS

- A. Submit in accordance with the Terms and Conditions.
- B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, submit certification of grass seed stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production, date of packaging, and the name and telephone number of supplier for approval by the project engineer prior to ordering bulk quantity.
- C. Product Certificates: For soil amendments and fertilizers, submit product certificates from the manufacturer for approval by the project engineer prior to ordering.
- D. Pesticides and Herbicides: Submit product labels and manufacturer's application instructions specific to Project for approval by the project engineer prior to ordering.

## 1.4 QUALITY ASSURANCE

- A. All seed bags shall have a label attached stating the date of harvest, lot number, percent purity, percent germination, noxious weed certification, and date of test. All seed shall have been tested within a period of six months of the date of planting.

## PART 2 PRODUCTS

### 2.1 GENERAL

- A. Seed materials shall meet the requirements of the Georgia Department of Agriculture, and all applicable state laws.
- B. Seed materials shall be free of noxious weeds and exotic pest plants, plant parts, or seed listed in the Georgia Department of Natural Resources, Wildlife Resources Division's current list of "Invasive Species of Concern in Georgia" provided in Appendix A of the Georgia Invasive Species Strategy plan or in the "Invasive Species Lists" provided by the Georgia Invasive Species Council (GISC).
- C. All materials shall meet plant quarantine and certification entry requirements of Georgia Department of Agriculture, Plant Protection Regulations.
- D. Dates for seed application are included in Section 3.1 as a reference. Not all species of seed listed in these tables are permitted for this project. **Weeping love grass and lespedeza are not permitted to grow on Category I dams, including Lake Erin Dam.**

### 2.2 TURFGRASS SEED

- A. Grass Seed: Fresh, clean, dry seed complying with the Association of Official Seed Analyst's (AOSA) "Rules for Testing Seeds" for purity and germination tolerances. Seed shall have been harvested from the previous year's crop.
- B. Seed Species:
  - 1. Seed Mix: Provide a seed mix comprised of one full sun, sun and partial shade, and shade at the specified ratio. When seed mixtures are specified, each variety of seed shall be furnished separately and mixed after approval by the Engineer.
  - 2. Quality: State-certified seed of grass species as listed below for solar exposure. Seed must contain a minimum pure live seed content of 95%, and not more than 0.5% weed seed. Seed shall have not less than 85% germination rates.
    - a. Full Sun
      - 1) Cynodon dactylon (Bermuda Grass)
    - b. Sun and Partial Shade: Proportioned by weight as follows
      - 1) 65% Cynodon dactylon (Bermuda Grass)
      - 2) 35% Festuca spp.
    - c. Shade: Proportioned by weight as follows
      - 1) 85% Festuca spp.

2) 15% Cynodon dactylon

## 2.3 INORGANIC SOIL AMENDMENTS

### A. Lime:

1. Apply agricultural lime made of ground or pelletized dolomitic limestone at the rate recommended by a public or private Soil Laboratory that participates in a national proficiency testing program. Proof of testing is the responsibility of the Contractor.
2. Provide a soil test report to the Engineer prior to application. Take soil test samples in accordance with GDOT's Sampling Procedure GSP 18 Sampling, Testing and Inspection Specifications.
3. Agricultural lime will meet the following requirements:
  - a. Agricultural liming material containing a minimum of 85 percent calcium carbonate equivalent, with a minimum of 90 percent passing through the No. 10 sieve, a minimum of 25 percent passing through No. 100 sieve, and a minimum elemental magnesium derived from magnesium carbonate of 6 percent.

## 2.4 FERTILIZERS

- A. Must comply and meet the fertilizer requirements of the Georgia Fertilizer Act of 1997 and the Georgia Soil Amendment Act of 1976.
- B. All fertilizers must be purchased through a Georgia registered licensed distributor and is subject to a sampling inspection by the Georgia Department of Agriculture.
- C. Apply fertilizer based on recommendations from a public or private Soil Laboratory that participates in a national proficiency testing program. Proof of testing is the responsibility of the Contractor. Provide a soil test report to the Engineer prior to application. Take soil test samples in accordance with GDOT's Sampling Procedure GSP 18 Sampling, Testing and Inspection Specifications.
- D. Use commercial fertilizer as a single nutrient or mixed grade containing the following nutrients in amounts as recommended by the soil test:
  1. Nitrogen (N)
  2. Phosphate (P<sub>2</sub>O<sub>5</sub>)
  3. Potash (K<sub>2</sub>
- E. Composted animal manure may be substituted for commercial fertilizer that meets the soil test recommendations.
- F. Clearly label the analysis on the fertilizer container.
- G. Apply fertilizer as a dry or liquid material, using equipment specifically designed for mixing and agitating the fertilizer. Dry or liquid fertilizer may be applied by use of a hydroseeder.
- H. Any fertilizer that becomes caked or otherwise damaged, making it unsuitable for use, shall be replaced at the Contractor's expense.

## 2.5 MULCHES

### A. Straw or Mulch:

1. Areas with permanent grass seed and covered with slope mats or blankets will not require mulch. Evenly apply straw mulch between 3/4 in. and 1-1/2 in. (20 mm and 40 mm) deep, according to the texture and moisture content of the mulch material.
2. Mulch shall allow sunlight to penetrate and air to circulate as well as shade the ground, reduce erosion, and conserve soil moisture. Mulch shall be air-dry, clean, mildew- and seed-free.
3. Use mulching equipment that uniformly cuts the specified materials into the soil to the required control depth.
4. Mulch with Tackifier:
  - a. Mulch uniformly applied manually or with special blower equipment designed for the purpose. When using a blower, thoroughly loosen baled material before feeding it into the machine so that it is broken up.
  - b. After distributing the mulch initially, redistribute it to bare or inadequately covered areas in clumps dense enough to prevent new grass from emerging (if required). Do not apply mulch on windy days.
  - c. Use a tackifier listed in GDOT's Laboratory Qualified Products Manual and apply at the manufacturer's recommended rates.
  - d. Apply enough tackifier to the mulch to hold it in place. Immediately replace mulch that blows away. If distributing the mulch by hand, immediately apply the tackifier uniformly over the mulched areas.
5. Walked-in-Mulch:
  - a. Apply walked-in-mulch on slopes ranging in steepness from 5:1 to 2:1.
  - b. Immediately walk it into the soil with a cleated track dozer. Make dozer passes vertically up and down the slope.
6. Apply only wheat straw mulch on Riparian Areas, Stream Restoration Areas, and Wetland and Stream Mitigation Areas after they have been seeded. The wheat straw mulch is to be applied with a maximum thickness of 1 in.

### B. Wood Fiber Mulch:

1. Use wood fibers that do not contain germination or growth-inhibiting factors.
2. Hydraulically applied for Hydroseeding only.
3. On an equilibrium air-dried basis, they contain a maximum of 15 percent water, and maintain a pH range of 4.5 to 8.5.
4. Use a wood fiber mulch listed in GDOT's Qualified Products List (QPL), see QP No. 25.

## 2.6 PESTICIDES

- A. The Contractor shall have a certified pesticide operator's license for the State of Georgia and shall furnish evidence of such with the bid.
- B. General: Use pesticides according to Federal, State, and County directives on environmental control that are registered and approved by the EPA, are acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction. Follow the manufacturer's instructions.
- C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

## 2.7 EROSION CONTROL MATERIALS

- A. Erosion Control Blankets: Biodegradable straw, wood excelsior, wood or coconut-fiber mat. Use anchoring staples made from minimum 11-gauge wire, formed into a U shape. The legs will be at least 6 in. (150 mm) long and the crown at least 1 in. (25 mm) wide. Use staples rigid enough to penetrate the soil without distortion.
  - 1. Straw Blanket: A machine-produced blanket of clean, weed-free, consistently thick straw from agricultural crops. The straw is evenly distributed over the entire area of the blanket. Use blankets at least 48 in. (1.2 m) wide and at least 3/8 in. (9 mm) thick with a minimum dry weight of 0.5 lb./yd<sup>2</sup> (270 g/m<sup>2</sup>) and a stitch pattern and row spacing of no more than 2 in. (50 mm). Have the top side covered with a photo-degradable plastic mesh having a maximum mesh size of 1/2 by 1/2 in. (25 mm by 25 mm). The mesh will be sewn to the straw with biodegradable thread. Use this blanket on slopes only.
  - 2. Excelsior Blanket: A machine-produced mat of curled wood excelsior. Eighty percent consists of 6 in. (150 mm) or longer fiber evenly distributed over the entire blanket. Use a smolder-resistant blanket with the top side clearly marked. Use a blanket at least 48 in. (1.2 m) wide and 1/4 in. (6 mm) thick with a minimum dry weight of 0.8 lb./yd<sup>2</sup> (430 g/m<sup>2</sup>) and a stitch pattern and row spacing of no more than 2 in. (50 mm).
    - a. Slopes: Have the top side covered with a photo-degradable plastic mesh having a maximum mesh size of 1-1/2 by 3 in. (38 by 75 mm).
    - b. Waterways: Have the top and bottom sides of the blanket covered with a photodegradable plastic mesh having a maximum mesh size of 1 1/2 x 3 in. (38 x 75 mm), sewn to the fiber with biodegradable thread or otherwise bonded as approved by the Engineer.
  - 3. Coconut Fiber Blanket: A machine-produced blanket of 100 percent coconut fiber evenly distributed over the entire blanket. Use a blanket at least 48 in. (1.2 m) wide and 1/4 in. (6 mm) thick with a minimum dry weight of 0.5 lb./yd<sup>2</sup> (270 g/m<sup>2</sup>) and a stitch pattern and row spacing of no more than 2 in. (50 mm). Ensure that both sides of the blanket are covered with a photo-degradable plastic mesh with a maximum of 5/8 by 5/8 in. (19 by 19 mm). Have the mesh sewn to the fiber with a breakdown-resistant synthetic yarn.
  - 4. Wood Fiber Blanket:
    - a. Type I:

- 1) A machine-produced blanket manufactured with reprocessed wood fibers to a consistent thickness.
- 2) Use a machine produced blanket manufactured to a consistent thickness using reprocessed wood fibers.
- 3) Use a blanket at least 48 in. (1.2 m) wide with a minimum dry weight of 0.35 lb./yd<sup>2</sup>. (190 g/m<sup>2</sup>). Use the blanket on slopes only.
- 4) Ensure that the top side of the blanket is covered with a photo-degradable plastic mesh with a maximum mesh size of 5/8 by 3/4 in. (16 by 19 mm) securely bonded to the mat.
- 5) Ensure that the fibers do not contain a growth that inhibits germination.

b. Type II:

- 1) A hydraulically applied bonded fiber matrix which upon drying, adheres to the soil in the form of a continuous 100 percent coverage, biodegradable erosion control blanket.
- 2) Ensure the bonded fiber matrix is composed of long strand wood fibers or cellulosic-based fibers held together by a bonding agent, which, upon drying, becomes insoluble and non-dispersible.
- 3) Apply the matrix at the following rates:
  - a) 3,000 lbs./acre (3.4 Mg/ha) for 4:1 slope
  - b) 3,600 lbs./acre (4.1 Mg/ha) for 2:1 slope
  - c) 4,000 lbs./ acre (4.5 Mg/ha) for 1:1 slope

