



May 08, 2024

**REQUEST FOR PROPOSAL  
RP021-24**

The Gwinnett County Board of Commissioners is soliciting competitive sealed proposals from qualified contractors to **Provision of Watershed Improvements on an Annual Contract** for the Department of Water Resources.

Proposals must be returned in a sealed container marked on the outside with the Request for Proposal number and Company Name. Proposals will be received until **2:50 P.M. local time on June 13, 2024** at the Gwinnett County Financial Services - Purchasing Division – 2<sup>nd</sup> Floor, 75 Langley Drive, Lawrenceville, Georgia 30046. Any proposal received after this date and time will not be accepted. Proposals will be publicly opened and only names of submitting firms will be read at 3:00 P.M. A list of firms submitting proposals will be available the following business day on our website [www.gwinnettcounty.com](http://www.gwinnettcounty.com).

A pre-proposal conference is scheduled for **10:00 A.M. on May 23, 2024** at the Gwinnett County Purchasing Division Dogwood Conference Room located at 75 Langley Drive, Lawrenceville, GA 30046 on the 2<sup>nd</sup> Floor near the Department of Financial Department. All contractors are urged to attend.

Questions regarding proposals should be directed to Brittany Bryant, CPPB, Purchasing Associate III at [Brittany.Bryant@GwinnettCounty.com](mailto:Brittany.Bryant@GwinnettCounty.com) or by calling 770-822-7759, **no later than 3:00 P.M. June 05, 2024**. Proposals are legal and binding upon the vendor when submitted. One unbound original and six (6) copies should be submitted.

All bidders must submit with bid, a bid bond, certified check or cashier's check in the amount of five percent (5%) of the total bid. **Failure to submit a bid bond with the proper rating will result in the proposal being deemed non-responsive.** Successful contractor will be required to meet insurance requirements, submit a one-million-dollar (\$1,000,000.00) performance bond and a one-million-dollar (\$1,000,000.00) payment bond. **The payment and performance bond amounts are subject to change for each renewal option. It is the intent of Gwinnett County to award this contract to multiple contractors. Each awarded contractor will be provided the required bond amount during the renewal process and will be required to provide bonds for that amount. Note that the renewal Payment and Performance Bond amounts will not exceed two-million-dollars (\$2,000,000.00) each.**

Insurance and Bonding Company should be licensed to do business by the Georgia Secretary of State, authorized to do business in Georgia by The Georgia Insurance Department, listed in the Department of Treasury's Publication of Companies holding Certificates of Authority as Acceptable Surety on Federal Bonds and as acceptable reinsuring companies. **The bid bond, payment bond, and performance bond must have an A.M. Best rating of A-10 or higher.**

Gwinnett County does not discriminate on the basis of disability in the admission or access to its programs or activities. Any requests for reasonable accommodations required by individuals to fully participate in any open meeting, program or activity of Gwinnett County Government should be directed to the ADA Coordinator at the Gwinnett County Justice and Administration Center, 770-822-8165.

The written proposal documents supersede any verbal or written prior communications between the parties.

Selection criteria are outlined in the request for proposal documents. Gwinnett County reserves the right to reject any or all proposals to waive technicalities, and to make an award deemed in its best interest.

Award notification will be posted after award on the County website, [www.gwinnettcounty.com](http://www.gwinnettcounty.com) and companies submitting a proposal will be notified via email.

We look forward to your proposal and appreciate your interest in Gwinnett County.

Brittany Bryant, CPPB  
Purchasing Associate III

FAILURE TO RETURN THIS PAGE MAY RESULT IN REMOVAL OF YOUR COMPANY FROM COMMODITY LISTING.

# RP021-24

**Buyer Initials: BB**

IF YOU DESIRE TO SUBMIT A "NO BID" IN RESPONSE TO THIS PACKAGE, PLEASE INDICATE BY CHECKING ONE OR MORE OF THE REASONS LISTED BELOW AND EXPLAIN.

- Do not offer this product or service; remove us from your bidder's list for this item only.
- Specifications too "tight"; geared toward one brand or manufacturer only.
- Specifications are unclear.
- Unable to meet specifications.
- Unable to meet bond requirements.
- Unable to meet insurance requirements.
- Our schedule would not permit us to perform.
- Insufficient time to respond.
- Other

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COMPANY NAME \_\_\_\_\_

AUTHORIZED REPRESENTATIVE \_\_\_\_\_

SIGNATURE

### **STATEMENT OF WORK**

The Gwinnett County Department of Water Resources (GCDWR) intends to award this contract to one or more independent contractors for construction work (Work) that could be classified as the construction, retrofit, maintenance and repair of watershed improvements on an annual contract within Gwinnett County, Georgia. Watershed improvement projects consist of stormwater management practices identified in the 2020 Gwinnett County Stormwater Management Manual, stream restoration/rehabilitation projects or a combination of these elements. Work will be of varying degrees of urgency and scope in order to pursue sustainability, public health, safety, and environmental protection goals. Tasks under the contract will be assigned based on the following:

1. Are resources available within the timeframe required?
2. Are the specific services needed and available within the contractor's team?
3. Is the contractor available to meet onsite to view the Work and participate in task development and estimating?
4. Cost.

Contractor shall furnish all insurance, transportation, materials, supplies, parts, test equipment, instrumentation, apparatus, services, tools, qualified staff, project management, supervision, labor, engineering, technical knowledge, skills, and all things necessary to complete the Work conformant to contract documents and to the satisfaction of Gwinnett County (County).

The Work is further described as the construction, retrofit, maintenance and repair of a variety of stormwater facilities and watershed improvement projects and installations including, but not limited to:

- Green Infrastructure/Low Impact Development BMPs such as:
  - Bioretention Basins/Areas and Bioslopes.
  - Filter Strips and Infiltrative Swales and Grass Channels.
  - Regenerative Stormwater Conveyances.
  - Other practices as indicated in the Gwinnett County Stormwater Management Manual, latest version, for more information.
- Stream Restoration (employing natural channel design techniques).
- Wetland Restoration and Enhancement.
- Stormwater Drainage Systems that are a part of the improvements mentioned above such as:
  - Curbs/Gutters, Inlets and Catch Basins.
  - Pipes, Culverts and Manholes.
  - Detention Basins.
  - Stormwater Ponds.
  - Stormwater (constructed) Wetlands.
  - BMP Outlet Control Structures.
  - Other practices as indicated in the Gwinnett County Stormwater Management Manual, latest version, for more information.

Scope of work for tasks assigned as part of the Contract shall be estimated (schedule and budget) and shall be written out and presented as a detailed estimate prior to task initiation. At the discretion of GCDWR, GCDWR may provide the Contractor with a given task estimate or may request the Contractor to prepare the estimate.

**I. INVITATION TO SUBMIT PROPOSALS**

- A. GCDWR hereby requests Proposals for Watershed Improvements on an Annual Contract. This submission will assist GCDWR in qualifying firms to provide construction services related to the Work. No minimum or maximum amount of work is guaranteed under this solicitation, and work will be procured on an "as-needed" basis. GCDWR reserves the right to complete separate solicitations when in the best interest of the County.

GCDWR requires sufficient information to determine that your firm is adequately staffed and capable of providing "as-needed" construction services.

- B. The full cost of proposal preparation in response to this request for proposal is to be borne by the proposing firm.
- C. Rates in the Fee Schedule will cover all work proposed and performed under this contract. The full cost of developing task estimates under this contract shall be borne by the Contractor.
- D. One (1) unbound original (designated as the original), five (5) exact bound copies of your proposal should be submitted. All copies of the proposal must be identified with the proposal number, date of the opening, and the company name. The original proposal must be signed in ink by a company official who has authorization to commit company resources. All copies of the proposal must be identical. These officials will also be individuals noted as authorized to sign Work Authorizations.

Proposals shall be submitted in a sealed envelope/package. Envelope/package shall be addressed to Gwinnett County Purchasing Division, Gwinnett Justice and Administration Center, Second Floor, 75 Langley Drive, Lawrenceville, Georgia 30046 and shall be identified with the proposal number, date of opening and company name on the outside.

- E. The proposer is to submit in a separately sealed envelope the Fee Schedule. This separately sealed envelope should be labeled as "Fee Schedule" with the Proposers name, and RP #.
- F. Sole responsibility rests with the firm seeing that their proposals are received on time at the above stated location.
- G. Proposals submitted by alternate means other than the means specified in this solicitation will be rejected and disposed of accordingly. This includes proposals transmitted by facsimile, email, or any other electronic or telegraphic means. If the County receives a proposal through such alternate means, the County does not assume any burden or liability to notify the vendor that the proposal has been rejected. This language is not applicable to the request for an electronic copy of the proposal which is to be submitted as part of the firm's submittal.

Proposers are to follow the instructions outlined in this solicitation and failure for the Proposer to do so may result in the County deeming the Proposer's submittal as non-responsive. Firms are expected to allow adequate time for delivery of their proposals either by hand delivery, postal service or other means. Late proposals will not be accepted and will be returned to the Proposer.



- H. To provide these services, the proposal shall address the firm's capabilities and resources in the following areas:
- Availability of staff and location of office and other necessary resources including percentage of the Work committed to be performed by the Proposer (as opposed to subcontractors).
  - Designation as minority, disadvantaged or woman-owned business enterprise (MBE/DBE/WBE) or consideration of MBE/DBE/WBE subcontractor(s).
  - Organizational structure relating to service delivery including key staff.
  - Experience of the firm.
  - Understanding and approach to the Work.
  - Contact number(s) of the individual appointed directly to service this contract.
  - Appropriate equipment and technology.
- I. All questions concerning this Request for Proposal (RP) should be directed IN WRITING to Brittany Bryant, CPPB Purchasing Associate III, Gwinnett County - Purchasing Division, 75 Langley Drive, Lawrenceville, Georgia 30046 either by Fax: 770-822-8728 or by email to [Brittany.Bryant@GwinnettCounty.com](mailto:Brittany.Bryant@GwinnettCounty.com).
- J. Individuals, firms, and businesses seeking an award of a County contract may not initiate or continue any verbal or written communications regarding a solicitation with any County officer, elected official, employee or other County representative without permission of the Purchasing Associate named in the solicitation between the date of the issuance of the solicitation and the date of the final contract award by the Board of Commissioners. Violations will be reviewed by the Purchasing Director. If determined that such communication has compromised the competitive process, the offer submitted by the individual, firm or business may be disqualified from consideration for award. This is to ensure that all prospective respondents have the same level of knowledge relative to the project as well as ensuring the additional data is made available to all proposers.
- K. Submitted proposals and all documentation regarding the proposals will not be made available to the public until such time that an official action has been taken by the Gwinnett County Board of Commissioners to award or reject this solicitation. The proposals are subject to GA Open Records Law.
- L. All applicable State of Georgia and Federal Laws, City and County ordinances, licenses and regulations of all agencies having jurisdiction shall apply to the Contractor firm and services throughout and incorporated herein by reference. The Agreement with the selected firm, and all questions concerning the execution, validity or invalidity, capacity of the parties, and the performance of the Agreement, shall be interpreted in all respects in accordance with the Charter and Code of Gwinnett County and the laws of the State of Georgia.

## II. INSTRUCTIONS TO PROPOSERS

### A. Qualifications

No proposal shall be accepted from and no contract will be awarded to any person, firm, or corporation that is in arrears to the County, upon debt or contract that is a defaulter, as surety or otherwise, upon any obligation to the County, has open or pending litigation against the County (for a department or division other than Purchasing), or that is deemed irresponsible or unreliable by the County. If requested, the Proposer will be required to submit satisfactory evidence that they have a practical knowledge of the particular service proposed upon, and that they have the necessary personnel, equipment, experience and financial resources to provide the proposed services requested.

B. Representation

Proposals must be signed in ink by a company official(s) that has authorization to commit company resources and shall contain the firm’s full business address. These officials will also be individuals noted as authorized to sign Work Authorizations.

C. Proposal Evaluation Process

The County reserves the right to reject any or all proposals, in whole or in part, to request clarifications, to negotiate changes in the scope of services, and to waive any technicalities as deemed in its best interest.

The proposals will be reviewed by an evaluation team composed of County personnel. There will be a phased approach to the review process. During the first phase of the evaluation, the team will have access to all proposal materials except the separately sealed envelope marked “Fee Schedule.” The specific phases of review will proceed as follows:

<u>Phase I</u> —Proposals will be evaluated based on their relative responsiveness to the criteria described below and will be scored based on the point values as shown:		
<b>Tab</b>		<b>Scoring</b>
i	Firm Experience/Project References	35
ii	Key Personnel	20
iii	Understanding and Approach	25
<b>TOTAL: Phase I</b>		<b>80</b>
<u>Phase II</u> — At GCDWR’s discretion or as deemed in the best interest of GCDWR, proposing firms may be short listed before proceeding into Phase II. The number of firms being short listed will be at the sole discretion of the scoring committee. In lieu of the County establishing a short list, the fee schedule of all proposers will be opened and scored as indicated below.		20
Evaluation of fee schedule and/or multiplier schedule: The proposer that submitted the lowest overall price shall receive the maximum points allowed, and scores received for the higher priced firm(s) will be calculated using a mathematical formula based upon the percentage of difference between the proposers’ cost to the lowest cost.		
<b>TOTAL: Phase I &amp; II</b>		<b>100</b>
<u>Phase III</u> —At GCDWR’s discretion firms may be further short listed. The County may choose to extend an option for a presentation/interview to the short-listed firms. The number of firms being short listed is at the sole discretion of the scoring committee. Interviews will only be extended if the County deems that interviews are necessary in order to make a final selection. Interviews are optional and do not have to be extended by the scoring committee.		20
<b>TOTAL (with Optional Interview)</b>		<b>120</b>

All costs associated with the presentation/interview are the responsibility of the respondent.

The County may negotiate terms and/or pricing of the contract with the highest scoring firm(s). In the event that negotiations with the highest ranked firm(s) are unsuccessful, the County may then negotiate with the second ranked firm and so on until a satisfactory agreement has been reached.

D. Contract

The Proposer is to hold pricing firm for the duration of the initial term of the contract. Any increases/decreases to the contract will be reviewed at the time of the renewal offer. There are four options to renew. These renewal options are not guaranteed and will be based upon 1) any pricing changes or changes in other terms and conditions; 2) level of satisfaction with service; 3) willingness of both parties to renew; and 4) Board of Commissioners approval, if required.

The proposal must contain a statement that the firm has carefully reviewed the Agreement, can meet all insurance and other requirements set forth in the proposal, and if selected, will sign the Agreement. If any exceptions are taken to any part, each exception must be stated in detail and submitted as part of the proposal document. If no exceptions are stated, it is assumed that the proposer fully agrees to the "Sample Agreement" in its entirety. This information will be included in the cover letter.

Successful firm(s) are required within ten (10) days of the Notice of Award to provide the following:

- a. Certificate of Insurance specified in proposal.
- b. Payment and Performance Bonds.
- c. Two (2) sets of properly executed agreements.