PART 3 EXECUTION

3.1 DATES FOR SEED APPLICATION

**NON-NATIVE GRASS SEEDING TABLE 1**

(Temporary and Permanent Seed Types for Shoulders, Medians and Slopes 3:1 or Flatter)

Common Name	Botanical Name	Class/Type	Rate/Acre	Planting Zone	Planting Dates
Common Bermuda Grass (Hulled)	<i>Cynodon dactylon</i>	Required Permanent Grass	10 (11)	1	April 16 – August 31
Common Bermuda Grass (Unhulled)			10 (11)		
Common Bermuda Grass (Hulled)	<i>Cynodon dactylon</i>	Required Permanent Grass	10 (11)	2,3,4	April 1 – October 15
Common Bermuda Grass (Unhulled)			10 (11)		
Bahaia Grass			<i>Paspalum motatum</i>		
Rye Grass, Millet, Cereal Grass (Oats)	<i>Lolium penne</i> ssp. <i>Multiflorum</i> , <i>Echinochloa cursgalli</i> , <i>Avena sativa</i>	Temporary Grass	50 (56)	1	September 1- April 15
Rye Grass, Millet, Cereal Grass (Oats)	<i>Lolium penne</i> ssp. <i>Multiflorum</i> , <i>Echinochloa cursgalli</i> , <i>Avena sativa</i>	Temporary Grass	50 (56)	2,3,4	October 16- March 31



**NON-NATIVE SEEDING TABLE 2**

(Temporary and Permanent Seed Types for back slopes, fill slopes and areas which will not be subject to frequent mowing, slopes steeper than 3:1)

Common Name	Botanical Name	Class/Type	Rate/Acre	Planting Zone	Planting Dates
Interstate Lespedeza	<i>Lespedeza sericea</i>	Permanent Grass	50(56)	1,2	March 1 – August 31
Weeping Lovegrass	<i>Eragrostis curvula</i>	Temporary Grass	10(11)		
Interstate Lespedeza	<i>Lespedeza sericea</i>	Permanent Grass	75(84)	1,2	September 1- February 28
Tall Fescue	<i>Festuca arundinacea</i>	Temporary Grass	50(56)		
Interstate Lespedeza	<i>Lespedeza sericea</i>	Permanent Grass	50(56)	3,4	April 1 – October 31
Weeping Love Grass	<i>Eragrostis curvula</i>	Temporary Grass	10(11)		
Interstate Lespedeza	<i>Lespedeza sericea</i>	Permanent Grass	50(56)	3,4	November 1 – March 31
Weeping Love Grass	<i>Eragrostis curvula</i>	Temporary Grass	10(11)		

**NATIVE GRASS SEEDING TABLE 3**

**For Non-mowable Slopes or Areas Designated as Permanent Native Grass Plots.**

(Plant native seed mixes on back slopes, fill slopes and areas which will not be subject to frequent mowing (slopes steeper than 3:1).

Common Name	Botanical Name	Class/Type	Rate/Acre	Planting Zone	Planting Dates
Canada Wild Rye	<i>Elymus canadensis</i>	Cool Season	Minimum 2 (2)	1,2,3,4	October 31 - March 31
Virginia Wild Rye	<i>Elymus virginicus</i>	Cool Season	Minimum 2 (2)	1,2,3,4	October 31 - March 31
Bottle-brush Grass	<i>Hystrix patula</i>	Cool Season	Minimum 2 (2)	1,2,3,4	October 31 - March 31
Little Bluestem	<i>Schizachyrium scoparium (Andropogon scoparius)</i>	Warm Season	Minimum 2 (2)	1,2,3,4	March 31- August 31
Indiangrass	<i>Sorghastrum nutans</i>	Warm Season	Minimum 2 (2)	1,2,3,4	March 31- August 31
Eastern Gama Grass	<i>Tripsacum dactyloides</i>	Warm Season	Minimum 2 (2)	1,2,3,4,1,2,3,4	March 31- August 31
Rice Cut Grass	<i>Leersia oryzoides</i>	Warm Season	Minimum 2 (2)	1,2,3,4	March 31- August 31
Deertongue	<i>Panicum clandestinum</i>	Warm Season	Minimum 2 (2)	1,2,3,4	March 31- August 31
Switchgrass	<i>Panicum virgatum</i>	Warm Season	Minimum 2 (2)	1,2,3,4	March 31- August 31
Woolgrass	<i>Scirpus cyperinus</i>	Cool Season	Minimum 2 (2)	1,2,3,4	October 31 - March 31
River Oats	<i>Chasmanthium latifolium</i>	Cool Season	Minimum 2 (2)	1,2,3,4	October 31 - March 31
Purple Top	<i>Tridens flavus</i>	Warm Season	Minimum 2 (2)	1,2,3,4	March 31- August 31

See plan sheets/plant lists for detailed native restoration and riparian mitigation seed mix combinations to be applied at a minimum rate total of 10 (11) lbs. per acre (kg/hectare) for each combined mix. If the mix is not provided in the plan sheets, use a minimum of 3 species based on planting dates shown above.

Wild bergamot	<i>Monarda fistulosa</i>	Herbaceous Perennial	Up to 10(11)	1,2,3,4	September 1 – May 1
Mountain mint	<i>Pycnanthemum tenuifolium</i>	Herbaceous Perennial	Up to 10(11)	1,2,3,4	September 1 – May 1
Black-eyed susan	<i>Rudbeckia hirta</i>	Herbaceous Perennial	Up to 10(11)	1,2,3,4	September 1 – May 1
Goldenrod	<i>Solidago nemoralis</i>	Herbaceous Perennial	Up to 10(11)	1,2,3,4	September 1 – May 1
Butterfly Weed	<i>Asclepias tuberosa</i>	Herbaceous Perennial	Up to 10(11)	1,2,3,4	March 1 - August 31,

Species	Rates per 1000 sq. ft.	Rates per Acre	Planting Date By Zone		
			1 & 2	2	3 & 4
Rye (Grain)	3.9 lbs	168 lbs	8/1 - 11/30	8/15 - 12/1	9/1 - 2/28
Ryegrass	0.9 lbs	40 lbs	8/1 - 11/30	9/1 - 12/15	9/15 - 1/1
Rye & Annual Lespedeza	0.6 lbs 0.6 lbs	28 lbs 24 lbs	3/1 - 4/1	2/1 - 3/1	2/1 - 3/1
Weeping Lovegrass	0.1 lbs	4 lbs	3/15 - 6/15	3/15 - 7/15	3/15 - 7/15
Sudangrass	1.0 lbs	60 lbs	4/1 - 8/31	4/1 - 8/31	3/15 - 8/1
Browntop Millet	1.1 lbs	50 lbs	4/1 - 6/30	4/1 - 7/15	4/1 - 7/15
Wheat	3.9 lbs	168 lbs	9/1 - 12/31	9/1 - 12/31	9/15 - 1/31

For native restoration and riparian mitigation seed mix combinations, use Table 4 for approved native herbaceous seed types in combination with Table 3 of native grass seeds. Native restoration and riparian seed mixes should incorporate a mix of 60% native grass types (see Table 3) and 40% native herbaceous types (see Table 4) applied at a minimum rate total of 10 (11) lbs. per acre (kg/hectare) for each combined mix.

#### HERBACEOUS PLANT SEEDING TABLE 4

(Approved for Riparian Mitigation or for Seed Mixes on Slopes Steeper than 3:1- Requiring Permanent Planting)

Common name	Botanical name	Class/type	Rate/Acre	Planting Zone	Planting Dates
Joe Pye Weed	<i>Eupatorium fistulosum</i>	Herbaceous Perennial	Minimum 2 (2)	1,2,3,4	September 1 – May 1
Ironweed	<i>Vernonia novaboracensis</i>	Herbaceous Perennial	Up to 10(11)	1,2,3,4	March 1 - August 31,
White snakeroot	<i>Ageratina altissima (Eupatorium rugosum)</i>	Herbaceous Perennial	Up to 10(11)	1,2,3,4	September 1 – May 1
Swamp milkweed	<i>Asclepias incarnata</i>	Herbaceous Perennial	Up to 10(11)	1,2,3,4	March 1 - August 31,
Frost aster	<i>Aster pilosus (Symphyotrichum pilosum)</i>	Herbaceous Perennial	Up to 10(11)	1,2,3,4	September 1 – May 1
Partridge pea	<i>Chamaecrista fasciculata (Cassia fasciculata)</i>	Herbaceous Perennial	Up to 10(11)	1,2,3,4	March 1 - August 31,
Lance-leaf coreopsis	<i>Coreopsis lanceolata</i>	Herbaceous Perennial	Up to 10(11)	1,2,3,4	September 1 – May 1
Tall coreopsis	<i>Coreopsis tripteris</i>	Herbaceous Perennial	Up to 10(11)	1,2,3,4	September 1 – May 1
Boneset	<i>Eupatorium perfoliatum</i>	Herbaceous Perennial	Up to 10(11)	1,2,3,4	September 1 – May 1
Sneezeweed	<i>Helenium autumnale</i>	Herbaceous Perennial	Up to 10(11)	1,2,3,4	September 1 – May 1
Swamp sunflower	<i>Helianthus angustifolius</i>	Herbaceous Perennial	Up to 10(11)	1,2,3,4	March 1 - August 31,
Fringed loosestrife	<i>Lysimachia ciliata</i>	Herbaceous Perennial	Up to 10(11)	1,2,3,4	September 1 – May 1

### 3.2 FIELD CONDITIONS

- A. 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 the manufacturer's written instructions.

### 3.3 EXAMINATION

- A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.
  - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
  - 2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
  - 3. Uniformly moisten excessively dry soil that is not workable, or which is dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Engineer and replace with new planting soil.
- D. Determine the acidity or alkalinity (pH) of the soil per ASTM D4972 "Standard Test Method for pH of Soils." Test shall be conducted by a certified soils laboratory.

### 3.4 PREPARATION

- A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
  - 1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
  - 2. Protect grade stakes set by others until directed to remove them.
- B. Remove boulders, stumps, large roots, large clods, and other objects that interfere with grassing or may slide.
- C. Install erosion control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and pavements.

### 3.5 TURF AREA PREPARATION

- A. Limit turf subgrade preparation to areas to be planted.
- B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 4 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off the project area.
  - 1. Spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.
    - a. Delay mixing fertilizer with planting soil if planting will not proceed a few days.
    - b. Mix lime with dry soil before mixing fertilizer. Lime application shall be sufficient to achieve a soil pH value of between 5.5 and 7.0.

2. Spread topsoil to a depth of 6 inches but not less than the required to meet finish grades after light rolling and natural settlement. Do not spread if topsoil or subgrade is frozen, muddy, or excessively wet.
  - a. Spread approximately ½ the thickness of planting soil over loosened subgrade. Mix thoroughly into top 2 inches of subgrade, then spread remainder of topsoil.
- C. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface as follows:
  1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
  2. Loosen surface soil to a depth of at least 6 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches of soil. Till soil to a homogeneous of fine texture.
  3. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, trash, and other extraneous matter.
  4. Legally dispose of waste material, including grass, vegetation, and turf, off the project area.
- D. Finishing Grade: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture, Grade to within plus or minus ½ inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.
- E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- F. Before planting, obtain the Engineer's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

### 3.6 PREPARATION FOR EROSION-CONTROL MATERIALS

- A. Before placing the blanket, complete the grassing operations, smooth the area, and remove stones, lumps, roots, or other material that would prevent the blanket from laying snugly on the soil. Prepare area as specified in "Turf Area Preparation" Article above.
- B. For erosion-control blanket or mesh, install blankets or mats vertically on the slopes beginning at the top of the slope and extending to the bottom of the slope and as recommended by material manufacturer for site conditions. Horizontal installation of the blankets or mats is not permitted. Fasten as recommended by material manufacturer.
- C. Place the blanket within 24 hours after planting and before rain or watering. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- D. Place the blanket on slopes and waterways as follows:
  1. Unroll the blanket with the netting on top and the fibers contacting the soil over the entire slope. When using two or more blankets to cover an area, overlay the joint 4 in. (100 mm) and staple through the joint. Overlap the ends of the blanket at least 6 in. (150 mm) with the upgrade section on top and staple through the overlap.
  2. In waterways, ditches, flumes, and channels unroll the blanket with netting sewn on both sides and place in contact with the soil beginning at the downstream terminal and progressing upstream of the blanket according to the Construction Detail for Permanent Soil Reinforcing Mat. Allow a longitudinal seam only if the blankets overlap at least 6 in. (150 mm) and are securely stapled. Overlap ends of the blanket at least 6 in. (150 mm) with

the upgrade section on top. Insert 12 in. (300 mm) of the upslope end of the first row of blankets into a 6 in. (150 mm) deep anchor slot. Staple the blanket in the slot bottom, backfill the slot, and solidly tamp.

- E. Drive staples vertically into the ground to anchor the plastic mesh. Place the staples approximately 2 yd (2 m) apart on each side of the blanket and add one row in the center alternately spaced between each side staple. Where blankets lay side to side, place each staple so that half of the staple anchors mesh from each blanket. At the beginning of a blanket, space staples approximately 12 in. (300 mm) apart in a row.

### 3.7 SEEDING

- A. Prepare seed and sow as follows:

- 1. Inoculation of Seed

- a. Inoculate each kind of leguminous seed separately with the appropriate commercial culture according to the manufacturer's instructions for the culture.
- b. When hydroseeding, double the inoculation rate.
- c. Protect inoculated seed from the sun and plant it the same day it is inoculated.

- 2. Sowing

- a. Weather permitting, sow seed within 24 hours after preparing the seed bed and applying the fertilizer and lime.
- b. Sow seed uniformly at the rates specified in the GDOT seeding tables. Use approved mechanical seed drills, rotary hand seeders, hydroseeding equipment, or other equipment to uniformly apply the seed. Do not distribute by hand.
- c. To distribute the seeds evenly, sow seed types separately, except for similarly sized and weighted seeds. They may be mixed and sown together.
- d. Do not sow during windy weather, when the prepared surface is crusted, or when the ground is frozen, wet, or otherwise non-tillable. Do not broadcast or drop seed when the wind velocity exceeds 5 mph.
- e. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
- f. Do not use wet seed or seed that is moldy or otherwise damaged.
- g. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

- B. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.

- C. Protect seeded areas with slopes exceeding 4-horizontal-to-1-vertical (4H:1V) with erosion-control blankets installed and stapled according to manufacturer's written instructions.

- D. Protect seeded areas with slopes not exceeding 4H:1V by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.

1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.

E. Riparian Seed Mix shall only be used when specified in the plans.

### 3.8 HYDROSEEDING

A. Hydroseeding: Hydroseeding may be used on any grassing area. Under this method, spread the seed, fertilizer, and wood fiber mulch in the form of a slurry. Seeds of all sizes may be mixed together. Apply hydroseeding as follows:

1. Use wood fiber mulch as a metering agent and seed bed regardless of which mulching method is chosen. Apply wood fiber mulch at approximately 500 lbs./acre (560 kg/ha).
2. Prepare the ground for hydroseeding in the same manner as for conventional seeding provided in "Turf Area Preparation" Article above.
3. Use specially designed equipment to mix and apply the slurry uniformly over the entire seeding area.
4. Agitate the slurry mixture during application.
5. Discharge slurry within one hour after being combined in the hydroseeder. Do not hydroseed when winds prevent an even application (wind velocity exceeding 5 mph).
6. Closely follow the equipment manufacturer's directions unless the Engineer modifies the application methods.
7. Mulch the entire hydroseeded area according to section 2.5 and 3.7.1, above. Native Restoration Areas, Multitropic Native Planting Areas, Riparian Areas, Stream Restoration Areas, and Wetland and Stream Mitigation Areas may be hydroseeded. When hydroseeding in these areas, only use water, seed, and wood fiber mulch.

### 3.9 TURF MAINTENANCE

A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and re-mulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.

B. Watering: Water the areas during this period as necessary to promote maximum growth.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch.
2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

C. Additional Fertilizer Mixed Grade

1. Apply fertilizer based on the initial soil test report at half the recommended rate each spring after initial plant establishment. For bid purposes apply 200 lbs./acre of 19-19-19. Continue annual applications until Final Acceptance. This additional fertilizer will be measured and paid for at the Contract Unit Price for fertilizer mixed grade.
2. Do not apply additional fertilizer to Native Restoration Areas, Multitropic Native Planting Areas, Riparian Areas, Stream Restoration Areas, and Wetland and Stream Mitigation Areas.

D. Growth and Coverage:

1. Provide satisfactory growth and coverage, ensuring that vegetation growth is satisfactory with no bare spots larger than 1 square foot (0.1 m<sup>2</sup>). An exception is given for seed not expected to have germinated and shown growth at that time.

3.10 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by the Engineer:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 100 square feet and bare spots not exceeding 12-inches by 12-inches.
- B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.11 LIME AND FERTILIZER APPLICATION

A. Apply and mix lime and fertilizer as follows:

1. Agricultural Lime:
  - a. Uniformly spread agricultural lime on the ground at the approximate rate determined by the laboratory soil test.
  - b. Agricultural Lime may be used as filler material in mixed grade fertilizer in lieu of inert material. The use of agricultural lime as filler material is to be shown on the fertilizer bag or invoice from the supplier. Do not deduct any amount of fertilizer when lime is used as filler.
2. Fertilizer Mixed Grade:
  - a. Uniformly spread the fertilizer selected in Section 2.4 over the ground or by use of hydroseeding. For bid purposes base estimated quantities on an initial application of 400 lb./acre of 19-19-19.
3. Mixing:
  - a. Before proceeding, uniformly work the lime and fertilizer into the top 4 in. (100 mm) of soil using harrows, rotary tillers, or other equipment acceptable to the Engineer.
  - b. On cut slopes steeper than 3:1, other than serrated slopes, reduce the mixing depth to the maximum practical depth as determined by the Engineer.
  - c. Omit mixing on serrated slopes.

4. Native Restoration Areas, Multitropic Native Planting Areas, Riparian Areas, Stream Restoration Areas, and Wetland and Stream Mitigation Areas:
  - a. Omit the application of lime and fertilizer within riparian areas.

### 3.12 PESTICIDE APPLICATION

- A. Inspect all planted or seeded vegetation for insects, grubs, mites, diseases, etc., once every two weeks. Apply insecticides, fungicides, and herbicides according to the manufacturer's recommendations to effectively control or eradicate the problem.
- B. Perform all pesticide applications under the direct supervision of a trained licensed commercial pesticide operator whose license includes subcategory 25 – Seed Treatment per Georgia's Department of Agriculture's Pesticide Applicator License Category.
- C. Carry the pesticide license/certification on the work site during applications. Carry all labeling associated with the chemical being applied at the work site.
- D. Submit all product information data sheets and EPA approval numbers on all pesticides proposed to be used prior to application for approval. Notify the Owner and Engineer a minimum of 48 hours prior to any and all pesticide applications.
- E. Add a blue dye to all spray applications unless approved otherwise by the Engineer.
- F. Monitor the weather and spray under proper weather conditions. Spraying shall not occur when the weather is greater than 10 miles per hour.
- G. Wear the proper safety attire. Wear long sleeve shirts, long pants, gloves, and safety glasses. Wear or use any additional protective safety attire or gear as recommended by the product's manufacturer.
- H. Repair any damage that is a result of mishandling or misuse of materials, at no expense to the Owner, Georgia's Department of Agriculture or Engineer, to the satisfaction of the Engineer.
- I. For stream buffer and marsh restoration areas, pesticides are not to be used unless approved by the Department Ecology Manager.
- J. Apply pesticides and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with the Owner's operations and others in proximity to the Work.
- K. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

### 3.13 CLEANUP AND PROTECTION

- A. Contractor shall maintain temporary access roads, construction entrances, and other areas intended for construction traffic in a passable manner during construction. Upon completion of the project, any imported gravel shall be removed in accordance with Section 01 74 19 "Disposal of Waste Materials" and the area will be restored as outlined in this specification.
- B. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.
- D. Remove nondegradable erosion-control measures after the grass establishment period.



3.14 MAINTENANCE SERVICE

A. Turf Maintenance Service: Provide full maintenance by skilled employees of the landscape Installer. Maintain as required in "Turf Maintenance" section above. Begin maintenance immediately after each area is planted and continue until acceptable turf is established, but for not less than the following periods:

1. Seeded Turf: 30 days from date of planting completion.

END OF SECTION 32 92 00

## SECTION 33 01 30

### PIPE CLEANING AND VIDEO INSPECTION

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Requirements for cleaning and conducting video inspections of pipe conduits including:
  - 1. Inspection of new toe drain pipe conduits.
  - 2. Inspection of new principal spillway pipe conduit.

##### 1.2 REFERENCES

- A. ASTM International
  - 1. ASTM E177 Standard Practice for Use of the Terms Precision and Bias in ASTM Test Methods
  - 2. ASTM E691 Standard Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

##### 1.3 SUBMITTALS

- A. Submit in accordance with the Terms and Conditions and as specified herein.
- B. Submit proposed pipe cleaning procedures and equipment.
- C. Submit qualifications of video inspection firm and video inspection equipment. Qualifications shall show at least 3 video pipe inspection projects completed in the last 2 years.
- D. Submit all recorded information to the Engineer on standard forms along with the complete video inspection on digital video disc (DVD) or solid-state data storage device (flash drive) format with audio recording documenting video inspection of all pipe conduits. The forms included in this method shall be used for reporting the inspection information. Ensure the name of the contractor conducting the inspection is provided. Ensure all video pipe runs on the DVD have the station, milepost, distance into the drain or other indicators of location superimposed on the video.
- E. Submit 1 copy of the paper inspection, 3 copies of the DVD or flash drive and 1 electronic copy of the report. All inspection reports shall be completed on the attached forms of GDOT's Sampling, Testing, and Inspection Specification GDT 136 and shall be clearly named and organized in the electronic copy. Submit one electronic copy of inspection video(s), inspection data/database, and all field notes taken by the inspector.
- F. Submit the video inspection within one day of inspection. The DVD or flash drive becomes the property of the Owner.