E. Proposal Submittal/Format

One (1) unbound original, five (5) exact bound copies, and one (1) exact electronic copy on a USB flash memory drive of the firm's proposal are required to be submitted. Proposals do not have a page limit; however, certain elements do. Proposals should be letter size, single-sided written pages using an Arial font no smaller than 12-point font. Figures, chart, and exhibits shall be included under the appropriate tabs as described below. Resumes are to be included in an appendix and should be limited to no more than two (2) pages per individual and should be project relevant.

The following information shall be submitted in the proposal in the format as specified herein. Proposals must be physically divided by tabs into sections as described below.

Cover Letter - Firm Identification

Give the full legal name of the firm, the firm's principal business office and its satellite offices, if any; and indicate the location from which the requested services will be provided. Give information on the firm's history, business activities, size, employees (per office), officers, affiliates, subsidiaries, ownership (including any MBE/DBE/WBE qualification), and corporate data, as applicable to the provision of that service. This information as well as an executive summary of the proposal must be included in the cover letter.

**Please limit this cover letter to two (s) pages or less.**

Tab i. Firm Experience

Describe the effective and substantive experience of the firm in the provision of services similar to the Work. Locality and responsiveness of the firm and availability of crew and equipment (rented or owned) are also key components.

Clients and references must be included, but all references may or may not be verified, at the discretion of Gwinnett County. Emphasis will be given to the quality of the references, feedback given by the reference or lack of response by the reference. Regarding lack of response: incorrect telephone numbers or other contact information may result in the proposal being deemed non-responsive.

To respond to this tab, use the provided "Firm Experience Forms," and follow the instructions therein. Three (3) projects descriptions with confirmed references must be returned in the proposal. Submitting more or less than three (3) project descriptions may result in a proposal being considered non-responsive.

TAB i. FIRM EXPERIENCE FORMS

**Project No. 1**

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

Location: \_\_\_\_\_

Contractor Project Manager: \_\_\_\_\_

Project References

Project Owner: \_\_\_\_\_

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

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

Confirmed Contact Information (tel and/or email): \_\_\_\_\_

Project Budget and Schedule

Project Bid Amount and Final Contract Amount: \$ \_\_\_\_\_

Contract Completion Time:      Established Days: \_\_\_\_\_

Actual Completion Days: \_\_\_\_\_

Final Completion Date: \_\_\_\_\_

Description of Project Scope

[Please provide a general project description and, if desired, attach up to **two** separate pages of description and photos per project.]

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**COMPANY NAME** \_\_\_\_\_



**Project No. 3**

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

Location: \_\_\_\_\_

Contractor Project Manager: \_\_\_\_\_

Project References

Project Owner: \_\_\_\_\_

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

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

Confirmed Contact Information (tel and/or email): \_\_\_\_\_

Project Budget and Schedule

Project Bid Amount and Final Contract Amount: \$ \_\_\_\_\_

Contract Completion Time:      Established Days: \_\_\_\_\_

Actual Completion Days: \_\_\_\_\_

Final Completion Date: \_\_\_\_\_

Description of Project Scope

[Please provide a general project description and, if desired, attach up to **two** separate pages of description and photos per project.]

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**COMPANY NAME** \_\_\_\_\_

Tab ii. Key Personnel

Identify the key personnel proposed for this contract, specifically the following roles, which must be provided for the Work. Relevant qualifications, experience and availability of proposed personnel must be described.

- Project Manager (PM) – the individual who will be responsible for the day-to-day coordination of work activities for the assignments issued under the contract. The PM is responsible for scheduling work, communication with GCDWR’s project manager, operations and maintenance staff, the engineer, and any subcontractors or suppliers being utilized in the work. The PM will be required to attend operations staff meetings for coordination of work and is expected to be actively involved in the daily activities of the work to ensure all the GCDWR personnel and the engineer are apprised of work activities to quickly respond to unforeseen conditions.
- Contract Manager – the individual who will be responsible for handling contract and work order related issues. This individual shall have the authority to allocate company resources for meeting the needs of GCDWR. The Contract Manager may be the same individual as the PM.
- Financial Support Staff – personnel responsible for preparation of pay applications and assembling the required supporting documentation. This individual will work closely with GCDWR’s financial personnel for processing pay requests.
- Additional Staff – consideration will be given to additional staff information provided in the proposal. These may include, but not be limited to, Project Estimator, Foreman and Operators.

Provide a description of the qualifications and experience of the key staff members that may be involved in assignments. Mention certifications, degrees and specialty training relating to the Work such as Rosgen or North Carolina State University stream restoration training, and Georgia Stormwater Management Manual/Gwinnett County Stormwater Management Manual training. Resumes must be included in an appendix and not in the body of the proposal. **Resumes must be two (2) pages or less.**

Tab iii. Understanding and Approach

Description of contractors understanding of how a watershed improvement project will be initiated and managed, which includes methods, processes, identification of issues and resolution of conflicts. Specifically define the proposed plan for executing the following aspects of a project assignment.

- Scope review and comprehension, and project preparation.
- Mobilization and de-mobilization.
- Performance of field work including challenges typical of watershed improvement projects. Additionally, describe experience with any complex site grading operations, stream restoration work and BMP construction.
- Quality and inspection procedures.
- Health and safety planning and training.
- Erosion and spill control.
- Site security.
- Communication/reporting.
- Schedule and budget management.
- Conflict resolution.



- Demonstration of understanding of General Conditions and Technical Specifications.

If the utilization of subcontractors is planned, complete the provided "List of Subcontractors" form. If major subcontractors (>25% of Work) will be included, complete two "Firm Experience Forms" for each major subcontractor.

Tab iv. Fee Schedules

The proposer is to submit in a separately sealed envelope a Fee Schedule which has been labeled with the Proposers name, RP021-24, and "FEE SCHEDULE." All firm fees are to be billed at rates identified in the fee schedule. **Do not submit the Fee Schedule with the Technical Proposal.**

FAILURE TO RETURN THIS PAGE AS PART OF YOUR PROPOSAL MAY RESULT IN PROPOSAL BEING DEEMED NON- RESPONSIVE.

**FEE SCHEDULE  
(TO BE SUBMITTED IN A SEPARATE ENVELOPE)**

Proposer submits the following Unit Prices for the Watershed Improvements on an Annual Contract. The cost of Work to be included within each Item in the Unit Price Schedule is described in Section 01 22 00 – Unit Prices and the Specifications.

PAY ITEM NO.	SPEC. SECTION	DESCRIPTION	APPROX. ANNUAL QTY	UNIT PRICE	TOTAL PRICE
<b>TEMPORARY FENCING</b>					
1	01 56 26	ORANGE BARRIER FENCING	12,000 LF	\$	\$
2	01 56 26	TEMPORARY CHAIN LINK FENCING	100 LF	\$	\$
3	01 56 26	TEMPORARY WELDED WIRE FENCING	100 LF	\$	\$
<b>EXPLORATORY AND REMOVAL ITEMS</b>					
4	02 32 19	BENTONITE	1000 LB	\$	\$
5	02 41 13	PARTIAL DEPTH ASPHALT REMOVAL (MILLING)	100 CY	\$	\$
6	02 41 13	FULL DEPTH ASPHALT REMOVAL	50 CY	\$	\$
7	02 41 13	CONCRETE PAVEMENT REMOVAL	50 CY	\$	\$
8	02 41 13	REMOVAL OF EXISTING CURB OR CURB AND GUTTER, ANY TYPE	250 LF	\$	\$
9	02 41 13	REMOVAL OF EXISTING STORM DRAIN PIPE			
A		4-IN TO 12-IN DIAMETER	10 LF	\$	\$
B		15-IN TO 30-IN DIAMETER	50 LF	\$	\$
C		36-IN TO 48-IN DIAMETER	50 LF	\$	\$
D		54-IN TO 60-IN DIAMETER	25 LF	\$	\$
10	02 41 13	REMOVAL OR ABANDONMENT OF EXISTING STORM DRAIN STRUCTURE			
A		MANHOLES, INLETS, AND CATCH BASINS, ≤ 20 SF INNER CROSS-SECTIONAL AREA, ≤ 8-FT HEIGHT	1 EA	\$	\$
B		MANHOLES, INLETS, AND CATCH BASINS, ≤ 20 SF INNER CROSS-SECTIONAL AREA, > 8-FT HEIGHT	1 EA	\$	\$

COMPANY NAME \_\_\_\_\_

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**FEE SCHEDULE  
(TO BE SUBMITTED IN A SEPARATE ENVELOPE)**

PAY ITEM NO.	SPEC. SECTION	DESCRIPTION	APPROX. ANNUAL QTY	UNIT PRICE	TOTAL PRICE
C		MANHOLES, INLETS, AND CATCH BASINS, > 20 SF INNER CROSS-SECTIONAL AREA, ≤ 8-FT HEIGHT	1 EA	\$	\$
D		MANHOLES, INLETS, AND CATCH BASINS, > 20 SF INNER CROSS-SECTIONAL AREA, > 8-FT HEIGHT	1 EA	\$	\$
E		PVC STRUCTURES, ALL SIZES	1 EA	\$	\$
F		HEADWALLS, ENDWALLS, END SECTIONS, ALL SIZES	1 EA	\$	\$
11	02 41 13	FENCE REMOVAL			
A		CHAIN LINK FENCE, 4-FT HEIGHT	20 LF	\$	\$
B		CHAIN LINK FENCE, 6-FT HEIGHT	50 LF	\$	\$
C		CHAIN LINK FENCE, 8-FT HEIGHT	20 LF	\$	\$
D		WOOD FENCE, ALL SIZES	20 LF	\$	\$
12	02 41 13	SELECTIVE TREE REMOVAL			
A		PER TREE, OVER 12-IN UP TO 24-IN (DBH)	40 EA	\$	\$
B		PER TREE, OVER 24-IN UP TO 36-IN (DBH)	8 EA	\$	\$
C		PER TREE, OVER 36-IN UP TO 48-IN (DBH)	4 EA	\$	\$
D		PER TREE, OVER 48-IN (DBH)	2 EA	\$	\$
E		TREE REMOVAL CREW HALF DAY	5 EA	\$	\$
F		TREE REMOVAL CREW FULL DAY	2 EA	\$	\$
13	02 41 13	STUMP GRINDING			
A		UP TO 12-IN DIAMETER AT GROUND LEVEL	5 EA	\$	\$
B		12-IN TO 24-IN DIAMETER AT GROUND LEVEL	5 EA	\$	\$
C		OVER 24-IN DIAMETER AT GROUND LEVEL	5 EA	\$	\$

COMPANY NAME \_\_\_\_\_

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**FEE SCHEDULE  
(TO BE SUBMITTED IN A SEPARATE ENVELOPE)**

PAY ITEM NO.	SPEC. SECTION	DESCRIPTION	APPROX. ANNUAL QTY	UNIT PRICE	TOTAL PRICE
14	02 42 00	SOLID WASTE DISPOSAL	50 TON	\$	\$
15	02 42 00	INERT WASTE DISPOSAL	200 CY	\$	\$
<b>CONCRETE</b>					
16	03 30 00	CONCRETE STRUCTURES, CAST-IN-PLACE, INCLUDING REINFORCING STEEL			
A		CLASS AAA (5,000 PSI)	5 CY	\$	\$
B		CLASS AA1(4,500 PSI)	5 CY	\$	\$
C		CLASS A (3,000 PSI)	5 CY	\$	\$
D		CLASS B (2,200 PSI)	5 CY	\$	\$
17	03 30 00	FLAT WORK CONCRETE, CAST-IN-PLACE			
A		CLASS AAA (5,000 PSI)	10 CY	\$	\$
B		CLASS AA1(4,500 PSI)	10 CY	\$	\$
C		CLASS A (3,000 PSI)	10 CY	\$	\$
D		CLASS B (2,200 PSI)	10 CY	\$	\$
18	03 62 00	GROUTING (NON-PRESSURE)	10 CY	\$	\$
<b>METALS AND SPECIALTIES</b>					
19	05 52 00	GALVANIZED METAL RAILING (TOP RAIL, MID RAIL, OR BOTTOM RAIL)	50 LF	\$	\$
20	10 14 00	TEMPORARY PROJECT SIGN			
A		LARGE (8FT X 4FT)	1 EA	\$	\$
B		MEDIUM (4FT x 2FT)	2 EA	\$	\$
C		SMALL (2.25 FT x 1.5 FT)	5 EA	\$	\$
21	10 14 00	INTERPRETIVE SIGN	1 EA	\$	\$
22	10 14 00	MITIGATION BOUNDARY SIGN	2 EA	\$	\$
23	10 14 00	PREFABRICATED SIGNAGE	10 SF	\$	\$

COMPANY NAME \_\_\_\_\_

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PAY ITEM NO.	SPEC. SECTION	DESCRIPTION	APPROX. ANNUAL QTY	UNIT PRICE	TOTAL PRICE
24	10 89 01	FISH STOCKING	250 LB	\$	\$
25	10 89 01	ELECTROFISHING	2 AC	\$	\$
<b>CLEARING AND EARTHWORK</b>					
26	31 05 16	AGGREGATE STONE			
A		NO. 3 STONE	10 CY	\$	\$
B		NO. 4 STONE	10 CY	\$	\$
C		NO. 5 STONE	10 CY	\$	\$
D		NO. 57 STONE	25 CY	\$	\$
E		NO. 8 STONE	10 CY	\$	\$
F		NO. 89 STONE	25 CY	\$	\$
G		GRADED AGGREGATE BASE	25 CY	\$	\$
H		PEA GRAVEL	10 CY	\$	\$
27	31 05 19.19	GEOGRID REINFORCEMENT	100 SY	\$	\$
28	31 05 19.19	GEOCELL CONFINEMENT SYSTEM, 4" CELL DEPTH	80 SY	\$	\$
29	31 10 00	CLEARING AND GRUBBING, MULCH ON SITE	5.0 AC	\$	\$
30	31 10 00	CLEARING AND GRUBBING, HAUL OFF SITE	1.0 AC	\$	\$
31	31 10 00	SELECTIVE TREE PRUNING			
A		TREE PRUNING CREW HALF DAY	4 EA	\$	\$
B		TREE PRUNING CREW FULL DAY	2 EA	\$	\$
32	31 10 00	BRUSH CUTTING			
A		BRUSH CUTTING CREW HALF DAY	2 EA	\$	\$
B		BRUSH CUTTING CREW FULL DAY	1 EA	\$	\$