##### 1.4 COORDINATION

- A. Coordinate video inspection of the pipe so the Engineer may be present. Notify the Engineer a minimum of 7 calendar days before the inspection is to be conducted.
- B. Video inspection may need to be conducted in a flowing pipe.
- C. Unless directed by the Engineer, schedule the video inspections for the selected locations no sooner than 30 days after completing pipe installations to be tested.

## PART 2 PRODUCTS

### 2.1 CAMERA INSPECTION EQUIPMENT

- A. Provide a pipeline inspection camera having the following features:
  - 1. Configured properly in the pipe both vertically and horizontally and having the ability to pan and tilt to a 90-degree angle with the axis of the pipe and rotate 360 degrees.
  - 2. Low barrel distortion camera.
  - 3. Color image with a minimum standard resolution of 720 x 480 pixel.
  - 4. Equipped with sufficient lighting to provide a clear image of the full circumference of the pipe.
  - 5. Capable of recording the station, milepost, distance along the invert of the pipe, or other indicators of location superimposed on the video.
  - 6. Capable of moving through the entire length of the pipe.
  - 7. Capable of measuring cracks greater than or equal to 0.01 inch and joint separations greater than 0.5 inch.
  - 8. Software capable of generating a report that includes the following:
    - a. Actual recorded length and width measurements of all cracks within the pipe.
    - b. Actual recorded separation measurement of all pipe joints.
    - c. Pipe ovality report.
    - d. Deflection measurements and graphical diameter analysis report in terms of x and y axis.
    - e. Flat analysis report.
    - f. Representative diameter of pipe.
    - g. Pipe deformation measurements, leaks, debris, or other damage or defects.
    - h. Deviation in pipe line and grade, joint gaps, and joint misalignment.
- B. Video Recording Equipment:

1. Video monitor for viewing real-time video footage, along with recording capabilities.
2. Capability to record pipe inspection video on color video in DVD or flash drive format. Provide the ability for any captured video to be played back from a DVD or flash drive by any user with a personal computer (PC) utilizing standard viewers.
3. Setup video monitor in a location for viewing by the Engineer. Provide shrouds or other light blocking so that the video monitor is clearly visible.
4. Provide an audio voice with the video that includes a description of obstructions and anomalies or obstructions. In lieu of audio voice, text may be written onto the video that describes obstructions and anomalies. Zoom and pause at anomalies when directed by the Engineer. Draw attention to all recognizable defects and imperfections on the video. Record on written notes locations of any defects.

## 2.2 LASER DEFLECTION MEASURING DEVICE

- A. Provide a laser deflection measuring device, for use of flexible pipe up to 48 inches in diameter, capable of measuring deflection to an accuracy of 0.5% or better and a repeatability of 0.12% or better. References of the equipment calibration are ASTM E691 and ASTM E177.

## 2.3 MANDREL

- A. Provide a mandrel device which are rigid, nonadjustable, odd numbered legged (9 minimum) having the following:
  1. Length not less than 7/16 of its nominal diameter.
  2. Diameter at any point shall not be less than the diameter specified in Section 3.4 of this Article.
  3. Diameter, whether fixed or variable, shall be verified with a proving ring or other method per the manufacturer's guidelines.

## 2.4 MANUAL INSPECTION MEASURING DEVICES

- A. Use contact or non-contact distance instruments.

# PART 3 EXECUTION

## 3.1 CLEANING

- A. Clean existing pipes with approved equipment specifically designed for the purpose of pipe cleaning, before conducting video inspection. Follow requirements as applicable when specified separately. A video inspection may be conducted during cleaning to verify the cleaning process, if requested by the Engineer. A final recorded video must be completed after cleaning tools are removed.

## 3.2 VIDEO INSPECTION FOR DEFECTS AND DISTRESSESS

- A. Ensure pipe is clear of water, debris and/or obstructions.

- B. Complete the video inspection and any necessary measurement prior to placing the final surface over any pipe. Take measurements 30 days or more after the completion of earthwork to within 1 foot of the finished grade. Notify the engineer a minimum of 7 days in advance of inspection. Notify the engineer immediately if distresses or locations of improper alignment are logged.
- C. Begin at the outlet end and proceed through to the inlet at a speed less than or equal to 30 feet per minute. The distance shall have an accuracy of 1 foot per 100 feet. Remove blockages that will prohibit a continuous operation.
- D. Document locations of all observed defects and distresses including cracking, exposed reinforcing steel, sags, joint offsets, joint separations, deflections, improper joints/connections, blockages, leaks, rips, tears, buckling, deviation from line and grade, and other anomalies not consistent with a properly installed pipe.
- E. During the video inspection provide a continuous 360 degree pan of every pipe joint.
- F. Identify and measure all cracks greater than or equal to 0.01 inch and joint separations greater than 0.5 inch. Cracks with a width less than 0.01 inch are considered hairline and minor and only need to be noted in the inspection report.
- G. Video inspections are conducted from junction to junction which defines a pipe run. A junction is defined as a headwall, drop inlet, manhole, junction box, or other structure that disturbs the continuity of the pipe. Each pipe run must be on a separate video file and all locations are to be referenced from the nearest junction relative to that pipe run.
- H. Record single frames of video images and live video, as well as inspection data, onto a DVD or flash drive and submit all data per Section 1.3 of this Specification.

### 3.3 LASER INSPECTION FOR DEFLECTION

- A. Calibrate the laser deflection measuring device according to the manufacturer's specifications. Provide all calibration data and applicable manufacturer's recommendations for calibration and use to the Engineer.
- B. Measure the deflection occurring at the point the projected laser and at a minimum interval of 0.1 feet along the pipe.
- C. All deflection measurements are to be based on the AASHTO Nominal Diameter. Refer to Section 3.5 of this Article.
- D. Inspect at a speed that will provide proper data acquisition to effectively measure the maximum deflection. The inspection speed shall be less than or equal to 30 feet per minute. The laser projection head shall be positioned so that the laser ring fills minimum 75% of the monitor screen height.
- E. Laser inspections are conducted in the same manner as Section 3.2.G of this Article.
- F. Record and submit all data per Section 1.3 of this Article.

### 3.4 MANDREL TESTING

- A. Mandrel Testing will be used for deflection testing if the video measurements are called into question or if limitations in the laser deflection measuring device are exceeded.
- B. Use proving ring or other method recommended by the mandrel manufacturer to verify mandrel diameter prior to inspection. Provide verification documentation for each size mandrel to the Engineer.
- C. All deflection measurements are to be based on the AASHTO Nominal Diameters. Refer to Section 3.5 of this Article.
- D. Begin by using a mandrel set to 5% deflection limit. Place the mandrel in the inlet end of the pipe and pull through the outlet end. If resistance is met prior to completing the entire run, record the maximum distance achieved from the inlet side, then move the mandrel and continue the inspection from the outlet end of the pipe toward the inlet end. Record the maximum distance achieved from the outlet side.
- E. If no resistance is met at 5% then the inspection is complete. If resistance occurred at 5% then repeat 3.4.B and 3.4.C of this Article with the mandrel set to the 10% deflection limit. If the deflection of the entire pipe run cannot be verified with the mandrel, then notify the Engineer immediately.
- F. Record and submit all data as per Section 1.3 of this Article.

END OF SECTION 33 01 30

SECTION 33 24 13  
PIEZOMETERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Provisions for installing open well piezometers.

1.2 DEFINITIONS

- A. Piezometer - A groundwater measuring device drilled and installed with a plastic casing and slotted section screened across a water-bearing zone allowing water to rise in the casing to measure the hydraulic potential (water level) at a specific point in the subsurface.

1.3 REFERENCES

- A. United States Army Corps of Engineers (USACE)
  - 1. ER\_1110-1-1807 Drilling in Earth Embankment Dams and Levees
  - 2. EM\_1110-2-1908 Instrumentation of Embankment Dams and Levees
- B. ASTM International (ASTM)
  - 3. D6913 Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

1.4 SUBMITTALS

- A. Submit in accordance with the Terms and Conditions.
- B. Qualifications: A licensed well driller in the State of Georgia shall install piezometers. All work shall be performed under the direction of an experienced, qualified, and competent geologist or geotechnical engineer approved by Engineer. The Contractor shall submit qualifications to Engineer for approval.
- C. Installation Reports: The Contractor shall submit a report describing piezometer installation including boring logs and confirmatory measurements and observations during installation. The report shall include survey coordinates and elevations of completed piezometers.
- D. Installation Plan: The Contractor shall submit a proposed plan for drilling and installation to Engineer for approval. The plan shall take into account all information furnished and all requirements imposed by the Contract Documents.
- E. Shop Drawings: Before use, the Contractor shall submit detailed shop drawings and material data for well casing, well screen, grout, seal, filter pack, and other associated materials for piezometers to Engineer for approval.

- F. Well As-Built Diagrams: Piezometer as-built construction diagrams shall include the following information:
- a. Boring location.
  - b. Boring depth and diameter.
  - c. Casing type and depth.
  - d. Screen description (including material length, location, diameter, and slot size).
  - e. Filter pack gradation, placement method, and depth.
  - f. Seal placement method including material hydration time and water content.
  - g. Grout mixture ratios and depth.
  - h. Construction details, including any difficulties setting casing and screen and procedures for determining depth.
  - i. Manufacturer and quantities of all materials used.
  - j. Borehole preparation before installation.

## 1.5 QUALITY ASSURANCE

- A. The Contractor shall observe, measure, and document installation of piezometers to assure compliance with the specified requirements. During drilling and construction, details of the installation shall be documented, including the depth of each construction material such as well screen, cement-bentonite grout, gravel pack, and final boring depth; materials used; and observations. Installation information shall be documented in the installation report.
- B. The Contractor is responsible for preparing and submitting all data, records, diagrams, and forms for record of piezometer installations and submittal to the regulating authorities, including the Georgia Environmental Protection Division.

## PART 2 PRODUCTS

### 2.1 WELL CASING

- A. Well Casing: The polyvinyl chloride (PVC) well casing shall be the minimum diameter and material type shown on the Drawings, flush threaded, manufactured to applicable standards, and equipped with a threaded cap at the bottom and slip cap at the top.
- B. Screen: The screen shall be commercially fabricated of the material type, diameter, length, and slot size shown on the Drawings, flush threaded, and manufactured to applicable standards.

### 2.2 FILTER PACK

- A. Material for the filter pack shall be the gradation and type shown on the Drawings.



## 2.3 BENTONITE

- A. Material for the bentonite seal shall be sodium bentonite supplied in pellet form.

## 2.4 WATER

- A. Water used in drilling and construction shall be potable water, free of contaminants, and obtained from an off-site or on-site source approved by Engineer.

## 2.5 PIPE PLUG

- A. Lockable, nylon expansion plug shall be compatible with the well size specified on the Drawings.

## 2.6 VAULT

- A. The outer protective vault shall be the size and material type as shown on the Drawings, equipped with a locking cap, and set within the ground surface as shown on the Drawings.

## 2.7 CONCRETE PAD

- A. For piezometers, concrete for the surface pad and surface seal shall meet the requirements of Section 03 31 00, "Backfill Concrete and Mud Mat Concrete", with a size and thickness as shown on the Drawings.

## PART 3 EXECUTION

### 3.1 GENERAL PIEZOMETER

- A. Drilling shall be completed in accordance with all requirements of USACE regulation ER 1110-1-1807 Drilling in Earth Embankment Dams and Levees.
- B. All downhole materials and equipment shall be clean and free of chemical contamination of any kind.
- C. The Contractor shall protect all structures, such as roads, underground and overhead utilities, existing wells, fences, and shrubbery during the Work; shall remove from well locations all cuttings, drilling debris, and unused materials; and shall, after completion of work, restore the site as nearly as possible to its original condition. Cuttings from installation and any other debris shall be disposed of off-site, or at other areas as approved by the Engineer.
- D. Piezometers shall be constructed at the locations shown on the Drawings. If it is necessary to relocate a proposed piezometer, the Contractor shall notify the Engineer for approval of a new location.
- E. Piezometers shall be constructed to the dimensions, details, and depths shown on the Drawings.
- F. The boring diameter shall not be smaller than the nominal size shown on the Drawings, consistent with installation method.

- G. The Contractor shall be responsible for coordinating utility locations in accordance with local laws and regulations.
- H. Lubricants shall not be used on downhole tools and equipment without prior approval of the Engineer.
- I. No drilling fluids besides potable water shall be used. Mud rotary drilling is not permitted.
- J. Abandonment of the existing piezometers shall be performed in accordance with notes provided on the drawings.

### 3.2 CAUSE OF PIEZOMETER ABANDONMENT DURING INSTALLATION

- A. This section does not address the abandonment of the six existing, historic, piezometers that are shown on the drawings.
- B. Loss of a boring or other components because of lack of material, inadequate or faulty equipment, or careless operating procedures will be considered cause for abandonment due to fault or neglect on the part of the Contractor. Boring shall be re-drilled at no cost to Owner.
- C. In the event that any piezometer or observation well requires abandonment for any cause, the Contractor shall abandon the piezometer as shown on the Drawings and in accordance with local, state, and federal regulations. The Contractor shall install another piezometer adjacent to the abandoned structure at a location approved by Engineer.

### 3.3 PIEZOMETER INSTALLATION

- A. Drilling Equipment: The inside diameter of the drill casing or hollow-stem auger shall be sufficient to allow installation of the specified well casing and annular materials.
- B. Casing and Screen Installation:
  - a. Assembly: All casing and screen shall be new and in good condition before installation. All joints and other accessory parts shall be securely fastened in place. Care shall be exercised to avoid damaging the screen and casing during installation and throughout all subsequent operations.
  - b. Installation: The assembled screen and casing shall be placed in the boring to avoid jarring impacts and to ensure that the assembly is not damaged or misplaced. The well screen shall be placed in the appropriate location in the boring so that the completed piezometer functions in accordance with Section 3.4 of this Specification and passes alignment testing outlined in Subsection 3.3.B.c below. The casing and screen shall be suspended and centered in the boring during placement of filter pack and bentonite seal. Immediately after installation of the screen and casing, the depth shall be measured. The casing top elevation shall be determined and recorded, and the well shall be capped.
  - c. Alignment testing: Each completed piezometer shall be straight and plumb. No sooner than 12 hours after grout placement, alignment tests shall be conducted by the Contractor in the presence of Engineer.
    - i. Alignment: Alignment tests shall consist of slowly lowering a 10-foot length of pipe to the bottom of the well. The outside diameter of the pipe shall be 0.5 inches smaller than the inside diameter of the well casing. If well misalignment results in

failure of the pipe to pass freely through any part of the well casing the well shall be rejected and abandoned in accordance with Section 3.2 of this Specification. The Contractor shall install another piezometer adjacent to the rejected well by the Contractor at no additional cost to Owner.

- C. Filter Pack Placement: After the screen and casing have been installed, the filter pack shall be poured around the casing, from the bottom of the boring up, in such a manner as to ensure uniform and continuous placement around the screen. The filter pack shall be placed in one continuous run, and in a manner as to provide equal thickness around the outside of the casing. The top of the filter pack shall be periodically sounded with a weighted tape to confirm that the filter pack has not bridged.
- D. Bentonite and Cement-Bentonite Seal: A bentonite seal shall be placed in the well annulus within the depth interval shown on the Drawings and hydrated with clean water. Cement-bentonite grout shall then be tremied into the well annulus on top of the bentonite seal. After the grout has set for a minimum of 24 hours, the surface completion shall be constructed.
- E. Capping: At all times before well completion and acceptance, open borings shall be maintained in a manner that will not constitute a hazard to either humans or animals. A slip type cap shall be installed on the casing to prevent extraneous material or substances from falling into the boring or casing.
- F. Surface Completion: The piezometer shall extend through a concrete pad constructed as shown on the Drawings. A steel piezometer road box shall be installed to the dimensions shown on the Drawings and shall be securely set in concrete as shown on the Drawings.
- G. Survey coordinates and elevations: After completion of a piezometer, the location and elevations of the riser pipe and adjacent ground surface shall be surveyed in accordance with Section 02 21 13, "Layout of Work and Surveying."
- H. Piezometer Identification: Piezometers shall be permanently numbered with numbers specified on the Drawings and identified/labeled with signage manufactured to include all information specified on the Drawings, or as directed by the Engineer.

### 3.4 ACCEPTANCE

- A. It is the responsibility of the Contractor to properly install all piezometers according to the requirements of this Specification so that they are suitable for determining accurate groundwater levels. If the Contractor installs piezometers that are not functional or not in accordance with this section, the Engineer will disapprove the piezometer and direct the Contractor to abandon the disapproved piezometer in accordance with this section, and repair or replace it at no additional cost to Owner.

END OF SECTION 33 24 13

SECTION 33 46 00  
SUBDRAINAGE SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Provisions for furnishing, placing, and compacting filter sand and drain stone fill materials for the downstream embankment east and west toe drains, as well as the filter diaphragm drains.
- B. Provisions for furnishing and installing drain pipe including slotted and solid High-Density Polyethylene (HDPE) drain pipes, cleanouts and animal guards, as shown on the Drawings and as specified; and cleaning and performing video inspection of drain pipes after installation.

1.2 REFERENCES

- A. ASTM International (ASTM)
  - 1. ASTM D2321 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
  - 2. ASTM D3350 Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
  - 3. ASTM F714 Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter
  - 4. ASTM F593 Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
  - 5. ASTM F594 Standard Specification for Stainless Steel Nuts
  - 6. ASTM F2620 Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings
- B. Plastic Pipe Institute (PPI) references and standards:
  - 1. PPI Handbook of Polyethylene Pipe, latest edition.

1.3 DEFINITIONS

- A. Fines: Soil particles finer than the No. 200 sieve size.
- B. Coverage: One coverage is defined as the result of successive passes by a piece of compaction equipment, which by means of sufficient overlap, will ensure that all areas of the layer or lift being compacted have been subjected to one pass of the compaction equipment.
- C. Unsuitable materials: Materials that contain waste, debris, roots, organic matter, frozen matter, or any other materials determined by the Engineer to not meet the specifications for required fill.

1.4 SUBMITTALS

- A. Submit in accordance with the Terms and Conditions.
- B. Material Certifications
  - 1. A minimum of 14 days prior to delivery to the site, submit the manufacturer's certification that raw materials and pipe to be furnished meet the requirements of this Section. The certification shall state that pipe complies with these specifications based on complete tests which the manufacturer has conducted on the lot.

2. Submit product data for piping materials, fittings, and jointing methods; and recommended method of installation of pipe and construction of branches in pipe.
- C. Submit manufacturer-recommended fusion procedures for high-density polyethylene pipe.
- D. Submit high-density polyethylene fusion technician certification from the manufacturer for the size and type of pipe being installed.
- E. Installation Plans
  1. An Installation Plan outlining the proposed plan for installation of subdrainage conduit systems shall be submitted to the Engineer for approval at least 21 days prior to the anticipated commencement of the Work. The Plan shall include a proposed schedule, proposed products to be used during installation, connection types, and measures that will be put in place to protect the work during construction. Include in the Plan measures to keep drain materials from becoming contaminated with soil or other materials during stockpiling and construction activities.
  2. Placement Plan for granular filter/drain materials, and measures for limiting waste of these materials. Include proposed equipment, and methods proposed for temporary stockpiling, hauling, spreading, placing, watering, and compacting the granular filter/drain materials.
- F. Samples and Test Results
  1. Submit samples of filter sand and drain stone materials, and their laboratory test results, for the Engineer's approval prior to shipment of the material to the site.
- G. Certified Truckload Weigh Bills
  1. Submit certified truckload weight bills for filter sand and drain stone materials at the time of delivery of each load of material to site.
- H. Subdrain Field Inspection and Testing
  1. Submit field inspection and testing reports to the Engineer for review and approval. Drain piping will be considered defective if it does not pass tests and inspections.
- I. Inspection Video
  1. Submit in accordance with Section 33 01 30 "Pipe Cleaning and Video Inspection."

## PART 2 PRODUCTS

### 2.1 HDPE DRAIN PIPE

- A. Manufacturers shall have a minimum of five years of experience in the design and manufacture of the specific pipe to be supplied.
- B. Furnish pipe in the nominal sizes shown on the Drawings. All HDPE pipes shall have a designation code of PE4710 or higher. The material shall meet or exceed a cell classification of 445574C/E as defined in ASTM D3350.
  1. Slotted Pipe: Slotted pipe shall conform to ASTM F714, Dimension Ratio (DR) 17 circular pipe sized using Ductile Iron Pipe Sizing (DIPS) criteria. Slots shall be clean and completely free of burrs, cuttings, frayed edges, tears and cracks, and other defects. Slot geometry, spacing, and quantity are as specified on the Drawings. Pipe not meeting these requirements will be rejected. Fabrication of slotted HDPE pipe shall be completed by the supplier before delivery to the site. Pipe shall be homogeneous throughout and free of visible cracks, holes, inclusions, or other defects. It shall be uniform in color, opacity, density, and other physical characteristics.

- 2. Solid Pipe: Solid pipe shall conform to ASTM F714, Dimension Ratio (DR) 17 circular pipe sized using Ductile Iron Pipe Sizing (DIPS) criteria. Pipe shall be homogeneous throughout and free of visible cracks, holes, inclusions, or other defects. It shall be uniform in color, opacity, density, and other physical characteristics.
  - C. Fittings: HDPE pipes to be fused using butt fusing techniques, as appropriate, in accordance with ASTM F2620. All fittings are to be supplied by pipe manufacturer and may not be fabricated on site.
  - D. End Plugs or Caps: End plugs or caps shall be the manufacturer's standard end plugs or caps to provide a watertight seal suitable for use in perforated and non-perforated drain pipe, subject to the approval of the Engineer.
- 2.2 ANIMAL GUARDS
- A. As specified on the Drawings.
- 2.3 FILTER SAND
- A. Filter Sand in accordance with Section 31 23 00 "Earthwork."
- 2.4 DRAIN STONE
- A. Drain Stone in accordance with Section 31 23 00 "Earthwork."
- 2.5 COMPACTION EQUIPMENT
- A. Compaction Equipment in accordance with Section 31 23 00 "Earthwork."