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**FEE SCHEDULE  
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PAY ITEM NO.	SPEC. SECTION	DESCRIPTION	APPROX. ANNUAL QTY	UNIT PRICE	TOTAL PRICE
33	31 10 00	SHRUB TRIMMING			
A		SHRUB TRIMMING CREW HALF DAY	2 EA	\$	\$
B		SHRUB TRIMMING CREW FULL DAY	1 EA	\$	\$
34	31 23 00	UNCLASSIFIED EXCAVATION AND FILL	5,000 CY	\$	\$
35	31 23 00	IMPORTED FILL	200 CY	\$	\$
36	31 23 00	TRENCH EXCAVATION - ADDITIONAL DEPTH	200 CY	\$	\$
37	31 23 00	CHANNEL EXCAVATION	600 CY	\$	\$
38	31 23 00	ROCK EXCAVATION (0-100 CY PER PROJECT)	10 CY	\$	\$
39	31 23 00	SPOIL REMOVAL	2,000 CY	\$	\$
40	31 23 00	POND SEDIMENT REMOVAL - WET SEDIMENT	200 CY	\$	\$
41	31 23 19	TEMPORARY STREAM BYPASS PUMPING		\$	\$
A		PUMP SIZE ≥ 6" AND < 8"	10 DAY	\$	\$
B		PUMP SIZE ≥ 8"	5 DAY	\$	\$
42	31 23 23.33	FLOWABLE FILL	3 CY	\$	\$
43	31 23 34	ENGINEERED SOIL MEDIA	200 CY	\$	\$
<b>EROSION AND SEDIMENTATION CONTROLS</b>					
44	31 25 00	TEMPORARY SEEDING	10,000 SY	\$	\$
45	31 25 00	FLOCCULANTS AND COAGULANTS			
A		POWDERED FLOCCULANT	10 LB	\$	\$
B		FLOCCULANT LOGS	5 EA	\$	\$
C		LIQUID FLOCCULANT	5 GA	\$	\$
46	31 25 00	TACKIFIER	25 LB	\$	\$

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PAY ITEM NO.	SPEC. SECTION	DESCRIPTION	APPROX. ANNUAL QTY		UNIT PRICE	TOTAL PRICE
47	31 25 00	CHECK DAM - STONE	10	CY	\$	\$
48	31 25 00	STRAW BALES (STAKED)	50	EA	\$	\$
49	31 25 00	FILTER SOCKS				
A		SMALL (UP TO 12-IN DIAMETER)	20	LF	\$	\$
B		LARGE (UP TO 18-IN DIAMETER)	10	LF	\$	\$
50	31 25 00	COIR WATTLE (6-IN To 12-IN DIAMETER)	20	LF	\$	\$
51	31 25 00	STRAW WATTLE (6-IN To 12-IN DIAMETER)	20	LF	\$	\$
52	31 25 00	COIR LOG (15-IN TO 20-IN DIAMETER)	10	LF	\$	\$
53	31 25 00	CONSTRUCTION EXIT	2	EA	\$	\$
54	31 25 00	TEMPORARY DOWNDRAIN STRUCTURE	25	LF	\$	\$
55	31 25 00	ROCK FILTER DAM	1	EA	\$	\$
56	31 25 00	SILT BAG	2	EA	\$	\$
57	31 25 00	SILT FENCE - TYPE S	2,500	LF	\$	\$
58	31 25 00	INLET SEDIMENT TRAP	10	EA	\$	\$
59	31 25 00	SKIMMER	1	EA	\$	\$
60	31 25 00	TEMPORARY BRIDGE STREAM CROSSING	1	LF	\$	\$
61	31 25 00	TURBIDITY CURTAIN	70	LF	\$	\$
62	31 25 00	CONCRETE WASHOUT STRUCTURE	1	EA	\$	\$
63	31 25 14.13	FLEXIBLE GROWTH MEDIUM (FGM)				
A		SLOPES ≤ 3H to 1V	0.5	AC	\$	\$
B		SLOPES > TO 3H to 1V and ≤ 2H to 1V	0.5	AC	\$	\$
C		SLOPES > 2H to 1V and ≤ 1H to 1V	0.5	AC	\$	\$

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PAY ITEM NO.	SPEC. SECTION	DESCRIPTION	APPROX. ANNUAL QTY	UNIT PRICE	TOTAL PRICE
D		SLOPES > 1H to 1V	0.5 AC	\$	\$
E		BELOW RECP OR TRM	0.5 AC	\$	\$
64	31 25 14.13	BONDED FIBER MATRIX (BFM)			
A		SLOPES ≤ 3H to 1V	0.5 AC	\$	\$
B		SLOPES > 3H to 1V and ≤ 2H to 1V	0.5 AC	\$	\$
C		SLOPES > 2H to 1V and ≤ 1H to 1V	0.5 AC	\$	\$
D		SLOPES > TO 1H to 1V	0.5 AC	\$	\$
E		BELOW RECP OR TRM	0.5 AC	\$	\$
65	31 25 14.13	STABILIZED MULCH MATRIX (SSM)			
A		SLOPES ≤ 3H to 1V	0.5 AC	\$	\$
B		SLOPES > 3H to 1V and ≤ 2H to 1V	0.5 AC	\$	\$
C		BELOW RECP OR TRM	0.5 AC	\$	\$
66	31 32 01	STRAW-BASED EROSION CONTROL MATTING			
A		SINGLE NET STRAW MATTING	4,000 SY	\$	\$
B		DOUBLE NET STRAW MATTING	2,000 SY	\$	\$
67	31 32 01	WOOD FIBER (EXCELSIOR) EROSION CONTROL MATTING	2,000 SY	\$	\$
68	31 32 01	COIR FABRIC			
A		COIR BLANKET (UNIT WEIGHT - 10.5 TO 18 OZ./SY)	5,000 SY	\$	\$
B		COIR BLANKET (UNIT WEIGHT - 18.1 TO 25.9 OZ./SY)	3,000 SY	\$	\$
C		COIR MATTRESS (UNIT WEIGHT - 26.0 OZ./SY OR GREATER)	1,000 SY	\$	\$

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PAY ITEM NO.	SPEC. SECTION	DESCRIPTION	APPROX. ANNUAL QTY	UNIT PRICE	TOTAL PRICE
<b>STABILIZATION AND SHEETING ITEMS</b>					
69	31 32 19.16	GEOTEXTILE FABRIC			
A		WOVEN (TYPE 1)	750 SY	\$	\$
B		NON-WOVEN (TYPE 2)	750 SY	\$	\$
C		NON-WOVEN (TYPE 3)	750 SY	\$	\$
70	31 32 23	PRESSURE GROUTING SOIL STABILIZATION	5 CY	\$	\$
71	31 35 19.21	PERMANENT TURF REINFORCEMENT MATTING (TRM)	100 SY	\$	\$
72	31 36 00	GABION STRUCTURES	25 CY	\$	\$
73	31 37 00	RIP RAP IN PLACE			
A		TYPE 1	30 CY	\$	\$
B		TYPE 3	150 CY	\$	\$
C		WELL-GRADED	100 CY	\$	\$
74	31 37 00	STONE GROUTED RIP RAP IN PLACE	5 CY	\$	\$
75	31 41 16.13	STEEL SHEET PILING - PERMANENT	150 SF	\$	\$
76	31 41 16.13	STEEL SHEET PILING - TEMPORARY	150 SF	\$	\$
77	31 41 16.16	VINYL SHEET PILING	150 SF	\$	\$
<b>STREAM AND WETLAND CONSTRUCTION</b>					
78	31 80 02	LOG – ON-SITE	2 EA	\$	\$
79	31 80 02	LOG – IMPORTED			
A		12 FT TO 25 FT LENGTH	2 EA	\$	\$
B		OVER 25 FT TO 50 FT LENGTH	2 EA	\$	\$

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PAY ITEM NO.	SPEC. SECTION	DESCRIPTION	APPROX. ANNUAL QTY	UNIT PRICE	TOTAL PRICE
80	31 80 02	BOULDERS			
A		FIELDSTONE - EXTRA LARGE	1 EA	\$	\$
B		FIELDSTONE - LARGE	2 EA	\$	\$
C		FIELDSTONE - MEDIUM	4 EA	\$	\$
D		FIELDSTONE - SMALL	4 EA	\$	\$
E		GRANITE QUARRY STONE - EXTRA LARGE	1 EA	\$	\$
F		GRANITE QUARRY STONE - LARGE	2 EA	\$	\$
G		GRANITE QUARRY STONE - MEDIUM	4 EA	\$	\$
H		GRANITE QUARRY STONE - SMALL	4 EA	\$	\$
81	31 80 02	RIVER COBBLE	10 CY	\$	\$
82	31 80 02	RIFFLE ROCK	8 CY	\$	\$
83	31 80 02	RIVER PEBBLE	6 CY	\$	\$
84	31 80 03	STONE TOE PROTECTION & BENDWAY WEIR	300 CY	\$	\$
85	31 80 05	ROOT WAD REVETMENT	20 LF	\$	\$
86	31 80 06	CROSS VANE			
A		EXTRA LARGE	125 LF	\$	\$
B		LARGE	200 LF	\$	\$
C		MEDIUM	300 LF	\$	\$
D		SMALL	250 LF	\$	\$
87	31 80 07	J-HOOK VANE			
A		EXTRA LARGE	50 LF	\$	\$
B		LARGE	75 LF	\$	\$

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PAY ITEM NO.	SPEC. SECTION	DESCRIPTION	APPROX. ANNUAL QTY	UNIT PRICE	TOTAL PRICE
D		SMALL	80 LF	\$	\$
88	31 80 07	BOULDER VANE			
A		EXTRA LARGE	5 LF	\$	\$
B		LARGE	10 LF	\$	\$
C		MEDIUM	10 LF	\$	\$
D		SMALL	15 LF	\$	\$
89	31 80 08	J-HOOK LOG VANE			
A		EXTRA LARGE	60 LF	\$	\$
B		LARGE	90 LF	\$	\$
C		MEDIUM	125 LF	\$	\$
D		SMALL	90 LF	\$	\$
90	31 80 08	LOG VANE			
A		EXTRA LARGE	6 LF	\$	\$
B		LARGE	8 LF	\$	\$
C		MEDIUM	10 LF	\$	\$
D		SMALL	8 LF	\$	\$
91	31 80 09	STEP POOL SERIES			
A		EXTRA LARGE	75 LF	\$	\$
B		LARGE	100 LF	\$	\$
C		MEDIUM	175 LF	\$	\$
D		SMALL	125 LF	\$	\$

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PAY ITEM NO.	SPEC. SECTION	DESCRIPTION	APPROX. ANNUAL QTY	UNIT PRICE	TOTAL PRICE
92	31 80 10	LOG SILL - FELLED ON-SITE			
A		EXTRA LARGE	6 LF	\$	\$
B		LARGE	8 LF	\$	\$
C		MEDIUM	6 LF	\$	\$
D		SMALL	10 LF	\$	\$
93	31 80 10	LOG SILL - IMPORTED			
A		EXTRA LARGE	6 LF	\$	\$
B		LARGE	8 LF	\$	\$
C		MEDIUM	6 LF	\$	\$
D		SMALL	10 LF	\$	\$
94	31 80 12	TOE WOOD PROTECTION	10 SY	\$	\$
95	31 80 14	LIVE FASCINE	125 LF	\$	\$
96	31 80 15	STONE CASCADE			
A		EXTRA LARGE	10 CY	\$	\$
B		LARGE	12 CY	\$	\$
C		MEDIUM	15 CY	\$	\$
D		SMALL	10 CY	\$	\$
97	31 80 17	SOIL ENCAPSULATED LIFT (SEL) WITHOUT COIR BLOCK			
A		5.5-FT TAIL	250 LF	\$	\$
B		4-FT TAIL	250 LF	\$	\$

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PAY ITEM NO.	SPEC. SECTION	DESCRIPTION	APPROX. ANNUAL QTY	UNIT PRICE	TOTAL PRICE
98	31 80 17	SOIL ENCAPSULATED LIFT (SEL) WITH COIR BLOCK			
A		5.5-FT TAIL	500 LF	\$	\$
B	31 80 17	4-FT TAIL	500 LF	\$	\$
99		STORMWATER OUTFALL STEPS	50 SF	\$	\$
<b>LABOR RATES AND CONSTRUCTION AIDS</b>					
100	32 01 30	LABOR RATES			
A		FOREMAN	80 HR	\$	\$
B		LABORER	160 HR	\$	\$
C		SURVEYOR (2-PERSON CREW)	40 HR	\$	\$
D		TECHNICAL LABORER	40 HR	\$	\$
101	32 01 31	HEAVY EQUIPMENT RATES			
A		TRACKED EXCAVATOR W/HYDRAULIC THUMB (30,000 - 50,000 LB)	20 HR	\$	\$
B		MINI EXCAVATOR (6,000 - 20,000 LB)	40 HR	\$	\$
C		RUBBER TIRE LOADER	20 HR	\$	\$
D		4WD RUBBER TIRE LOADER	20 HR	\$	\$
E		SKID STEER LOADER (3,500 LB)	40 HR	\$	\$
F		DUMP TRUCK (SINGLE AXLE)	20 HR	\$	\$
G		DUMP TRUCK (DUAL AXLE)	20 HR	\$	\$
H		DUMP TRUCK (TRI/QUAD AXLE)	10 HR	\$	\$
I		TRACKED DUMP TRUCK	10 HR	\$	\$
J		OFF-HIGHWAY DUMP TRUCK	10 HR	\$	\$

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PAY ITEM NO.	SPEC. SECTION	DESCRIPTION	APPROX. ANNUAL QTY	UNIT PRICE	TOTAL PRICE
K		REGENERATIVE AIR STREET SWEEPER	10 HR	\$	\$
<b>SITE RESTORATION AND LANDSCAPING</b>					
102	32 12 16	ASPHALT PAVING	200 TON	\$	\$
103	32 14 13	CONCRETE UNIT PAVERS			
A		STANDARD CONCRETE UNIT PAVERS	100 SY	\$	\$
B		PERMEABLE INTERLOCKING UNIT PAVERS	100 SY	\$	\$
C		CONCRETE GRID PAVER UNITS	100 SY	\$	\$
104	32 14 43	PERVIOUS CONCRETE PAVING	150 CY	\$	\$
105	32 14 43	MODULAR PREFABRICATED PERVIOUS CONCRETE PANELS	250 SY	\$	\$
106	32 16 00	CURB AND GUTTER			
A		HIGH BACK, 6" X 24" X 12"	10 LF	\$	\$
B		HIGH BACK, 6" X 30" X 12"	10 LF	\$	\$
C		ROLL BACK, 6" X 24" X 10"	10 LF	\$	\$
107	32 16 00	HEADER CURB			
A		HEADER CURB, 6" CURB HEIGHT	10 LF	\$	\$
B		HEADER CURB, 8" CURB HEIGHT	10 LF	\$	\$
108	32 16 00	SIDEWALK	10 SY	\$	\$
109	32 31 00	CHAIN LINK FENCE			
A		4-FT HEIGHT, GALVANIZED FABRIC	50 LF	\$	\$
B		6-FT HEIGHT, GALVANIZED FABRIC	75 LF	\$	\$
C		8-FT HEIGHT, GALVANIZED FABRIC	50 LF	\$	\$
D		4-FT HEIGHT, VINYL COATED FABRIC	50 LF	\$	\$

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PAY ITEM NO.	SPEC. SECTION	DESCRIPTION	APPROX. ANNUAL QTY	UNIT PRICE	TOTAL PRICE
E		6-FT HEIGHT, VINYL COATED FABRIC	75 LF	\$	\$
F		8-FT HEIGHT, VINYL COATED FABRIC	50 LF	\$	\$
G		BARBED WIRE	75 LF	\$	\$
110	32 31 00	SPLIT RAIL FENCE			
A		2 RAIL FENCE	60 LF	\$	\$
B		3 RAIL FENCE	60 LF	\$	\$
111	32 31 00	WOODEN PRIVACY FENCE			
A		6-FT HEIGHT	100 LF	\$	\$
B		8-FT HEIGHT	40 LF	\$	\$
112	32 31 00	DECORATIVE FENCE			
A		6-FT HEIGHT	20 LF	\$	\$
B		8-FT HEIGHT	10 LF	\$	\$
113	32 31 00	WELDED WIRE FENCE			
A		4-FT HEIGHT	100 LF	\$	\$
B		5-FT HEIGHT	100 LF	\$	\$
114	32 31 00	CHICKEN WIRE FENCE	50 LF	\$	\$
115	32 31 00	BOLLARDS, STEEL	10 EA	\$	\$
116	32 32 23	SEGMENTAL RETAINING WALL			
A		MODULAR BLOCK FACE	60 SF	\$	\$
B		PERMANENT FIELDSTONE FACE	60 SF	\$	\$
117	32 39 10	ACCESS MATS			
A		TIMBER MATS	60 SY	\$	\$

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PAY ITEM NO.	SPEC. SECTION	DESCRIPTION	APPROX. ANNUAL QTY		UNIT PRICE	TOTAL PRICE
B		COMPOSITE MATS	60	SY	\$	\$
118	32 91 13	TOPSOIL	25	CY	\$	\$
119	32 91 13	SOIL AMENDMENTS				
A		LIME	5,000	LB	\$	\$
B		SAWDUST	50	LB	\$	\$
C		GROUND BARK	50	LB	\$	\$
D		COMPOST MULCH	50	LB	\$	\$
E		PEAT	50	LB	\$	\$
F		FERTILIZER	200	LB	\$	\$
G		SAND	50	LB	\$	\$
H		PERLITE	20	LB	\$	\$
I		GYP SUM	50	LB	\$	\$
120	32 91 13	COMPOST MULCH				
A		BLOWN	50	CY	\$	\$
B		HAND PLACED	15	CY	\$	\$
121	32 91 13	PLANTING SOIL MIXES	20	CY	\$	\$
122	32 91 13	TILLING	5,000	SY	\$	\$
123	32 91 13	HAND GRADING	1,000	SY	\$	\$
124	32 91 13	SAND FILL	75	CY	\$	\$
125	32 92 00	SEEDING				
A		NATIVE UPLAND	4,000	SY	\$	\$
B		NATIVE WETLAND	4,000	SY	\$	\$
C		ORNAMENTAL	2,000	SY	\$	\$

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PAY ITEM NO.	SPEC. SECTION	DESCRIPTION	APPROX. ANNUAL QTY	UNIT PRICE	TOTAL PRICE
D		CUSTOM	2,000 SY	\$	\$
126	32 92 00	TURFGRASS SEEDING			
A		STANDARD VARIETIES	3,000 SY	\$	\$
B		PREMIUM VARIETIES	1,500 SY	\$	\$
127	32 92 00	TURFGRASS SODDING			
A		STANDARD VARIETIES	1,000 SY	\$	\$
B		PREMIUM VARIETIES	1,000 SY	\$	\$
C		BERMUDA GRASS	1,000 SY	\$	\$
128	32 92 00	HYDROSEEDING			
A		STANDARD TURFGRASS VARIETIES	1,200 SY	\$	\$
B		PREMIUM TURFGRASS VARIETIES	1,200 SY	\$	\$
C		NATIVE UPLAND	1,200 SY	\$	\$
D		NATIVE WETLAND	1,200 SY	\$	\$
E		ORNAMENTAL	300 SY	\$	\$
F		CUSTOM	300 SY	\$	\$
129	32 97 00	LIVE STAKE	600 EA	\$	\$
130	32 97 00	LIVE WHIP	200 EA	\$	\$
131	32 97 00	LIVE POLE	100 EA	\$	\$
132	32 97 00	LIVE PLANTINGS			
A		FLOWER BULBS	100 EA	\$	\$
B		PLUGS	300 EA	\$	\$
C		BARE ROOT SEEDLINGS	250 EA	\$	\$

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PAY ITEM NO.	SPEC. SECTION	DESCRIPTION	APPROX. ANNUAL QTY	UNIT PRICE	TOTAL PRICE
133	32 97 00	CONTAINER PLANTINGS			
A		1-PINT	100 EA	\$	\$
B		1-QUART	150 EA	\$	\$
C		2.5-QUART	150 EA	\$	\$
D		1-GALLON	400 EA	\$	\$
E		3-GALLON	400 EA	\$	\$
F		5-GALLON	400 EA	\$	\$
G		7-GALLON	150 EA	\$	\$
H		15-GALLON	15 EA	\$	\$
I		30-GALLON	10 EA	\$	\$
134	32 97 00	CALIPER TREES			
A		1/2-INCH	15 EA	\$	\$
B		1-INCH	40 EA	\$	\$
C		1-1/2-INCH	20 EA	\$	\$
D		2-INCH	60 EA	\$	\$
E		3-INCH	15 EA	\$	\$
135	32 97 00	PLANT PROTECTION	100 EA	\$	\$
136	32 97 00	STRAW MULCH			
A		WHEAT STRAW BALES (18" X 36" X 14")	10 EA	\$	\$
B		PINE STRAW BALES (18" X 36" X 14")	10 EA	\$	\$
137	32 97 00	WOOD MULCH			
A		HARDWOOD, COARSE GROUND	50 CY	\$	\$

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PAY ITEM NO.	SPEC. SECTION	DESCRIPTION	APPROX. ANNUAL QTY	UNIT PRICE	TOTAL PRICE
B		HARDWOOD, DOUBLE GROUND	50 CY	\$	\$
C		SOFTWOOD, COARSE GROUND	50 CY	\$	\$
D		SOFTWOOD, DOUBLE GROUND	50 CY	\$	\$
138	32 97 00	LANDSCAPE EDGING BARRIER			
A		METAL	20 LF	\$	\$
B		PLASTIC	20 LF	\$	\$
C		WOOD	20 LF	\$	\$
139	32 97 00	TREE BAGS	5 EA	\$	\$
140	32 97 00	SLATE CHIPS	5 CY	\$	\$
141	32 97 00	FLAGSTONE	10 SY	\$	\$
142	32 97 10	INVASIVE SPECIES PHYSICAL REMOVAL			
A		CREW HALF DAY	2 EA	\$	\$
B		CREW FULL DAY	1 EA	\$	\$
143	32 97 10	HERBICIDE AND PESTICIDE, LICENSED APPLICATION			
A		HERBICIDE APPLICATION	2,000 SY	\$	\$
B		PESTICIDE APPLICATION	2,000 SY	\$	\$
<b>STORMWATER PIPING SYSTEMS</b>					
144	33 42 11	PVC SCHEDULE 40 PIPE, UP TO 5' DEPTH OF COVER			
A		4-IN DIAMETER SOLID WALL	20 LF	\$	\$
B		6-IN DIAMETER SOLID WALL	20 LF	\$	\$
C		8-IN DIAMETER SOLID WALL	20 LF	\$	\$
D		4-IN DIAMETER SLOTTED/ PERFORATED WALL	20 LF	\$	\$

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PAY ITEM NO.	SPEC. SECTION	DESCRIPTION	APPROX. ANNUAL QTY	UNIT PRICE	TOTAL PRICE
E		6-IN DIAMETER SLOTTED/ PERFORATED WALL	20 LF	\$	\$
F		8-IN DIAMETER SLOTTED/ PERFORATED WALL	20 LF	\$	\$
145	33 42 11	PVC SCHEDULE 40 PIPE, GREATER THAN 5' DEPTH OF COVER TO 10' DEPTH OF COVER			
A		4-IN DIAMETER SOLID WALL	20 LF	\$	\$
B		6-IN DIAMETER SOLID WALL	20 LF	\$	\$
C		8-IN DIAMETER SOLID WALL	20 LF	\$	\$
D		4-IN DIAMETER SLOTTED/ PERFORATED WALL	20 LF	\$	\$
E		6-IN DIAMETER SLOTTED/ PERFORATED WALL	20 LF	\$	\$
F		8-IN DIAMETER SLOTTED/ PERFORATED WALL	20 LF	\$	\$
146	33 42 11	ALUMINUM COATED (TYPE 2) CORRUGATED STEEL PIPE, UP TO 5' DEPTH OF COVER			
A		18-IN TO 36-IN DIAMETER	10 LF	\$	\$
B		42-IN TO 72-IN DIAMETER	10 LF	\$	\$
C		78-IN TO 96-IN DIAMETER	10 LF	\$	\$
147	33 42 11	ALUMINUM COATED (TYPE 2) CORRUGATED STEEL PIPE, GREATER THAN 5' DEPTH OF COVER TO 10' DEPTH OF COVER			
A		18-IN TO 36-IN DIAMETER	10 LF	\$	\$
B		42-IN TO 72-IN DIAMETER	10 LF	\$	\$
C		78-IN TO 96-IN DIAMETER	10 LF	\$	\$
148	33 42 11	CORRUGATED POLYMER PRECOAT STEEL PIPE, UP TO 5' DEPTH OF COVER			
A		18-IN TO 36-IN DIAMETER	10 LF	\$	\$
B		42-IN TO 72-IN DIAMETER	10 LF	\$	\$

COMPANY NAME \_\_\_\_\_

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**FEE SCHEDULE  
(TO BE SUBMITTED IN A SEPARATE ENVELOPE)**

PAY ITEM NO.	SPEC. SECTION	DESCRIPTION	APPROX. ANNUAL QTY	UNIT PRICE	TOTAL PRICE
149	33 42 11	CORRUGATED POLYMER PRECOAT STEEL PIPE, GREATER THAN 5' DEPTH OF COVER TO 10' DEPTH OF COVER			
A		18-IN TO 36-IN DIAMETER	10 LF	\$	\$
B		42-IN TO 72-IN DIAMETER	10 LF	\$	\$
150	33 42 11	CORRUGATED ALUMINUM ALLOY PIPE, UP TO 5' DEPTH OF COVER			
A		18-IN TO 36-IN DIAMETER	10 LF	\$	\$
B		42-IN TO 72-IN DIAMETER	10 LF	\$	\$
151	33 42 11	CORRUGATED ALUMINUM ALLOY PIPE, GREATER THAN 5' DEPTH OF COVER TO 10' DEPTH OF COVER			
A		18-IN TO 36-IN DIAMETER	10 LF	\$	\$
B		42-IN TO 72-IN DIAMETER	10 LF	\$	\$
152	33 42 11	RCP PIPE - ANY CONFIGURATION, UP TO 5' DEPTH OF COVER			
A		18-IN TO 24-IN DIAMETER	20 LF	\$	\$
B		30-IN TO 36-IN DIAMETER	20 LF	\$	\$
C		42-IN TO 48-IN DIAMETER	20 LF	\$	\$
D		52-IN TO 60-IN DIAMETER	20 LF	\$	\$
153	33 42 11	RCP PIPE - ANY CONFIGURATION, GREATER THAN 5' DEPTH OF COVER TO 10' DEPTH OF COVER			
A		18-IN TO 24-IN DIAMETER	15 LF	\$	\$
B		30-IN TO 36-IN DIAMETER	15 LF	\$	\$
C		42-IN TO 48-IN DIAMETER	15 LF	\$	\$
D		52-IN TO 60-IN DIAMETER	15 LF	\$	\$

COMPANY NAME \_\_\_\_\_

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**FEE SCHEDULE  
(TO BE SUBMITTED IN A SEPARATE ENVELOPE)**

PAY ITEM NO.	SPEC. SECTION	DESCRIPTION	APPROX. ANNUAL QTY	UNIT PRICE	TOTAL PRICE
154	33 42 11	HDPE PIPE, CORRUGATED SINGLE WALL, UP TO 5' DEPTH OF COVER			
A		4-IN TO 8-IN DIAMETER, SOLID WALL	20 LF	\$	\$
B		4-IN TO 8-IN DIAMETER, SLOTTED WALL	20 LF	\$	\$
155	33 42 11	HDPE PIPE, CORRUGATED SINGLE WALL, GREATER THAN 5' DEPTH OF COVER TO 10' DEPTH OF COVER			
A		4-IN TO 8-IN DIAMETER, SOLID WALL	20 LF	\$	\$
B		4-IN TO 8-IN DIAMETER, SLOTTED WALL	20 LF	\$	\$
156	33 42 11	HDPE, DOUBLE WALL, UP TO 5' DEPTH OF COVER			
A		6-IN TO 8-IN DIAMETER	15 LF	\$	\$
B		12-IN TO 15-IN DIAMETER	15 LF	\$	\$
C		18-IN TO 24-IN DIAMETER	15 LF	\$	\$
D		30-IN TO 36-IN DIAMETER	15 LF	\$	\$
E		42-IN TO 48-IN DIAMETER	15 LF	\$	\$
F		52-IN TO 60-IN DIAMETER	15 LF	\$	\$
157	33 42 11	HDPE, DOUBLE WALL, GREATER THAN 5' DEPTH OF COVER TO 10' DEPTH OF COVER			
A		6-IN TO 8-IN DIAMETER	15 LF	\$	\$
B		12-IN TO 15-IN DIAMETER	15 LF	\$	\$
C		18-IN TO 24-IN DIAMETER	15 LF	\$	\$
D		30-IN TO 36-IN DIAMETER	15 LF	\$	\$
E		42-IN TO 48-IN DIAMETER	15 LF	\$	\$
F		52-IN TO 60-IN DIAMETER	15 LF	\$	\$

COMPANY NAME \_\_\_\_\_

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**FEE SCHEDULE  
(TO BE SUBMITTED IN A SEPARATE ENVELOPE)**

PAY ITEM NO.	SPEC. SECTION	DESCRIPTION	APPROX. ANNUAL QTY	UNIT PRICE	TOTAL PRICE
158	33 42 11	DUCTILE IRON PIPE, UP TO 5' DEPTH OF COVER			
A		4-INCH DIAMETER	10 LF	\$	\$
B		6-INCH DIAMETER	10 LF	\$	\$
C		8-INCH DIAMETER	10 LF	\$	\$
159	33 42 11	DUCTILE IRON PIPE, GREATER THAN 5' DEPTH OF COVER TO 10' DEPTH OF COVER			
A		4-INCH DIAMETER	10 LF	\$	\$
B		6-INCH DIAMETER	10 LF	\$	\$
C		8-INCH DIAMETER	10 LF	\$	\$
160	33 42 30	PRECAST MANHOLE			
A		TYPE 1 (GDOT 1011A)	8 VF	\$	\$
B		TYPE 2 (GDOT 1011A)	8 VF	\$	\$
161	33 42 30	MANHOLE COVERS			
A		TRAFFIC RATED	1 EA	\$	\$
B		NON-TRAFFIC RATED	1 EA	\$	\$
162	33 42 30	PRECAST DROP INLET			
A		GROUP 1 (GDOT 1019A)	8 VF	\$	\$
B		GROUP 2 (GDOT 1019A)	8 VF	\$	\$
C		GROUP 1 (GWINNETT P&D 610)	8 VF	\$	\$
D		GROUP 2 (GWINNETT P&D 610)	8 VF	\$	\$
E		GROUP 1 (GDOT 9031S/9031D)	8 VF	\$	\$
F		GROUP 2 (GDOT 9031S/9031D)	8 VF	\$	\$