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Examine surfaces and areas for suitable conditions where subdrainage systems are to be installed.
- B. Locate and mark existing utilities, underground structures, and aboveground obstructions before beginning installation and avoid disruption and damage of services.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 FILTER SAND AND DRAIN STONE

- A. Excavation for drains shall be in accordance with Section 31 23 00 "Earthwork."
- B. Before placing filter sand material, verify that the prepared foundation has been inspected by the Engineer. Do not place fill without approval from the Engineer.
- C. Control and conduct all operations including but not limited to transporting, stockpiling, excavating, producing, and placing the materials to minimize waste, contamination, segregation, and particle breakdown.
- D. Place filter sand and drain stone to the locations, lines, grades, and thicknesses shown on the drawings.
- E. Do not place drain materials when filter sand, drain stone, or the foundation on which it would be placed is frozen. Stop fill placement temporarily during unsuitable weather conditions, as directed by the Engineer.
- F. Placement and compaction of filter sand shall be in accordance with Section 31 23 00 "Earthwork."

### 3.3 DRAIN PIPE

- A. Construct HDPE drain pipes in accordance with this Section, manufacturer's recommendations, and ASTM D2321. In case of a conflict, this specification shall govern.
- B. Fusion Joining Methods:
  - 1. Use only appropriately sized and outfitted fusion machines that have been approved by the manufacturer in the fusion process.
  - 2. All fusion joints shall be made in accordance with the manufacturer's recommendations.
  - 3. All fusion joints shall be made by a qualified fusion technician as determined by the manufacturer.
  - 4. Any fusion joints made by non-qualified technicians will be rejected and replaced at no additional cost to the Owner.
- C. Install pipes to the lines and grades shown on the Drawings. Installed pipe shall not deviate from the design grade by more than 1 inch per 100 feet unless approved by the Engineer. Record grade and alignment measurements for each piece of pipe installed and at each turn, junction, or change in grade. Furnish measurements to the Engineer upon completion of the Work.
- D. Drain stone material shall be carefully placed about the drain pipes so as not to disturb the drain pipe and to hold it securely in position while the overlying material is being placed. Blocking or wedging of the pipe is not allowed. Adjustments shall be done by scraping away or filling the material beneath the pipe.
- E. Placement of drain stone shall be in accordance with Section 31 23 00 "Earthwork."
- F. Due to the drainage pipe's light weight and buoyancy, special care shall be exercised in laying the drainage pipe and placing materials adjacent to the pipe to ensure that the pipe is laid, and remains, on grade and in alignment.
- G. The method of laying the drainage pipe shall prevent stretching of the pipe during laying operations.
- H. Any drainage pipe which is broken, cracked, or otherwise unsuitable for use, as determined by the Engineer, shall be removed and replaced at the cost of and by the Contractor and at no additional cost to the Owner.
  - 1. HDPE pipe sections with gouges, scrapes, or other damage resulting in a loss of 10 percent of the wall thickness shall be cut out, removed, and replaced at no additional cost to the Owner.
- I. Keep the drainage pipe free from deposits of snow, ice, mud, sand, gravel, concrete, or other foreign matter, and in good working condition until the contract is complete and accepted. Do not store pipe materials in direct sunlight. Drainage pipe that is improperly stored will be rejected by the Engineer and replaced at no additional cost to the Owner.
- J. The Contractor is responsible for any damages to any installed drains. Damaged sections of drains or outfall pipe shall be removed and replaced at the cost of and by the Contractor and at no additional cost to the Owner.
- K. Handle materials to ensure delivery to installation locations in sound, undamaged condition. Do not drag pipe.
- L. Use straight pipe sections and elbows not exceeding 22.5° unless otherwise shown on the Drawings.

- M. Do not drop drain materials directly on pipe.
- N. Do not compact drain material or fill material with full-sized compaction equipment for at least 2 feet directly over the drain pipe.
- O. Support drain pipe circumferentially with drain material prior to backfilling above pipe.
- P. Prevent introduction of contaminants into the drain material.
- Q. Install animal guards as indicated on the Drawings after completion of cleaning and video inspection and with the approval of the Engineer.

### 3.4 FIELD QUALITY ASSURANCE

- A. Give advance notice of at least 48 hours to the Engineer when the east and west toe drains or filter diaphragm areas will be prepared and ready for filter sand and drain stone placement.
- B. If the fill is rejected, remove and replace rejected material at no additional cost to Owner.

### 3.5 SUBDRAIN FIELD INSPECTION AND TESTS

- A. Do not place fill over the embankment subdrain system until it has been inspected, tested, and approved by the Engineer.
- B. Notify the Engineer for inspection and allow inspection prior to placing any fill over any drain system piping.

#### C. Testing Drains

1. Immediately after installation of each of the segments of the drain pipe system, including placement and compaction of drain material, the drain pipe shall be tested by the Contractor for obstructions and deformation.
2. Testing shall be conducted by pulling a torpedo-shaped, rigid plug through the drain segment, or by another method approved by the Engineer.
3. The torpedo-shaped, rigid plug shall be tapered on both ends. The diameter of the plug shall be 1 inch less than the inside diameter of the drain to be tested. The length shall be sufficient to eliminate the possibility of wedging the plug in the drain by tipping. The maximum pull allowed will be 150 pounds of steady pull with no jerking. The line used to pull the plug shall be free of any protrusions which could snag the tubing or joints.
4. Drain piping will be considered defective if it does not pass tests and inspections.

#### D. Video Inspection of Drain Pipe

1. After all drain elements are installed, backfilled, cleaned, and in good working order, perform cleaning and video inspection in accordance with Section 33 01 30 "Pipe Cleaning and Video Inspection".

### 3.6 PROTECTION AND CLEANING

- A. Do not allow traffic loads on pipe and structures until the pipe has been covered to a depth of at least 3 feet, to prevent damage or breakage.
- B. All drain pipes shall be clear and free from debris at the time of final acceptance.

END OF SECTION 33 46 00



## SECTION 33 42 13

### REINFORCED CONCRETE PIPE

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. General provisions for furnishing all labor, materials, tools, equipment and incidentals necessary to install the Reinforced Concrete Pipe (RCP) for the 48-inch diameter Principal Spillway and 15-inch diameter Low Level Outlet conduits, including fittings, specials, rubber gaskets, accessories and joint protection as shown on the Drawings and as specified herein.

##### 1.2 REFERENCES

- A. ASTM International (ASTM):
  - 1. C361: Standard Specification for Reinforced Concrete Low-Head Pressure Pipe
- B. American Concrete Pipe Association (ACPA)
  - 1. Concrete Pipe Design Manual, Latest Edition
  - 2. Concrete Pipe Handbook, Latest Edition

##### 1.3 SUBMITTALS

- A. Submit in accordance with the Terms and Conditions.
- B. Delivery Schedule
  - 1. Submit anticipated delivery schedule at least 7 days in advance.
- C. Pipe Placement and Shop Drawings:
  - 1. Submit shop drawings showing the exact dimensions of the pipe and joint locations.
  - 2. Submit drawings for each individual pipe placement. An individual pipe placement is defined as a section of pipe placed in one continuous operation between specified joints.
    - a. Submit tabulated placement schedule and drawings based on information as shown on the Drawings. Placement schedule and drawings shall show code/piece numbers for all pipe, fittings, and specials. These code/piece numbers shall correspond to markings on the pipe, fittings, or specials. The location of all pipes, fittings and specials shall conform to the locations indicated on the drawings. Pipe supplied from inventory shall be approved by the Engineer.

- b. Include a separate drawing showing placement sequence, showing the Contractor's plan for placement of individual features, units, and other elements of pipe work.
- D. Material Approval Data
  - 1. Submit the manufacturer's certification and test reports for each lot from which shipments are drawn.
    - a. Certify materials were tested during production in accordance with specified reference specification.
    - b. Submittal of certification and test reports shall not relieve Contractor of responsibility for furnishing materials meeting specified requirement.

#### 1.4 QUALITY ASSURANCE AND QUALITY CONTROL

- A. All reinforced concrete pipe, fittings and specials shall be furnished by a manufacturer with a minimum of five (5) years' experience in the manufacture of reinforced concrete pipe. The pipe and fittings shall be designed, manufactured and installed in accordance with industry standards and methods and shall comply with specification requirements as stated herein.
- B. Pipe Handling and Inspection: Care shall be taken during storage, loading, and transporting to prevent damage to the pipe, fittings, specials or coatings.
- C. Obtain materials from the same source throughout the Work.
- D. Project Record Documents: Accurately record as-built dimensions, tolerances, and components on placement drawings.
- E. Sequencing and Scheduling
  - 1. Notify the Engineer at least 48 hours prior to commencing pipe placement Work.
  - 2. Allow the Engineer to perform an inspection of the pipe segments upon delivery of pipe and after placement.
  - 3. Contractor to obtain approval of pipe placement from the Engineer prior to placing concrete encasement and backfilling.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Ship in accordance with manufacturer's written instructions.
- B. Store in accordance with the manufacturer's written instructions.

### PART 2 PRODUCTS

#### 2.1 MATERIALS

- A. Reinforced Concrete Pipe (ASTM C361)

1. Unless otherwise specified herein, materials and workmanship shall be governed by ASTM C361 Specification. Minimum wall thickness shall be as specified in ASTM C361. The pipes shall be Class D-50 in accordance with ASTM C361.

## PART 3 EXECUTION

### 3.1 GENERAL

- A. The pipe shall be inspected by the Engineer for damage or defects before installation. Damaged or defective pipe shall not be installed.
- B. Verify all lines, grades, and measurements before installing pipe.
- C. Inspect size and location of structure penetrations to verify adequacy.
- D. Adequately brace and support pipes embedded in concrete both externally and internally, and vertically and horizontally as required, to prevent settling, uplift, distortion, or movement during concrete placement.

### 3.2 INSTALLATION

- A. Trench, backfill, and compact in accordance with Section 31 23 00
- B. Pipe installation.
  1. Begin laying pipe from lowest point in proposed line.
  2. Lay pipe with bell end of bell and spigot pipe pointing upgrade.
  3. Lay pipe uniformly to line and grade so finished line will present uniform bore.
- C. Joints.
  1. Remove burrs and sharp edges from joint area before installing gasket.
  2. Immediately before making joint, lubricate outside of gasket and inside of bell or groove of last pipe with approved vegetable lubricant.
  3. Take care gasket and ends of pipe are clean and free of sand or gravel.
  4. Introduce spigot of pipe being laid with gasket in place, into bell or groove end of previously laid pipe.
  5. Set pipe to line and grade, and then jack or push into final position.
  6. Protect joint rings (internal and external exposures) with protective sealant or exterior mortar covered with 8 inches wide burlap diaper with strapping and mastic sealing joint.
  7. Use jack or “come along” to ensure joints are tight if required.

### 3.3 TESTING

- A. The Georgia Safe Dams Program shall be notified at least 48 hours prior to the testing of the conduit.
- B. Prior to backfilling the conduit, it shall be tested and meet either of the following conditions:
  - 1. Conduits shall be water tested to a minimum of 10 feet of head at the upstream invert and are required to hold this head for a minimum of 2 hours.
  - 2. Conduits can be supplied from the manufacturer with testable joints. After the conduits sections are placed, each joint shall be required to maintain a static air pressure of not less than 50 psi for a minimum of 5 minutes.
- C. All pipe joints shall be inspected during the testing procedure. Any visible leaks shall be repaired regardless of the test results.
- D. Failure of the conduit to meet the requirements of the test shall be investigated by the contractor and reported to the design engineer along with recommendations for correcting the failure. The conduit shall be retested and must meet the requirements of the test prior to backfilling. The testing results and any corrective measures must be reported in the construction monitoring reports.
- E. The Design Engineer shall record all conduit pressure tests. The information shall be submitted for review and contain the following data:
  - 1. Testing procedure and requirements
  - 2. Equipment used to perform the test
  - 3. A copy of the continuous record of the test and any re-test

### 3.4 FIELD QUALITY CONTROL

- A. Noticeable variations from true alignment and grade will be considered sufficient cause for rejection of work.
- B. Pipe shall be subject to rejection for failure to conform to requirements of specifications or for following reasons:
  - 1. Defects indicating improper proportioning, mixing, and molding.
  - 2. Pressure pipe shall be laid to the lines and grades shown on the Plans. Do not deviate more than 1 inch from line or 1/4-inch from grade unless approved by the Engineer. Measure for grade at the pipe invert, not at the top of the pipe, because of permissible variation in pipe wall thickness.
  - 3. Insecure attachment of spurs.
  - 4. Extensive patching or painting of surface of pipe with exception of miter pipe formed by removal of wedge shaped sections from middle of pipe.
  - 5. Damaged ends, where such damage would prevent making satisfactory joint.

6. Fractures or cracks passing through pipe wall or socket, except single crack not exceeding 2 inches in length at either end of pipe or single fracture in socket not exceeding 3 inches in width or 2 inches in length shall not be considered cause for rejection, unless these defects exist in more than 5 percent of entire shipment or delivery.
  7. Fractures or spalling of pipe exposing reinforcement and/or steel cylinder pipe.
- C. Authorized representative of manufacturer shall determine if damaged pipe can be repaired to equal original specifications. Any pipe determined as not equal to specifications shall be removed from job site.
1. Engineer shall make final determination of acceptability of repaired pipe.
  2. Repairs shall be performed by an authorized representative of manufacturer.
- D. Acceptance of fittings, stubs, miters, cut-off or other specially fabricated pipe sections shall be based on visual inspection at job site.

END OF SECTION 33 42 13

## SECTION 35 43 35

### RIPRAP SLOPE AND SCOUR PROTECTION

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Provisions for furnishing and placing riprap, bedding, and geotextile as slope and scour protection.

##### 1.2 REFERENCES

- A. Georgia Department of Transportation (GDOT), Standard Specifications for Construction of Transportation Systems, latest edition.
- B. ASTM International (ASTM)
  - 1. ASTM C127 Standard Test Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate
  - 2. ASTM D5519-15 Standard Test Methods for Particle Size Analysis of Natural and Man-Made Riprap Materials
  - 3. ASTM C535 Standard Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- C. AASHTO
  - 1. AASHTO T96 Standard Method of Test for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
  - 2. AASHTO T104 Standard Method of Test for Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate

##### 1.3 SUBMITTALS

- A. Submit in accordance with the Terms and Conditions.
- B. Submit a list of equipment proposed for use in hauling and placing riprap and riprap bedding.
- C. Submit the proposed source(s) of the riprap and riprap bedding.
- D. Submit riprap and riprap bedding samples from offsite sources.
- E. Submit test certificates from riprap and riprap bedding sources demonstrating compliance with this Section.

#### PART 2 PRODUCTS

##### 2.1 RIPRAP

- A. Riprap: Dense, angular, reasonably well-graded rock material, with sound fragments resistant to abrasion and freeze thaw action. Free of cracks, seams, clay, organic material and other defects that would hasten degradation by water and/or frost action. Contaminated aggregate will be rejected when the Engineer deems it could be detrimental to the finished product. Rounded boulders or cobbles shall not be accepted as riprap. Neither width nor thickness of a single stone of riprap shall be less than 1/3 of its length.
- B. Broken concrete or asphalt is not acceptable for use in the Work.

C. Properties:

1. Well-graded from the smallest to the largest size, with an approximate  $D_{50}$  of 1-foot and graded within the limits shown in Table 1:

**Table 1: Riprap Gradation Properties for Type 1**

<b>Riprap Type 1: Severe Drainage Conditions or Moderate Wave Action</b>	<b>Size By Volume (ft<sup>3</sup>)</b>	<b>Approx. Weight (pounds)</b>	<b>Percent Small Than (%)</b>
	4.2	700	100
	1.8	300	50 – 90
	0.81	125	20 – 65

1) Between 0% and 15% of the Type 1 riprap shall pass a 4 inch (100mm) square opening sieve.

2. Specific gravity: 2.5 minimum (ASTM C127).
3. Stone for Plain Riprap shall be clean and free of rock dust and fines. Process the stone so that the largest pieces have a volume of 2 cubic feet or less. Ten percent or less of the total riprap weight can consist of spalls that pass a 5-inch (125 mm) sieve.

D. Aggregate Quality:

1. All riprap stone shall be made of sound, durable rock pieces that meet the requirements shown in Table 2:

**Table 2: Riprap Aggregate Quality**

<b>Aggregate Quality</b>	<b>Maximum Percent (%)</b>
Abrasion loss “B” grading	65
Soundness loss	15
Flat and slabby pieces (length five times more than the average thickness)	5
Weathered and / or decomposed pieces and shale	5

- E. Riprap shall conform to all requirements set forth in the GDOT Standard Specification’s Section 603 and Section 805.

2.2 RIPRAP BEDDING

- A. Bedding shall conform to gradation for ASTM C33 #3 or GDOT #3 coarse aggregate, See Table 3 below, underlain by drain stone (Stage 2) and filter sand (Stage 3) as shown on the drawings and graded as detailed in Section 31 23 00 Earthwork.

**Table 3 – Riprap Base Layer (Stage 1 Bedding Material) Gradation**

<b>ASTM C33 No. 3 Coarse Aggregate</b>		<b>GDOT 800 No. 3 Stone (Table 800.1)</b>	
<b>U.S. Standard Sieve</b>	<b>% Passing by Weight</b>	<b>U.S. Standard Sieve</b>	<b>% Passing by Weight</b>
2-1/2 inch	100	2-1/2 inch	100
2 inch	90-100	2 inch	90-100
1-1/2 inch	35-70	1-1/2 inch	35-70
1 inch	0-15	1 inch	0-15
1/2 inch	0-5	1/2 inch	0-5

**PART 3 EXECUTION**

**3.1 PREPARATION**

- A. Prepare the ground surface where the riprap stone and bedding will be placed to conform with the correct lines and grades before beginning the placement.
  - 1. Surfaces to receive riprap stone and bedding shall be smooth and firm, free from deleterious materials, and brought to the lines and grades shown on the Drawings.
  - 2. Prepare the surfaces that are to receive the riprap stone and bedding by rolling, trimming, and filling as necessary until it is smooth and free from obstructions, depressions, and debris to enable uniform lifts of riprap bedding and riprap of the specified thickness to be placed.
  - 3. Bring all low spots up to the lines and grades shown on the Drawings with compacted fill and remove all material projecting above lines and grades shown on the Drawings.

**3.2 PLACING RIPRAP BEDDING**

- A. Stone: Place sand and coarse aggregate bedding at the locations, thicknesses, lines, and grades shown on the Drawings or as directed by the Engineer. Do not drop the stones from a height of more than 3 feet during construction.

**3.3 PLACING RIPRAP**

- A. Place riprap at the locations, thicknesses, lines, and grades shown on the Drawings or as directed by the Engineer. Do not drop the stones from a height of more than 3 feet during construction.
- B. Riprap shall be placed by placing and working with a hydraulic excavator and smoothed by moving rocks in such a manner as to produce a well graded mass of rock with a minimum practical percentage of voids, and such that the material in place is stable. The finished riprap shall be free from objectionable pockets of unacceptable soil fines, small stones and clusters of nested large rocks, and voids, as determined by the Engineer.
- C. Place riprap materials to full layer thickness in one operation in such a manner as to minimize segregation and avoid displacement of underlying bedding materials.
- D. Chinking: Provide laborers during placement for rearrangement of loose rock fragments, “chinking” of void spaces, and hand-placement as needed to comply with the requirement of a well-keyed and stable layer of rock riprap.
- E. Place riprap on slopes beginning at the bottom of the slope and proceeding towards the top of slope.
- F. Ensure that the thickness tolerance for the course is plus 12 inches with no under-tolerance. If the plans do not show a thickness, place stone riprap to at least 27 inches.



3.4 TESTING

- A. Physical properties of riprap or riprap bedding from offsite sources shall be provided by the manufacturer of the material. If the provided test results are inconsistent with the observed conditions, the Engineer may request additional testing, which shall be performed by the Contractor using the services of an independent testing laboratory acceptable to the Engineer. Physical properties include any described in this Section.
- B. Riprap shall be certified for the minimum number of tests to establish quality control as shown in the Table 4 below:

**Table 4 – Test and Test Frequency**

<b>Test</b>	<b>Test Method (Current Version)</b>	<b>Test Frequency <sup>(1)</sup></b>	<b>Maximum Percent</b>
Abras	ASTM C535/AASHTO T96	Minimum 2 test per source	65
Riprap Size	ASTM D5519	Minimum 2 test per source	Refer to Table 1
Soundness	AASHTO T104	Minimum 2 test per source	15

1) If the test is not performed correctly, contractor using the services of an independent testing laboratory to perform additional test or testing and obtain approval of the Engineer.

- C. If acceptable certificates of compliance are provided by the imported riprap or riprap bedding supplier, physical properties testing may be waived at the Engineer’s discretion.
- D. Control of riprap gradation will primarily be by visual inspection. The Engineer will be the sole judge of riprap gradation acceptability by visual inspection. If the Engineer elects to have the Contractor perform a gradation test(s) of the riprap, the Contractor shall provide equipment, sorting site, and labor to conduct such testing under the observation of the Engineer. The gradation will be tested on a minimum of 25 tons sample of stone.
- E. If the specified gradation is not being produced, make adjustments as necessary to produce the specified material.

END OF SECTION 35 43 35

## SECTION 40 05 59

### STAINLEES STEEL SLIDE GATES

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. General provisions for furnishing and installing one (1) 20-inch by 20-inch manually operated stainless steel slide gate, including gate stem and guides, and pedestal at the location shown on the Drawings and as specified herein.

##### 1.2 REFERENCES

- A. ASTM International (ASTM)

- 1. ASTM A36 Standard Specification for Carbon Structural Steel
- 2. ASTM A276 Standard Specification for Stainless Steel Bars and Shapes
- 3. ASTM B584 Standard Specification for Copper Alloy Sand Castings for General Applications
- 4. ASTM F593 Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
- 5. ASTM F594 Standard Specification for Stainless Steel Nuts
- 6. ASTM D2000 Standard Classification System for Rubber Products in Automotive Applications
- 7. ASTM D 4020 Standard Specification for Ultra-High-Molecular-Weight Polyethylene Molding and Extrusion Materials

- B. American National Standards Institute (ANSI)

- 1. ANSI Z49.1 Safety in Welding, Cutting, and Allied Processes

- C. American Welding Society (AWS)

- 1. AWS D1.6 Structural Welding Code – Stainless Steel

- D. American Water Works Association (AWWA)

- 1. AWWA C561 Fabricated Stainless Steel Slide Gate

##### 1.3 SUBMITTALS

- A. Submit in accordance with the Terms and Conditions.