COMPANY NAME \_\_\_\_\_

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**FEE SCHEDULE**  
**(TO BE SUBMITTED IN A SEPARATE ENVELOPE)**

PAY ITEM NO.	SPEC. SECTION	DESCRIPTION	APPROX. ANNUAL QTY		UNIT PRICE	TOTAL PRICE
163	33 42 30	REPLACEMENT TOP				
A		FOR DI 610, WITH RING & COVER	1	EA	\$	\$
B		FOR DI 1019A, WITH FRAME & GRATE	1	EA	\$	\$
C		FOR DI 9031S/9031D, WITH STEEL PLATE	1	EA	\$	\$
164	33 42 30	PRECAST CATCH BASIN				
A		GROUP 1 (GDOT 1033 / 1034)	8	VF	\$	\$
B		GROUP 2 (GDOT 1033 / 1034)	8	VF	\$	\$
165		REPLACEMENT TOP FOR GDOT 1033 / 1034	1	EA	\$	\$
166	33 42 30	PVC DROP INLET, UP TO 6' HEIGHT				
A		12-IN (SOLID LID, FLAT GRATE, OR DOMED GRATE) - H20 RATED	5	EA	\$	\$
B		15-IN (SOLID LID, FLAT GRATE, OR DOMED GRATE) - H20 RATED	5	EA	\$	\$
C		18-IN (SOLID LID, FLAT GRATE, OR DOMED GRATE) - H20 RATED	5	EA	\$	\$
D		24-IN (SOLID LID, FLAT GRATE, OR DOMED GRATE) - H20 RATED	5	EA	\$	\$
E		30-IN (SOLID LID, FLAT GRATE, OR DOMED GRATE) - H20 RATED	5	EA	\$	\$
F		24-IN WITH STAINLESS STEEL WEIR (SOLID LID, FLAT GRATE, OR DOMED GRATE) - H20 RATED	5	EA	\$	\$
G		30-IN WITH STAINLESS STEEL WEIR (SOLID LID, FLAT GRATE, OR DOMED GRATE) - H20 RATED	5	EA	\$	\$
167	33 42 30	HEADWALL, VARIOUS PIPE SIZES				
A		PRECAST HEADWALL FOR 18" - 36" PIPE	2	EA	\$	\$
B		PRECAST HEADWALL FOR 42" - 72" PIPE	1	EA	\$	\$

COMPANY NAME \_\_\_\_\_



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**FEE SCHEDULE  
(TO BE SUBMITTED IN A SEPARATE ENVELOPE)**

PAY ITEM NO.	SPEC. SECTION	DESCRIPTION	APPROX. ANNUAL QTY	UNIT PRICE	TOTAL PRICE
C		ROCK HEADWALL FOR 18" - 36" PIPE	2 EA	\$	\$
D		ROCK HEADWALL FOR 42" - 72" PIPE	1 EA	\$	\$
168	33 42 30	BRICK MANHOLE			
A		TYPE 1 (GDOT 1011A)	8 VF	\$	\$
B		TYPE 2 (GDOT 1011A)	8 VF	\$	\$
169	33 42 30	BRICK DROP INLET			
A		GROUP 1 (GDOT 1019A)	8 VF	\$	\$
B		GROUP 2 (GDOT 1019A)	8 VF	\$	\$
C		GROUP 1 (GWINNETT P&D 610)	8 VF	\$	\$
D		GROUP 2 (GWINNETT P&D 610)	8 VF	\$	\$
E		GROUP 1 (GDOT 9031S/9031D)	8 VF	\$	\$
F		GROUP 2 (GDOT 9031S/9031D)	8 VF	\$	\$
170	33 42 30	BRICK CATCH BASIN			
A		GROUP 1 (GDOT 1033 / 1034)	8 VF	\$	\$
B		GROUP 2 (GDOT 1033 / 1034)	8 VF	\$	\$
171	33 42 30	CONCRETE FLARED END SECTIONS			
A		18-IN - 24-IN DIAMETER - STANDARD	2 EA	\$	\$
B		30-IN - 36 IN DIAMETER - STANDARD	2 EA	\$	\$
C		42-IN - 48-IN DIAMETER - STANDARD	1 EA	\$	\$
D		54-IN - 60-IN DIAMETER - STANDARD	1 EA	\$	\$
E		18-IN - 24-IN DIAMETER - SAFETY TYPE	2 EA	\$	\$

COMPANY NAME \_\_\_\_\_

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**FEE SCHEDULE  
(TO BE SUBMITTED IN A SEPARATE ENVELOPE)**

PAY ITEM NO.	SPEC. SECTION	DESCRIPTION	APPROX. ANNUAL QTY	UNIT PRICE	TOTAL PRICE
F		30-IN - 36 IN DIAMETER – SAFTEY TYPE	2 EA	\$	\$
G		42-IN - 48-IN DIAMETER – SAFETY TYPE	1 EA	\$	\$
H		54-IN - 60-IN DIAMETER – SAFETY TYPE	1 EA	\$	\$
172	33 42 30	CONCRETE FLUME	10 CY	\$	\$
173	33 42 30	CONCRETE FLUME WITH STONE INLAY	10 CY	\$	\$
174	33 42 30	TIE IN TO EXISTING STRUCTURES			
A		UP TO 8-IN DIAMETER PIPE TIE-IN	4 EA	\$	\$
B		GREATER THAN 8-IN DIAMETER PIPE UP TO 18-IN DIAMETER TIE-IN	2 EA	\$	\$
C		GREATER THAN 18-IN INNER DIAMETER PIPE TIE-IN	1 EA	\$	\$
<b>ROADWAY AND PAVEMENT RESTORATION</b>					
175	34 41 16.10	TEMPORARY STEEL PLATES	16 SF	\$	\$
176	34 71 00	STREET CUT			
A		GWINNETT DOT DETAIL 'A'	20 SY	\$	\$
B		GWINNETT DOT DETAIL 'B'	20 SY	\$	\$
C		GWINNETT DOT DETAIL 'C'	10 SY	\$	\$
D		GWINNETT DOT DETAIL 'D'	10 SY	\$	\$
177	34 71 00	DRIVEWAY/PARKING AREA RESTORATION			
A		6-INCH-THICK CONCRETE	25 SY	\$	\$
B		8-INCH-THICK CONCRETE	16 SY	\$	\$

COMPANY NAME \_\_\_\_\_

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**FEE SCHEDULE  
(TO BE SUBMITTED IN A SEPARATE ENVELOPE)**

PAY ITEM NO.	SPEC. SECTION	DESCRIPTION	APPROX. ANNUAL QTY	UNIT PRICE	TOTAL PRICE
<b>CONTINGENCY COST - ADDITIONAL WORK</b>					
178	01 22 00	STATE PERCENTAGE MARKUP FOR MATERIALS FOR OWNER-APPROVED WORK RELATED TO UNFORESEEN FIELD CONDITIONS OR SPECIALIZED PROJECT-REQUIRED ITEMS (NOT TO EXCEED 10%)	\$10,000.00	_____ %	\$
<b>OVERALL BID TOTAL</b>					<b>\$</b>

Gwinnett County requires pricing to remain firm for the duration of the initial term of the contract. Failure to hold firm pricing for the initial term of the contract will be sufficient cause for Gwinnett County to declare bid non-responsive. **Contract to begin May 22, 2024, or upon award.**

Unless otherwise noted, quoted prices will remain firm for four (4) additional 12-month periods. If a percentage increase/decrease is a part of the renewal options, please note this in the space provided together with an explanation.

Renewal Option 1:    \_\_\_\_\_ % Increase    \_\_\_\_\_ % Decrease    Explanation \_\_\_\_\_

Renewal Option 2:    \_\_\_\_\_ % Increase    \_\_\_\_\_ % Decrease    Explanation \_\_\_\_\_

Renewal Option 3:    \_\_\_\_\_ % Increase    \_\_\_\_\_ % Decrease    Explanation \_\_\_\_\_

Renewal Option 4:    \_\_\_\_\_ % Increase    \_\_\_\_\_ % Decrease    Explanation \_\_\_\_\_

Termination for Cause: The County may terminate this agreement for cause upon ten days prior written notice to the contractor of the contractor’s default in the performance of any term of this agreement. Such termination shall be without prejudice to any of the County’s rights or remedies by law.

Termination for Convenience: The County may terminate this agreement for its convenience at any time upon 30 days written notice to the contractor. In the event of the County’s termination of this agreement for convenience, the contractor will be paid for those services actually performed. Partially completed performance of the agreement will be compensated based upon a signed statement of completion to be submitted by the contractor, which shall itemize each element of performance.

**COMPANY NAME** \_\_\_\_\_

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**FEE SCHEDULE**  
**(TO BE SUBMITTED IN A SEPARATE ENVELOPE)**

Certification Of Non-Collusion in Bid Preparation \_\_\_\_\_  
Signature Date

In compliance with the attached specifications, the undersigned acknowledges all requirements outlined in the "Instructions to Vendors" and all documents referred to therein, offers and agrees, if this proposal is accepted by the Board of Commissioners within one hundred twenty (120) days of the date of proposal opening, to furnish any or all of the items upon which prices are quoted, at the price set opposite each item, delivered to the designated point(s) within the time specified in the fee schedule. By submission of this proposal, I understand that Gwinnett County uses Electronic Payments for remittance of goods and services. Vendors should select their preferred method of electronic payment upon notice of award. For more information on electronic payments, please refer to the Electronic Payment information in the instructions to vendors.

Legal Business Name \_\_\_\_\_

Address \_\_\_\_\_

Does your company currently have a location within Gwinnett County? Yes  No

Representative Signature \_\_\_\_\_

Printed Name \_\_\_\_\_

Telephone Number \_\_\_\_\_ Fax Number \_\_\_\_\_

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

Contact Person (if someone other than the authorized representative listed above)

\_\_\_\_\_

Telephone Number \_\_\_\_\_ Fax Number \_\_\_\_\_

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





**Bid # & Description RP021-24 - Provision of Watershed Improvements on an Annual Contract**

## CODE OF ETHICS AFFIDAVIT

**PLEASE RETURN THIS FORM COMPLETED WITH YOUR SUBMITTAL. SUBMITTED FORMS ARE REQUIRED PRIOR TO EVALUATION.**

In accordance with Section 54-33 of the Gwinnett County Code of Ordinances the undersigned bidder/proposer makes the following full and complete disclosure under oath, to the best of their knowledge, of the name(s) of all elected officials whom it employs or who have a direct or indirect pecuniary interest in or with the vendor, its affiliates or its subcontractors:

1. \_\_\_\_\_  
Company Submitting Bid/Proposal

2. Please select one of the following:
- No information to disclose (*complete only section 4 below*)
  - Disclosed information below (*complete section 3 & section 4 below*)

3. If additional space is required, please attach list:

\_\_\_\_\_  
Gwinnett County Elected Official Name

\_\_\_\_\_  
Gwinnett County Elected Official Name

\_\_\_\_\_  
Gwinnett County Elected Official Name

\_\_\_\_\_  
Gwinnett County Elected Official Name

4. BY: \_\_\_\_\_  
Authorized Officer or Agent Signature

Sworn to and subscribed before me this  
\_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_

\_\_\_\_\_  
Printed Name of Authorized Officer or Agent

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

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

(seal)

Note: See Gwinnett County Code of Ethics Ordinance EO2011, Sec. 54-33. The ordinance will be available to view in its' entirety at **GwinnettCounty.com**



**Solicitation Name & No. RP021-24 - Provision of Watershed Improvements on an Annual Contract**

**CONTRACTOR AFFIDAVIT AND AGREEMENT  
(THIS FORM SHOULD BE FULLY COMPLETED AND RETURNED WITH YOUR SUBMITTAL)**

By executing this affidavit, the undersigned contractor verifies its compliance with The Illegal Immigration Reform Enhancements for 2013, stating affirmatively that the individual, firm, or corporation which is contracting with the Gwinnett County Board of Commissioners has registered with and is participating in a federal work authorization program\* [any of the electronic verification of work authorization programs operated by the United States Department of Homeland Security or any equivalent federal work authorization program operated by the United States Department of Homeland Security] to verify information of newly hired employees, pursuant to the Immigration Reform and Control Act, in accordance with the applicability provisions and deadlines established therein.

The undersigned further agrees that, should it employ or contract with any subcontractor(s) in connection with the physical performance of services or the performance of labor pursuant to this contract with the Gwinnett County Board of Commissioners, contractor will secure from such subcontractor(s) similar verification of compliance with the Illegal Immigration Reform and Enforcement Act on the Subcontractor Affidavit provided in Rule 300-10-01-.08 or a substantially similar form. Contractor further agrees to maintain records of such compliance and provide a copy of each such verification to the Gwinnett County Board of Commissioners at the time the subcontractor(s) is retained to perform such service.

\_\_\_\_\_  
E-Verify \* User Identification Number

\_\_\_\_\_  
Date Registered

\_\_\_\_\_  
Legal Company Name

\_\_\_\_\_  
Street Address

\_\_\_\_\_  
City/State/Zip Code

BY: \_\_\_\_\_  
Authorized Officer or Agent  
(Contractor Signature)

\_\_\_\_\_  
Date

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

\_\_\_\_\_  
Printed Name of Authorized Officer or Agent

SUBSCRIBED AND SWORN  
BEFORE ME ON THIS THE  
\_\_\_\_\_ DAY OF \_\_\_\_\_, 20\_\_\_\_\_

\_\_\_\_\_  
Notary Public  
My Commission Expires: \_\_\_\_\_

**For Gwinnett County Use Only:**  
**Document ID #** \_\_\_\_\_  
**Issue Date:** \_\_\_\_\_  
**Initials:** \_\_\_\_\_

\* As of the effective date of O.C.G.A. 13-10-91, the applicable federal work authorization program is "E-Verify" operated by the U.S. Citizenship and Immigration Services Bureau of the U.S. Department of Homeland Security, in conjunction with the Social Security Administration (SSA).

**Gwinnett County, Georgia**

**BID BOND**

KNOW ALL MEN BY THESE PRESENTS: that

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

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

a \_\_\_\_\_

(Corporation, Partnership 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

Gwinnett County Board of Commissioners  
(Name of Obligee)

75 Langley Drive, Lawrenceville, Georgia 30046  
(Address of Obligee)

Thereinafter referred to as Obligee: in the penal sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_) in lawful money of the United States, for the payment of which sum will 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 Gwinnett County, Georgia, a proposal for furnishing materials, labor, and equipment for:

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 proposal be accepted, the Principal shall within ten days after receipt of notification of the acceptance, execute a Contract in accordance with the Proposal and upon the terms, conditions, and prices set forth in the form and manner required by Gwinnett County, Georgia, and execute a sufficient and satisfactory Performance Bond and Payment Bond payable to Gwinnett County, Georgia, each in the amount of 100% of the total Contract Price, in form and with security satisfactory to said Gwinnett County, 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 Gwinnett County, 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.



**Gwinnett County, Georgia**

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. § 36-91-1 et seq., 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)	
(Principal Secretary)		By: _____
(SEAL)		(Address)

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

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

\_\_\_\_\_

	(Surety)	
ATTEST:		By: _____
		(Attorney-in-Fact)
Resident or Nonresident Agent		(Address)
(SEAL)		

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

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

NOTE: If Contractor is Partnership, all partners should execute Bond. Surety Companies executing Bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the Project is located.

Principal Secretary, Principal and Witness as to Principal signature lines must be signed by three different individuals. Additionally, Resident or Nonresident Agent, Witness as to Surety, and Attorney-in-fact must be signed by three different individuals.

### INSURANCE REQUIREMENTS

1. Statutory Workers' Compensation Insurance
  - (a) Employers Liability:
    - ✓ Bodily Injury by Accident - \$100,000 each accident
    - ✓ Bodily Injury by Disease - \$500,000 policy limit
    - ✓ Bodily Injury by Disease - \$100,000 each employee
  
2. Commercial General Liability Insurance
  - (a) \$1,000,000 limit of liability per occurrence for bodily injury and property damage
  - (b) Separate \$1,000,000 Owner's and Contractor's Protective policy with Gwinnett County Board of Commissioners as **Named Insured**
  - (c) The following additional coverage must apply:
    - ✓ 1986 (or later) ISO Commercial General Liability Form
    - ✓ Dedicated Limits per Project Site or Location (CG 25 03 or CG 25 04)
    - ✓ Additional Insured Endorsement (Form B CG 20 10 with a modification for completed operations or a separate endorsement covering Completed Operations)
    - ✓ Blanket Contractual Liability
    - ✓ Broad Form Property Damage
    - ✓ Severability of Interest
    - ✓ Underground, explosion, and collapse coverage
    - ✓ Personal Injury (deleting both contractual and employee exclusions)
    - ✓ Incidental Medical Malpractice
    - ✓ Hostile Fire Pollution Wording
  
3. Auto Liability Insurance
  - (a) \$500,000 limit of liability per occurrence for bodily injury and property damage
  - (b) Comprehensive form covering all owned, non-owned, leased, hired, and borrowed vehicles
  - (c) Additional Insured Endorsement
  - (d) Contractual Liability
  
4. Umbrella Liability Insurance - Minimum \$5,000,000 limit of liability
  - (a) The following additional coverage must apply
    - ✓ Additional Insured Endorsement
    - ✓ Concurrency of Effective Dates with Primary
    - ✓ Blanket Contractual Liability
    - ✓ Drop Down Feature
    - ✓ Care, Custody, and Control - Follow Form Primary
    - ✓ Aggregates: Apply Where Applicable in Primary
    - ✓ Umbrella Policy must be as broad as the primary policy
  
5. Builder's Risk Insurance or Installation Floater Insurance required on all new structures, bridges, overpasses, tunnels, culverts and railroad crossings - limit at least as broad as contract amount
  
6. Gwinnett County Board of Commissioners should be shown as an additional insured on General Liability, Auto Liability and Umbrella Liability policies.
  
7. The cancellation should provide 10 days notice for nonpayment and 30 days notice of cancellation.
  
8. Certificate Holder should read:
  - Gwinnett County Board of Commissioners
  - 75 Langley Drive
  - Lawrenceville, GA 30046-6935

9. Insurance Company, except Worker' Compensation carrier, must have an A.M. Best Rating of A-10 or higher. Certain Workers' Comp funds may be acceptable by the approval of the Insurance Unit. European markets including those based in London and domestic surplus lines markets that operate on a non-admitted basis are exempt from this requirement provided that the contractor's broker/agent can provide financial data to establish that a market is equal to or exceeds the financial strengths associated with the A.M. Best's rating of A-10 or better.
10. Insurance Company should be licensed to do business by the Georgia Department of Insurance.
11. Certificates of Insurance, and any subsequent renewals, must reference specific bid/contract by project name and project/bid number.
12. The Contractor shall agree to provide complete certified copies of current insurance policy(ies) or a certified letter from the insurance company(ies) if requested by the County to verify the compliance with these insurance requirements.
13. All insurance coverages required to be provided by the Contractor will be primary over any insurance program carried by the County.
14. Contractor shall incorporate a copy of the insurance requirements as herein provided in each and every subcontract with each and every Subcontractor in any tier, and shall require each and every Subcontractor of any tier to comply with all such requirements. Contractor agrees that if for any reason Subcontractor fails to procure and maintain insurance as required, all such required Insurance shall be procured and maintained by Contractor at Contractor's expense.
15. No Contractor or Subcontractor shall commence any work of any kind under this Contract until all insurance requirements contained in this Contract have been complied with and until evidence of such compliance satisfactory to Gwinnett County as to form and content has been filed with Gwinnett County. **The Acord Certificate of Insurance or a preapproved substitute is the required form in all cases where reference is made to a Certificate of Insurance or an approved substitute.**
16. The Contractor shall agree to waive all rights of subrogation against the County, the Board of Commissioners, its officers, officials, employees, and volunteers from losses arising from work performed by the contractor for the County.
17. Special Form Contractors' Equipment and Contents Insurance covering owned, used, and leased equipment, tools, supplies, and contents required to perform the services called for in the Contract. The coverage must be on a replacement cost basis. The County will be included as a Loss Payee in this coverage for County owned equipment, tools, supplies, and contents.
18. The Contractor shall make available to the County, through its records or records of their insurer, information regarding a specific claim related to any County project. Any loss run information available from the contractor or their insurer relating to a County project will be made available to the county upon their request.
19. Compliance by the Contractor and all subcontractors with the foregoing requirements as to carrying insurance shall not relieve the Contractor and all Subcontractors of their liability provisions of the Contract.
20. The Contractor and all Subcontractors are to comply with the Occupational Safety and Health Act of 1970, Public Law 91-956, and any other laws that may apply to this Contract.
21. The Contractor shall at a minimum apply risk management practices accepted by the contractors' industry.

#### Surety Bonds (If Required)

All of the surety requirements will stay the same except the Surety Company must have the same rating as item 9 above.

BOND # \_\_\_\_\_

**PERFORMANCE BOND**

KNOW ALL MEN BY THESE PRESENTS: that

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

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

a \_\_\_\_\_  
(Corporation, Partnership 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

Gwinnett County Board of Commissioners  
Name of Obligee)

75 Langley Drive, Lawrenceville, Georgia 30046  
(Address of Obligee)

hereinafter referred to as Obligee, are held and firmly bound unto said Obligee and all persons doing work or furnishing skill, tools, machinery, supplies, or material under or for the purpose of the Contract hereinafter referred to, in the penal sum of

\_\_\_\_\_ Dollars

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

The condition of this obligation is such, as whereas the Principal entered into a certain contract, hereto attached, with the Obligee.

NOW, THEREFORE THE CONDITION OF THIS OBLIGATION IS SUCH, that if the Principal shall well, truly, fully and faithfully perform said contract according to its terms, covenants, conditions, and agreements of said contract during the original term of said contract and any extensions thereof that may be granted by the Obligee, with or without notice to the Surety, and during the life of any guaranty required under the contract, and shall also well and truly perform and fulfill all the undertakings, covenants, terms, conditions and agreement of any and all duly authorized modifications of said contract that may hereafter be made, then this obligation shall be void, otherwise to remain in full force and effect.

**PROVIDED FURTHER, that said Surety to this Bond, for value received, hereby stipulates and agrees that no change, extension of time, alterations, or additions to the terms of the Contract or to the Work to be performed thereunder shall in any way affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alterations, or additions to the terms of the Contract or to the work to be performed thereunder.**

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. § 36-91-1 et seq., and is intended to be and shall be construed as a bond in compliance with the requirements thereof.

(Signatures Next Page)

ATTEST:

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

(SEAL)

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

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

\_\_\_\_\_

ATTEST:

\_\_\_\_\_  
Resident or Nonresident Agent

(SEAL)

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

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

\_\_\_\_\_

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

By: \_\_\_\_\_

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

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

By: \_\_\_\_\_

(Attorney-in-Fact)

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

\_\_\_\_\_

**BONDING AGENT CONTACT INFO**

Print Name \_\_\_\_\_

Company Name \_\_\_\_\_

E-Mail \_\_\_\_\_

Phone \_\_\_\_\_

NOTE: If Contractor is Partnership, all partners should execute Bond. Surety Companies executing Bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the Project is located.

**Principal Secretary, Principal and Witness as to Principal signature lines must be signed by three different individuals. Additionally, Resident or Nonresident Agent, Witness as to Surety, and Attorney-in-fact must be signed by three different individuals.**

BOND # \_\_\_\_\_

*PAYMENT BOND*

KNOW ALL MEN BY THESE PRESENTS: that

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

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

a \_\_\_\_\_  
(Corporation, Partnership 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

Gwinnett County Board of Commissioners

\_\_\_\_\_  
(Name of Obligee)

75 Langley Drive, Lawrenceville, Georgia 30046

\_\_\_\_\_  
(Address of Obligee)

hereinafter called Obligee;

for the use and protection of all subcontractors and all persons supplying labor, services, skill, tools, machinery, materials and/or equipment in the prosecution of the work provided for in the contract hereinafter referred to in the full and just sum of \_\_\_\_\_

\_\_\_\_\_ Dollars

(\$ \_\_\_\_\_) in lawful money of the United States, for the payment of which sum, will and truly to be made, the Principal and Surety bind themselves, their, and each of their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

The condition of this obligation is such, as whereas the Principal entered into a certain contract, hereto attached, with the Obligee.

NOW, THEREFORE THE CONDITION OF THIS OBLIGATION IS SUCH, that if the Principal shall well, truly, and faithfully perform said Contract according to its terms, covenants, and conditions, and shall promptly pay all persons furnishing labor, materials services, skill, tools, machinery and/or equipment for use in the performance of said Contract, then this obligation shall be void; otherwise it shall remain in full force and effect.

ALL persons who have furnished labor, materials, services, skill, tools, machinery and/or equipment for use in the performance of said Contract shall have a direct right of action on this Bond, provided payment has not been made in full within ninety (90) days after the last day on which labor was performed, materials, services, skill, tools, machinery, and equipment furnished or the subcontract completed.

PROVIDED FURTHER, that said Surety to this Bond, for value received, hereby stipulates and agrees that no change, extension of time, alterations, or additions to the terms of the Contract or to the Work to be performed thereunder shall in any way affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alterations, or additions to the terms of the Contract or to the work to be performed thereunder.

PROVIDED, HOWEVER, that no suit or action shall be commenced hereunder by any person furnishing labor, materials, services, skill, tools, machinery, and/or equipment having a direct contractual relationship with a subcontractor, but no contractual relationship express or implied with the Principal:

Unless such person shall have given notice to the Principal within ninety (90) days after such person did, or performed the last of the work or labor, or furnished the last of the materials, services, skill, tools, machinery and/or equipment for which claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials, services, skill, tools, machinery and/or equipment were furnished, or for whom the work or labor was done or performed. Such a notice shall be served by mailing the same by registered mail, postage prepaid, in an envelope addressed to the Principal, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the State in which the aforesaid project is located, save that such service need not be made by a public officer, and a copy of such notice shall be delivered to the Obligee, to the person and at the address provided for in the Contract, within five (5) days of the mailing of the notice to the Principal.

PROVIDED, FURTHER, that any suit under this bond must be instituted before the expiration of one (1) year after the acceptance of the public works covered by the Contract by the proper authorities.

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. § 36-91-1 et seq., and is intended to be and shall be construed as a bond in compliance with the requirements thereof.

[Signatures Next Page]

ATTEST:

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

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

(SEAL)

By: \_\_\_\_\_

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

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

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

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

ATTEST:

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

\_\_\_\_\_  
Resident or Nonresident Agent

(SEAL)

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

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

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

**BONDING AGENT CONTACT INFO**

Print Name\_\_\_\_\_

Company Name\_\_\_\_\_

E-Mail\_\_\_\_\_

Phone\_\_\_\_\_

**NOTE: If Contractor is Partnership, all partners should execute Bond. Surety Companies executing Bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the Project is located.**

**Principal Secretary, Principal and Witness as to Principal signature lines must be signed by three different individuals. Additionally, Resident or Nonresident Agent, Witness as to Surety, and Attorney-in-fact must be signed by three different individuals.**



\*\*\*Gwinnett County requires that all Contracts between parties be entered into via the following documents. If any exceptions are taken to any part of this document, each must be stated in detail and submitted as part of your proposal/bid document. If no exceptions are noted, it is assumed that the party fully agrees to the contract in its entirety. Exceptions to the sample contract provided in this request for proposal will be considered in terms of responsiveness when making the award. \*\*\*

**SAMPLE CONTRACT  
RP021-24**

This **CONTRACT** made and entered into this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_ by and between Gwinnett County, Georgia (Party of the First Part, hereinafter called the County), and \_\_\_\_\_, (Party of the Second Part, hereinafter called the Contractor).

**WITNESSETH:** That the said Contractor has agreed, and by these presents does agree with the said County, for the consideration herein mentioned and under the provision of the Performance Bond and Payment Bond required by the Specifications to furnish all equipment, tools, materials, skill and labor of every description necessary to carry out and complete in a good, firm and substantial and workmanlike manner, the work specified, in strict conformity with the drawings and specifications, together with the foregoing proposal made by the Contractor, the Advertisement, the Instructions to Bidders, General Conditions, and this Contract, shall all form essential parts to this Contract. The work covered by this Contract includes all work shown on plans and specifications and listed in the conditions and specifications to wit:

**Provision of Watershed Improvements on an Annual Contract**

This Contract shall consist of the Service Provider's bid/proposal and all Invitations to Bid/Proposals including all drawings, specifications, price lists, Instructions to Bidders, General Conditions, Special Provisions, Detailed Specifications, addenda, and change orders issued after execution of the Contract (hereinafter collectively referred to as the "Bid"), which are specifically incorporated herein by reference (Exhibit A). In the event of a conflict between the County's contract documents and the Service Provider's bid/proposal, the County's contract documents shall control.

The Contractor awarded work under this contract shall commence work within ten (10) days after the issuance of the Notice to Proceed and shall fully complete all work hereunder within the time allowed for each work assignment for a one-year period with four (4) options to renew.

If said work is not completed within the time stated, the Contractor shall be liable and hereby agrees to pay the County as liquidated damages and not as a penalty, the amount of seven hundred Dollars and no/100 dollars (\$700.00) per day as liquidation of the extra expense incurred by the County and liquidated damages to the County.