- B. General: Provide a technical submittal demonstrating that all equipment provided conforms completely to the requirements of this Section.
- C. Submit Shop Drawings and product data for all fabricated or manufactured items:
1. Data and Drawings for review and approval prior to fabrication, showing details and materials of the stainless-steel slide gate, manual lift, and all data required to locate and install the slide gate and accessories.
  2. Cross section drawings labeling all interior parts, including bearings, seals, and other mechanical parts.
  3. Anchoring and mounting details.
  4. Weights of equipment assemblies and components, to include stem and slide weight.
  5. Catalog Data for Dielectric Gasket Sets.
  6. Manufacturer's catalog information, descriptive literature, Specifications, and identification of materials of construction including the material thickness of all structural components of the frame and slide.
  7. Calculations for the slide gate and service condition demonstrating that the slide gate, gate stems, and appurtenances are designed for this application and in compliance with this specification. Include the following:
    - a. Maximum bending stress and deflection of the slide under the maximum design head.
    - b. Gate opening and closing thrust forces.
    - c. Manual lift and stem sizing calculations.
- D. Quality Control Submittals:
1. Special shipping, storage and protection, and handling instructions.
  2. Manufacturer's written/printed installation instructions.
- E. Operation and Maintenance Manual:
1. Submit as required by the Engineer. Include the following:
    - a. Previously approved submittal shop drawings and product data.
    - b. Significant design criteria.
    - c. Complete, detailed operating instructions for each piece of equipment.
    - d. Information and instructions for lubrication and adjustments.

- e. Maintenance instructions with illustrations as necessary.
  - f. Recommended schedule of maintenance.
  - g. Lubrication schedule and table of alternate lubricants.
  - h. List of special tools and equipment required for maintenance.
  - i. Recommended spare parts list.
- F. Manufacturer's Warranty.

#### 1.4 DESIGN REQUIREMENTS

- A. Design and fabricate gate and frame in accordance with AWWA C561, and as shown on the Drawings.
- B. If there is a conflict between AWWA requirements and this specification, this specification shall govern.

#### 1.5 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Furnish stainless steel slide gate from a manufacturer having at least 5 years' experience in the design and fabrication of items of equipment of similar size and pressure.
- B. Manufacturer's shop welds, welding procedures, and welders: Qualified and certified in accordance with the requirements of ANSI/AWS D1.6.

#### 1.6 HANDLING, DELIVERY, AND STORAGE

- A. Handling and Storage instructions shall accompany the slide gate delivered to the site.

### PART 2 PRODUCTS

#### 2.1 GENERAL

- A. 20-inch by 20-inch manually operated, stainless steel slide gate, frame, and appurtenances designed for 30 feet of unseating head and installation on the inlet conduit flange as shown on the Drawings.
- B. Acceptable Manufacturers: Golden Harvest Inc., Whipps Inc., or approved equal.

#### 2.2 MATERIALS

- A. Slide, Frame Assembly, Cover Bars, Gate Stems, Stem Couplings, Flush Bottom Retainer Bar, Seal Retainers, Stem Guide Brackets: Stainless Steel, ASTM A240 or ASTM A276, Type 304 or 316 (304L or 316L for all welded components).
- B. Lift Pedestal: Stainless Steel, Type 304L or 316L, ASTM A240.
- C. Pedestal Support Plate (If Required): Carbon Steel ASTM A39.
- D. Flush Bottom Rubber Seals: Neoprene, ASTM D2000.

- E. Lift Nuts and Stem Couplings: Bronze ASTM B584.
- F. Seat/Seals and Facing: Ultra High Molecular Weight Polyethylene (UHMW), ASTM D4020.
- G. Stem Guides: Bronze unless otherwise approved.
- H. Assembly Hardware and Fasteners: Stainless Steel, Type 316, ASTM F593 and F594.
- I. Anchor Studs: Stainless Steel, Type 316, ASTM A276.
- J. Dielectric Gasket Set: Provide an insulated gasket set between the existing pipe flange and the stainless-steel slide gate to prevent galvanic corrosion between dissimilar materials.

### 2.3 FRAME

- A. Suitable for flush-bottom style slide gate mounted on a 15-inch ANSI/AWWA, Class 125 pipe flange.
- B. Rigid, welded unit composed of guide rails and cross bars with a clear opening, as specified and reinforcement designed to resist all operating loads.
- C. Designed to positively retain the polymer (UHMWPE) guide/seal strips.
- D. Assembled with non-loosening (prevailing torque) fasteners.
- E. Replaceable guide/seal assembly with leaf mounted UHMWPE.

### 2.4 GUIDES

- A. Fabricated from formed plates, standard structural or extruded shapes to meet AWWA C561 safety factors. Minimum thickness of ¼ inch.
- B. Designed and fabricated to withstand the total thrust of the gate slide due to the design head.
- C. Fabricated in a length that will fully support the height of the slide when the gate is fully open.

### 2.5 SLIDE

- A. Fabricated from stainless-steel plates reinforced with structural shapes welded to the plate, to meet AWWA C561 safety factors. Minimum thicknesses: 3/8 inch for the slide plate, and ¼ inch for the reinforcing structural members.
- B. Deflection: 1/16 inch or less under maximum head.
- C. Flush-bottom design for effective sealing against a sill plate or bottom of frame.
- D. Stem connections threaded and bolted (or keyed). Thrust nuts supported in welded nut pockets. The clevis or nut pocket of the gate capable of withstanding at least twice the rated thrust of the manual actuator.
- E. The disc/gate leaf shall be suitable for throttling flow in varying openings from fully closed to fully open.

## 2.6 GATE SEALS

- A. The gate sealing arrangement for the side and top seals may consist of a combination of UHMWPE guides and neoprene J-seals, or self-adjusting UHMWPE guide/seal combination.
- B. Neoprene J-seals: Attached with stainless steel retainer bars held in place with stainless steel fasteners. Field replaceable without removing the gate frame from the concrete wall or wall thimble.
- C. The top and side seals shall remain in full contact with the slide for effective sealing at any gate position.
- D. The bottom seal shall be a neoprene seal attached to either the bottom of the gate slide or the flush bottom retainer bar.

## 2.7 GATE STEMS

- A. Gate stems shall be stainless-steel, as specified, designed for tensile strength and column loading for the manual operators specified.
- B. Gate stems and stem guides shall be designed to provide a length/radius of gyration ( $l/r$ ) not greater than 200. The stem guide brackets shall be fully adjustable in both horizontal directions to attain proper stem alignment and shall be suitable for mounting on stainless-steel anchor bolts attached to concrete walls.
- C. Provide gate stems with an overall length of 12 inches greater than determined from the elevations shown, and an additional 24 inches of threads at the top for the actuator, to accommodate potential variations.
- D. Stem couplings will be required to connect the stem sections.

## 2.8 MANUAL LIFT

- A. Support the manually operated lift device on a pedestal mounted as shown on the Drawings. Design lift for a rising-stem gate, with the hand wheel rotating in the clockwise direction to open, and the hand wheel marked to show the opening direction.
- B. Locate hand wheel or centerline of the operating crank approximately 3 feet above the operating deck concrete slab as shown on the Drawings.
- C. Design and fabricate the pedestal and manual operator to operate the slide gate with no more than 40 pounds pull on the hand wheel or crank and to withstand 80 pounds pull on the hand wheel or crank, assuming normal stresses. Provide a torque plate or other means to prevent the stem from twisting and suitable stop nuts to limit gate travel.
- D. Furnish a clear plastic stem cover, with graduations to indicate gate openings from 0 to 100 percent, in 2 percent increments.

## 2.9 FABRICATION

- A. Fully assemble fabricated gate in the shop to ensure that the components fit together properly, with proper clearances and alignment.

## 2.10 SHOP TESTING AND INSPECTION

- A. Notification: Notify the Owner and the Engineer in writing a minimum of 14 calendar days in advance of beginning shop tests.
- B. Operating Shop Tests: Open and close the gate slide at least two times in the shop to demonstrate that the leaf moves freely, and there is no binding or unusual noise.
- C. The Owner or the Engineer may make visits to the gate manufacturer's facilities to review progress of the work. Conduct shop testing in the presence of the Engineer, unless waived.

## 2.11 SHIPPING

- A. Ship slide gate fully assembled.
- B. Crate and wrap and otherwise protect the slide gates, gate stems, pedestal and lift, and accessories from damage during shipment. Repair or replace any damaged parts, including coatings, to the satisfaction of, and at no cost to the Owner.

## PART 3 EXECUTION

### 3.1 SLIDE GATE INSTALLATION

- A. Install the slide gate, gate frames, manual lift, gate stems, and accessories as shown on the Drawings and in accordance with the gate manufacturer's approved shop drawings and written installation instructions.
- B. Attach the slide gate with stainless steel bolts.
- C. Furnish necessary sealants, insulated gasket set, fasteners, and other hardware for a complete installation.
- D. Prior to installation of the slide gate, clean the concrete in the area to receive the slide gate with solvents and/or power brushing to provide a clean surface. Install the slide gate on the downstream face of the pipe flange with a dielectric gasket.
- E. Install the slide gate stems using the adjustable stem guides and brackets provided, to provide plumb alignment with no offsets to impede movement of the gate stems. Attach the stem guide brackets to the concrete wall of the intake structure with stainless steel epoxy anchors, using double-nuts allowing adjustment for proper vertical alignment.
- F. Install lift pedestal with stainless steel bolts, and then the manual lifts attached to the pedestal.
- G. Do not disassemble factory fabricated gate components.

### 3.2 QUALITY ASSURANCE

- A. Manufacturer Inspection:
  - 1. The Contractor shall include in his bid for the slide gate, a site visit and inspection of the completed gate installation by the gate manufacturer's factory-trained

personnel, including travel to the site. The visit shall be coordinated by the installation Contractor.

2. The factory-trained personnel shall:
  - a. Check the complete installation.
  - b. Make necessary adjustments on the slide gate, and manual lifts.
  - c. Conduct field testing.
  - d. Provide a certificate of proper installation indicating the slide gate is installed and functioning properly.
- B. Notify the Engineer 48 hours in advance of inspections.
- C. After installation of the slide gate is complete, operate gate through two complete cycles with the gate dewatered in the presence of the Engineer and Manufacturer's Field Service Representative. Observe the operation for any unusual noise or vibration and note any excessive hand wheel or crank force required for gate operation. Adjust as necessary for smooth operation.
- D. When reservoir head is available, operate slide gate through two complete cycles. Observe the operation of the gate for any unusual noise or vibration, as well as excessive operating force. The Contractor and the Engineer shall be present during the testing. Perform leakage tests in accordance with AWWA C561, with the maximum available reservoir head. The leakage shall not exceed the specified maximum allowable in AWWA C561.
- E. Repair gate with excessive leakage at no cost to the Owner.

END OF SECTION 40 05 59