The County shall pay and the Contractor shall receive the prices stipulated in the proposal hereto attached as full compensation for everything furnished and done by the Contractor under this contract, which shall in no event exceed (\$ \_\_\_\_\_) based on the proposal which sum shall be paid in the manner and terms specified in the Contract Documents, but before issuance of certificate of payment, if the Contractor shall not have submitted evidence satisfactory to the County that all payrolls, materials bills, and other indebtedness connected with the work have been paid, the County may withhold, in addition to the retained percentages, such amount or amounts as may be necessary to pay just claims for labor and services rendered and materials in and about the work, and such amount or amounts withheld or retained may be applied by the County to the payment of such just claims.

When the Contractor has performed in accordance with the provisions of this Contract, Gwinnett County shall pay to the Contractor, within thirty (30) days of receipt of any payment request based upon work completed or service provided pursuant to the Contract, the sum so requested, less the retainage stated in this Contract, if any. In the event that Gwinnett County fails to pay the Contractor within sixty (60) days of receipt of a pay request based upon work completed or service provided pursuant to the Contract, the County shall pay the Contractor interest at the rate of 1/2% per month or pro rata fraction thereof, beginning the sixty-first (61st) day following receipt of the pay request. The Contractor's acceptance of progress payments or final payment shall release all claims for interest on said payments.

It is further mutually agreed between the Parties hereto that if, at any time after the execution of the Contract and the Performance Bond for its faithful performance and the Payment Bond, the first party shall deem the surety or sureties upon such bond to be inadequate to cover the performance of the work, the second party shall, at its expense, within five (5) days after the receipt of notice from the first party to do so, furnish an additional bond or bonds in such form and amount, and with such surety or sureties as shall be satisfactory to the first party. In such event, no further payment to the second party shall be deemed to be due under this Contract until such new or additional security for the faithful performance of the work shall be furnished in a manner and form satisfactory to the first party.

The parties agree that each of the provisions included in this Contract is separate, distinct and severable from the other and remaining provisions of this Contract, and that the invalidity of any Contract provision shall not affect the validity of any other provision or provisions of this Contract.

(Signatures Next Page)

**IN WITNESS WHEREOF**, the parties hereto, acting through their duly authorized agents, have caused this **CONTRACT** to be signed, sealed and delivered.

WINNETT COUNTY, GEORGIA

By: \_\_\_\_\_  
Nicole L. Hendrickson, Chairwoman  
Gwinnett County Board of Commissioners

ATTEST:

\_\_\_\_\_  
**Signature**

Tina King, County Clerk  
Board of Commissioners

APPROVED AS TO FORM:

\_\_\_\_\_  
Signature  
Gwinnett County Staff Attorney

CONTRACTOR: \_\_\_\_\_

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

Signature

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Title

ATTEST:

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Print Name  
Corporate Secretary

(Seal)

**STANDARD GENERAL CONDITIONS  
OF THE CONSTRUCTION CONTRACT**

Prepared by

**ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE**

and

Issued and Published Jointly by



AMERICAN COUNCIL OF ENGINEERING COMPANIES

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ASSOCIATED GENERAL CONTRACTORS OF AMERICA

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AMERICAN SOCIETY OF CIVIL ENGINEERS

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PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE  
*A Practice Division of the*  
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Endorsed by



CONSTRUCTION SPECIFICATIONS  
INSTITUTE

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STANDARD GENERAL CONDITIONS OF THE  
CONSTRUCTION CONTRACT

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## ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

### 1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
  2. *Agreement*—The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
  3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
  4. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
  5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
  6. *Bidder*—The individual or entity who submits a Bid directly to Owner.
  7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).
  8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.
  9. *Change Order*—A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
  10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

11. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.
12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.
13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).
14. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer’s written recommendation of final payment.
15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.
16. *Cost of the Work*—See Paragraph 11.01 for definition.

16.1 Designer - The individual or entity named as such in the Agreement, if a different person

17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
18. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
19. *Engineer*—The individual or entity named as such in the Agreement.
20. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
21. *General Requirements*—Sections of Division 01 of the Specifications. The General Requirements are applicable to all Sections of the Specifications and to the entire Work.
22. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.

23. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
24. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
- 25.1 *Liquidated Damages* – amounts shall be as stipulated in the Agreement. Liquidated damages shall apply to the Contract Times for the Project. Liquidated Damages shall be both additive and cumulative. Liquidated Damages shall end upon Substantial Completion, Completion of the Work associated with each Milestone Date, and upon final completion of the Work.
26. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.
27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.
28. *Notice to Proceed*—A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.
29. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed. The Owner may designate an authorized representative to exercise the authority, in whole or in part, identified in these contract Documents, with such designation being identified in the Supplementary Conditions.
30. *PCBs*—Polychlorinated biphenyls.
31. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
32. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.

33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
34. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
35. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.
37. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.
39. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.
40. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, specified design related submittals, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
41. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
42. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
43. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
44. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents to provide the following: (i) the Owner full time, uninterrupted,

continuous operation of the work; and (ii) all required functional, performance, and operational or startup testing has been successfully demonstrated for all components, devices, equipment, and systems to the satisfaction of the Engineer in accordance with the requirements of the Specifications; and (iii) all required inspections and other work necessary for the Engineer to certify “substantially complete” have been completed. ~~, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended.~~ The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.

44.1 Submittals – All administrative documents, Shop Drawings, Samples, product data, manufacturer’s literature, quality control documents, design related documents, record documents, contract close-out documents, and/or any other specified document prepared or assembled by or for Contractor and submitted by Contractor to the Owner and/or Engineer.

45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.
46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.
47. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.
48. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
49. *Unit Price Work*—Work to be paid for on the basis of unit prices.
50. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the

Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

## 1.02 Terminology

A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

### B. *Intent of Certain Terms or Adjectives:*

1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

### C. *Day:*

1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.

### D. *Defective:*

1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
  - a. does not conform to the Contract Documents; or
  - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
  - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

### E. *Furnish, Install, Perform, Provide:*



1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
  2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
  3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
  4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, “provide” is implied.
- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

#### G. Contract Times

1. All Contract Times and time limits stated in the Contract Documents are of the essence of the Agreement. The Contractor shall proceed with the Work at a rate of progress which will ensure completion within the Contract Times. It is expressly understood and agreed by and between the Contractor and the Owner, that the Contract Times for the Work described herein are reasonable time, taking into consideration the average climatic and economic conditions, and other factors prevailing in the locality of the Work. If the Contractor shall fail to perform the Work required within the Contract Times, or extended Contract Times if authorized by Change Order, then the Contractor shall pay to the Owner the full amount of liquidated damages specified in the Contract Documents for each calendar day that the Contractor shall be in default after the Contract Times stipulated in the Contract Documents.

## ARTICLE 2 – PRELIMINARY MATTERS

### 2.01 *Delivery of Bonds and Evidence of Insurance*

- A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor ~~and Owner~~ shall ~~each~~ deliver to the ~~Owner~~~~either~~, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which ~~Ownereither of them~~ or any additional insured may reasonably



request) which Contractor ~~is and Owner respectively are~~ required to purchase and maintain in accordance with Article 5.

## 2.02 *Copies of Documents*

- A. Owner ~~shall~~will furnish to Contractor up to ~~ten~~four printed or hard copies of the ~~Drawings and Project Manual~~Contract Documents and one counterpart of the executed Contract Agreement. Additional copies will be furnished upon request at the cost of reproduction.

## 2.03 *Commencement of Contract Times; Notice to Proceed*

- A. ~~The~~ Contract Times will commence to run on the ~~thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated~~date established in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. ~~In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.~~

## 2.04 *Starting the Work*

- A. Contractor ~~shall~~may start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

## 2.05 *Before Starting Construction*

- A. *Preliminary Schedules:* Within 10 days after the ~~Effective Date of the Agreement~~Commencement of the Contract Time (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:

1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;
2. a preliminary Schedule of Submittals; which indicates each required Submittal and the dates for submitting, time for reviewing and processing each Submittal (periodic Submittals may be listed by a common monthly date); and
3. a preliminary Schedule of Values for all of the Work in a format acceptable to the Engineer Owner and in accordance with the requirements specified in the General Requirements.

~~which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.~~

## 2.06 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

## 2.07 *Initial Acceptance of Schedules*

- A. ~~At least 10 days before submission of the first Application for Payment a~~ Within ten days after the preconstruction conference a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
  1. The Progress Schedule will be acceptable to Engineer as being the Contractor's schedule for the ~~if it provides an~~ orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor. The Progress Schedule may subsequently be adjusted in accordance with Paragraph 6.04 and applicable provisions of the General Requirements.
  2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals. The Schedule of Submittals may subsequently be adjusted in accordance with Paragraph 6.04 and applicable provisions of the General Requirements.
  3. Contractor's Schedule of Values will be acceptable to the Engineer as to form and substance if it is provided in accordance with the requirements specified in the General Requirements. ~~provides a reasonable allocation of the Contract Price to component parts of the Work.~~

## 2.08 *Licensing*

Prior to execution of the Contract Agreement by the Owner, the Contractor shall deliver proof of licensure compliance to the Owner for any Work to be performed under this

Contract which is governed by the Construction Industry Licensing Board of Georgia (O.C.G.A. Section 43-14-1 et seq), or its rules or regulations.

### **ARTICLE 3 – CONTRACT DOCUMENTS; INTENT, AMENDING, REUSE**

#### 3.01 *Intent*

- A. The individual components of the Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.
- C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.
- D. Where the word “similar” occurs in the Contract Document, it shall have a general meaning and not be interpreted as being identical, and all details shall be worked out in relation to their location and their connection with other parts of the Work.
- E. Each and every clause or other provision required by law to be inserted in these Contract Documents shall be deemed to be inserted herein, and they shall be read and enforced as though it were included herein, and if through mistake or otherwise, any such provision is not inserted, or if not correctly inserted, then upon the application of either party, the Contract Documents shall forthwith be amended to make such insertion.
- F. Wherever in the Contract Documents the terms “as ordered”, “as directed”, “as required”, “as allowed”, “as approved” or terms of like effect or import are used, or the adjectives “reasonable”, “suitable”, “acceptable”, “proper” or “satisfactory” or adjectives of like effect or import are used to describe a requirement, direction, review or judgment of the Engineer as to the Work, it is intended that such requirement, direction, review or judgment will be solely to evaluate, in general, the Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective shall not be effective to assign to the Engineer any duty or authority to supervise or direct the furnishing or performance of Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.10 or any other provision of the Contract Documents.

- G. “Imperative” or “Command” type language is used in the Contract Documents. This command language refers to and is directed to the Contractor.
- H. All products (material or equipment) identified in the Contract Documents and all products incidental to the identified products, shall be new and unused and provided by Contractor unless specified otherwise.
- I. Emphasis, such as italics or quotes, has been used throughout the Contract Documents. Use of emphasis shall not change the meaning of the term emphasized.

### 3.02 *Reference Standards*

#### A. Standards, Specifications, Codes, Laws, and Regulations

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
2. No provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

### 3.03 *Reporting and Resolving Discrepancies*

#### A. *Reporting Discrepancies:*

1. *Contractor’s Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.
2. *Contractor’s Review of Contract Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation , (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then

Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge or reasonably should have known thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

- a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or
- b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

c. In resolving inconsistencies within the Contract Documents, precedence shall be given in the following descending order:

1. Amendments
2. Change Orders
3. Work Change Directives
4. Field Orders
5. Engineer's written interpretations and clarifications
6. Notice to Proceed
7. Addenda
8. Contract Agreement
9. Supplementary Conditions
10. General Conditions
11. Specifications

12. Drawings (Figure dimensions on Drawings shall take precedence over scaled dimensions and detailed drawings shall take precedence over general drawings.)

### 13. Bidding Requirements

#### 3.04 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.
- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:
  - 1. A Field Order; or
  - ~~2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or~~
  - 23. Engineer's written interpretation or clarification.

#### 3.05 *Reuse of Documents*

- A. Contractor and any Subcontractor or Supplier shall not:
  - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or
  - 2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

#### 3.06 *Electronic Data*

- A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

- B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.
- C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

#### **ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS**

##### *4.01 Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

##### *4.02 Subsurface and Physical Conditions*

###### *A. Reports and Drawings: The Supplementary Conditions identify:*

1. those reports ~~known to Owner~~ of explorations and tests of subsurface conditions at or contiguous to the Site that have been utilized by the Engineer in preparing the Contract Documents; -and
2. those drawings ~~known to Owner~~ of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities that have been utilized by the Engineer in preparing the Contract Documents).



B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the “technical data” contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such “technical data” is identified in the Supplementary Conditions. Except for such reliance on such “technical data,” Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

1. the completeness of such reports and drawings for Contractor’s purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
3. any Contractor interpretation of or conclusion drawn from any “technical data” or any such other data, interpretations, opinions, or information.

#### 4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:

1. is of such a nature as to establish that any “technical data” on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or
2. is of such a nature as to require a change in the Contract Documents; or
3. differs materially from that shown or indicated in the Contract Documents; or
4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *Engineer’s Review:* After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner’s obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer’s findings and conclusions.

C. *Possible Price and Times Adjustments:*



1. The Contract Price or the Contract Times, or both, ~~will~~may be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
  - a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and
  - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
  - a. Contractor knew or should have known of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or
  - b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or
  - c. Contractor failed to give the written notice as required by Paragraph 4.03.A.
3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

#### 4.04 *Underground Facilities*

- A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:
1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and

2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
  - a. reviewing and checking all such information and data;
  - b. locating all Underground Facilities shown or indicated in the Contract Documents;
  - c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and
  - d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

*B. Not Shown or Indicated:*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall ~~may~~ be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

C. The dimensions and descriptions given on the Drawings for adjacent work by others, if any, (including any existing facilities or utilities previously constructed for Owner) are based on the design drawings and not as-built drawings. Prior to commencing the Work, the Contractor shall verify all as-built conditions and information whenever existing facilities or utilities may impact the Work. Failure of Contractor to so verify all as-built conditions prior to commencing the Work shall bar Contractor from later seeking additional compensation for conflicts with existing facilities or utilities.

D. Prior to the construction or installation of any proposed facility or pipeline, the Contractor shall expose all existing utilities true to their vertical and horizontal location, within the vicinity of the Work. In order to avoid conflicts between existing and proposed facilities or utilities, the Contractor shall either relocate the existing or proposed utility on a temporary or permanent basis, or shall take whatever means necessary to protect the existing facilities or utilities during the installation of proposed utilities, as approved by the Engineer. No additional payment will be made for the relocation of existing utilities or for any work associated with the protection of existing facilities or utilities.

#### 4.05 *Reference Points*

A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

B. Engineer may check the lines, elevations, and reference marks set by Contractor, and Contractor shall correct any errors disclosed by such check. Such a check shall not be considered as approval of Contractor's work and shall not relieve Contractor of the responsibility for accurate construction of the entire Work. Contractor shall furnish personnel to assist Engineer in checking lines and grades.

C. The Contractor shall review the Contract Documents and the Project site to determine the presence and location of any property or rights-of-way monuments or markers, and to assess the possibility of disruption to these monuments or markers. It will be the Contractor's responsibility to flag, erect guard post, or provide offset references for the protection or the re-monumentation of these property or rights-of-way monuments or markers. In the event these monuments or markers are covered over or disturbed, it will be the Contractor's responsibility to employ a surveyor licensed in the state of Georgia to re-establish those monuments or markers of property or rights-of-way, which were present prior to Work on the Project.

D. It shall be the Contractor's responsibility to verify all reference points shown on the Contract Documents prior to beginning Work on the site. This verification shall be conducted by professionally qualified personnel in a manner which will verify the accuracy of the information shown in the Contract Documents. On projects which involve the connection to, or additions to existing structures, the elevations of these existing structures shall also be verified. Any findings which differ from those shown on the Contract Documents shall be submitted in writing to the Engineer for resolution.

E. Additional surveys necessary for the construction staking shall be performed by the Contractor, the cost of which shall be incorporated into the appropriate items of Work.

On projects in which payment is classified by depth of cut, the construction staking shall be performed in a manner that will allow for the determination of cut classification.

4.06 *Hazardous Environmental Condition at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the “technical data” contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such “technical data” is identified in the Supplementary Conditions. Except for such reliance on such “technical data,” Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
1. the completeness of such reports and drawings for Contractor’s purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
  2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
  3. any Contractor interpretation of or conclusion drawn from any “technical data” or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.
- D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.

- E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.
- F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may issue a Work Change Directive or Change Order as appropriate. ~~order the portion of the Work that is in the area affected by such condition to be deleted from the Work.~~ If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.
- G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

## ARTICLE 5 – BONDS AND INSURANCE

### 5.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment ~~becomes due~~ is made by the Owner or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.
- B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.
- C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

### 5.02 *Licensed Sureties and Insurers*

- A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as ~~may be provided below~~ in the Supplementary Conditions.
  - 1. Surety shall be in good standing with Georgia's Insurance Commissioner's Office.
  - 2. Surety and Insurers must have an A.M. Best Financial Strength Rating and a Financial Size Category as stated in the insurance requirements specified elsewhere in these Contract Documents.
  - 3. The surety shall have an underwriting limitation in Circular 570 in excess of the Contract Amount.



### 5.03 *Certificates of Insurance*

- A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.
- B. ~~Deleted. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.~~
- C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.
- D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.
- E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

### 5.04 *Contractor's Insurance*

- A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:
  - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
  - 2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
  - 3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
  - 4. claims for damages insured by ~~reasonably~~ available personal injury liability coverage which are sustained:
    - a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or

- b. by any other person for any other reason;
  - 5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and
  - 6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.
- B. The policies of insurance required by this Paragraph 5.04 shall:
- 1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;
  - 2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;
  - 3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
  - 4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);
  - 5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and
  - 6. include completed operations coverage:
    - a. Such insurance shall remain in effect for two years after final payment.
    - b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.



C. The limits of liability for the insurance required by paragraph 5.04.B.2 of the General Conditions shall provide coverage specified in the Supplementary Conditions or greater where required by Laws and Regulations.

5.05 *Owner's Liability Insurance*

A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

A. Unless otherwise provided in the Supplementary Conditions, ~~Owner~~Contractor shall purchase and maintain property insurance as required in the Supplementary Conditions upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

- ~~1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;~~
- ~~2. be written on a Builder's Risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;~~
- ~~3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);~~
- ~~4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;~~
- ~~5. allow for partial utilization of the Work by Owner;~~
- ~~6. include testing and startup; and~~

- ~~7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.~~
- ~~B. Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.~~
- ~~C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.~~
- ~~D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.~~
- ~~E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.~~

#### 5.07 Waiver of Rights

- A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 by Contractor will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. ~~Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and,~~

~~in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused.~~ None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by ~~Owner~~Contractor as trustee or otherwise payable under any policy so issued.

~~B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:~~

- ~~1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and~~
- ~~2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.~~

~~C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.~~

#### 5.08 *Receipt and Application of Insurance Proceeds*

- A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner ~~as fiduciary~~ for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.
- B. Owner ~~as fiduciary~~ shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner ~~as fiduciary~~ shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner ~~as fiduciary~~ shall adjust and settle the loss with the insurers. ~~and, if~~

~~required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.~~

#### 5.09 *Acceptance of Bonds and Insurance; Option to Replace*

A. If ~~either Owner or Contractor~~ has any objection to the coverage afforded by or other provisions of the ~~bonds or~~ insurance required to be purchased and maintained by ~~the other party~~ Contractor in accordance with this Article 5 on the basis of ~~non-conformance~~ is not complying with the Contract Documents, ~~the objecting party shall so~~ Owner will notify ~~the other party~~ Contractor in writing thereof within ~~10~~ ten days ~~after receipt of the certificates (or other evidence requested) required by~~ of the date of delivery of such certificate to Owner in accordance with Paragraph 2.01. ~~B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided by Contractor as the other Owner may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.~~

#### 5.10 *Partial Utilization, Acknowledgment of Property Insurer*

A. If Owner chooses ~~finds it necessary~~ to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

### **ARTICLE 6 – CONTRACTOR’S RESPONSIBILITIES**

#### 6.01 *Supervision and Superintendence*

A. Contractor shall supervise, provide quality control, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.

- B. At all times during the progress of the Work, Contractor shall assign a competent ~~resident~~ superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances. Contractor shall also designate, in writing, a representative, hereinafter referred to as Project Manager, assigned to the Project on a full-time basis during execution of the Work who shall have the authority to act on behalf of Contractor, including executing the orders or directions of the Engineer without delay. This Superintendent and/or Project Manager shall have full authority to promptly supply products, tools, plant equipment, and labor as may be required to diligently prosecute the Work. All communications given to or received from the Superintendent and/or the Project Manager shall be binding on Contractor.
- C. If at any time during the Project the Superintendent or Project Manager leaves the Project site while Work is in progress, Engineer shall be notified and provided with the name of Contractor's representative having responsible charge.
- D. Contractor shall also designate the person responsible for Contractor's quality control while Work is in progress. Engineer shall be notified in writing prior to any change in quality control representative assignment.
- E. Prior to the Commencement of the Contract Time, Contractor shall furnish to the Owner and Engineer the names, resumes, 24 hour contact information and other relevant information associated with the Project Manager and the Superintendent that are to be assigned to this project. The Project Manager and Superintendent must be acceptable to the Owner and Engineer.

#### 6.02 *Labor; Working Hours*

- A. Contractor shall provide competent, skilled, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site. Contractor shall, upon demand from the Engineer, immediately remove any manager, superintendent, foreman or workman whom the Engineer or Owner may consider incompetent or undesirable.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.
- C. Regular working hours may be Monday through Friday, excluding holidays, occurring between the hours of 7:00 AM and 7:00 PM, unless restricted otherwise. Contractor shall establish regular scheduled work times, e.g., four 10-hour days, five 8-hour days, or five 10- hour days within the hours and days allowed above. Approval for specific work outside regular scheduled work times shall be requested no less than 48 hours prior to the requested work period. Contractor shall request approval of changes in regular scheduled work times no less than one week prior to the desired change.

Occasional unscheduled overtime on weekdays may be permitted provided reasonable notice is given to Engineer.

D. Contractor shall pay all extra costs incurred by the Owner associated with work, outside of normal working hours, including additional support services, inspection services, testing services, utilities or other applicable costs. The cost associated with the Owner's inspection overtime will be the amounts as provided in the Supplementary Conditions per hour per individual, depending upon individuals assigned to the Project, the type of work being inspected, and the date of the invoice; i.e., allowing for salary escalation. Contractor will not be responsible for extra costs associated with inspection overtime for work in excess of 40 hours per week when such overtime work is explicitly required by the Contract Documents.

E. Except in the case of emergencies or other unusual circumstances, no work shall be permitted on the project on Sunday.

F. The Engineer will determine to what extent extraordinary onsite personnel work is required during Contractor's overtime work or working hours outside regular scheduled work hours.

### 6.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, quality control, testing, start-up, and completion of the Work.

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All products provided on this Project shall be products currently manufactured by the manufacturer, i.e., products shall not be discontinued or out-of-date products nor shall they be of the last production run of the product. Contractor shall incorporate the previous sentence in any contract or agreement between Contractor and subcontractor or supplier supplying products provided on this Project. All special warranties and guarantees required by the SpecificationsContract Documents shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.



- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.
- D. Without limiting the responsibility or liability of the Contractor pursuant to this agreement, all warranties given by manufacturers on materials or equipment incorporated in the work are hereby assigned by the Contractor to the Owner. Such assignment shall be effective upon completion of Contractor's warranty period. If requested, the Contractor shall execute formal assignments of said manufacturer's warranties to the Owner. All such warranties shall be directly enforceable by the Owner. Such assignment shall in no way affect the Contractor's responsibilities and duties during the warranty period.

#### 6.04 *Progress Schedule*

- A. The Contractor shall proceed with the Work at a rate of progress which will ensure completion within the Contract Time.
- BA. Contractor shall provide all resources, labor, materials, equipment, services, etc. necessary to adhere to the Progress Schedule established in accordance with Paragraph 2.07 and the General Requirements as it may be adjusted from time to time as provided below.
1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) ~~proposed adjustments in and the General Requirements~~ an updated ~~the~~ Progress Schedule ~~that will not result in changing the Contract Times~~ and an updated Schedule of Submittals with each partial payment request, but no less than monthly. Contractor's failure to provide acceptable updated Progress Schedule and Schedule of Submittals will delay processing of the pay request until receipt of the acceptable updated Progress Schedule and/or an updated Schedule of Submittals. Such ~~adjustments will~~ updates and adjustments shall comply with any provisions of the General Requirements applicable thereto.
  2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.
  3. Number of anticipated days associated with adverse weather conditions, as defined in the General Requirements, shall be included on the critical path of Project Schedule.
- C. If the Progress Schedule reflects a completion date prior to the completion date established by the Agreement, this shall afford no basis to claim for delay should Contractor not complete the Work prior to the projected completion date. Instead, all "float" between the completion date in Contractor's schedule and the completion date established in the Agreement shall belong to and is exclusively available to the Owner. Should a change order be executed with a revised completion date, the Progress Schedule shall be revised to reflect the new completion date.

- D. Project Coordination Meetings: The Contractor shall participate in Project Coordination Meetings to be held on the site monthly, or more often if conditions warrant, to establish the current state of completion and revise the schedule as necessary. The Project Coordination Meeting will be conducted by the Owner and/or the Engineer.
- E. The Contractor shall implement the detailed schedule of activities to the fullest extent possible between Project Coordination Meetings.
- F. The Contractor shall prepare its daily report by 10:00 a.m. of the day following the report date. This daily report will contain, as a minimum, the weather conditions; number of workers by craft, including supervision and management personnel on site; active and inactive equipment on site; work accomplished by schedule activity item; problems; and visitors to the jobsite.
- G. If a current activity or series of activities on the overall project schedule is behind schedule and if the late status is not due to an excusable delay for which a time extension would be forthcoming, the Contractor shall attempt to reschedule the activity to be consistent with the overall Project schedule so as not to delay any of the Contract milestones. The Contractor agrees that:
1. The Contractor shall attempt to expedite the activity completion so as to have it agree with the overall progress schedule. Such measures as the Contractor may choose shall be made explicit during the Project Coordination Meeting.
  2. If, within two weeks of identification of such behind-schedule activity, the Contractor is not successful in restoring the activity to an on schedule status, the Contractor shall:
    - a. Carry out the activity with the scheduled crew on an overtime basis until the activity is complete or back on schedule.
    - b. Increase the crew size or add shifts so the activity can be completed as scheduled.
    - c. Commit to overtime or increased crew sizes for subsequent activities, or some combination of the above as deemed suitable by the Engineer.
  3. These actions shall be taken at no increase in the Contract amount.
- H. The Contractor shall maintain a current copy of all construction schedules on prominent display in the Contractor's field office at the Project site.
- I. The Contractor shall cooperate with the Owner and Engineer in all aspects of the Project scheduling system. Failure to implement the Project scheduling system or to provide specified schedules, diagrams and reports, or to implement actions to re-establish progress consistent with the overall progress schedule may be causes for withholding of payment.



## 6.05 *Substitutes and "Or-Equals"*

- A. ~~See General Requirements. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.~~
1. ~~"Or-Equal" Items: If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:~~
    - a. ~~in the exercise of reasonable judgment Engineer determines that:~~
      - 1) ~~it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;~~
      - 2) ~~it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and~~
      - 3) ~~it has a proven record of performance and availability of responsive service.~~
    - b. ~~Contractor certifies that, if approved and incorporated into the Work:~~
      - 1) ~~there will be no increase in cost to the Owner or increase in Contract Times; and~~
      - 2) ~~it will conform substantially to the detailed requirements of the item named in the Contract Documents.~~
  2. ~~Substitute Items:~~
    - a. ~~If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.~~
    - b. ~~Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.~~

- ~~e. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.~~
- ~~d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:~~
- ~~1) shall certify that the proposed substitute item will:~~
    - ~~a) perform adequately the functions and achieve the results called for by the general design;~~
    - ~~b) be similar in substance to that specified, and~~
    - ~~c) be suited to the same use as that specified;~~
  - ~~2) will state:~~
    - ~~a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time;~~
    - ~~b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and~~
    - ~~c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;~~
  - ~~3) will identify:~~
    - ~~a) all variations of the proposed substitute item from that specified, and~~
    - ~~b) available engineering, sales, maintenance, repair, and replacement services; and~~
  - ~~4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.~~
- ~~B. *Substitute Construction Methods or Procedures:*— If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.~~

- ~~C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.~~
- ~~D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.~~
- ~~E. *Engineer's Cost Reimbursement:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.~~
- ~~F. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute or "or equal" at Contractor's expense.~~

#### 6.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Acceptance of any Subcontractor, other person or organization by Owner shall not constitute a waiver of any right of Owner to reject defective Work. Contractor shall not be required to employ any Subcontractor, ~~Supplier,~~ or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.
- B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, ~~and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued.~~ No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a

replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

- C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:
1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor
  2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.
- F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- G. All Work performed for Contractor by a Subcontractor or Supplier ~~will~~ shall be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. ~~Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.~~
- H. Owner or Engineer may furnish to any Subcontractor, Supplier or other person or organization, to the extent practicable, information about amounts paid on their behalf to Contractor in accordance with Contractor's Applications for Payment.

- I. Specialty Subcontractors: Contractor shall utilize the services of Specialty Subcontractors on those parts of the Work which is declared as specialty work in Specifications and which, under normal contracting practices, is best performed by Specialty Subcontractors, as required by the Engineer in Engineer's sole discretion, at no additional cost to the Owner. If Contractor desires to self-perform specialty work, Contractor shall submit a request to the Owner, accompanied by evidence that Contractor's own organization has successfully performed the type of work in question, is presently competent to perform the type of work, and the performance of the work by Specialty Subcontractors will result in materially increased costs or inordinate delays.
- J. The Contractor shall perform a minimum of 50 percent of the onsite labor with its own employees.

6.07 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents

6.08 *Permits*

- A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.
- D. The Contractor shall keep fully informed of all laws, ordinances and regulations of the federal, state, county, city and municipal governments or authorities 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.
- E. Contractor shall perform those duties as they relate to O.C.G.A. Section 36-91-92, including filing the Notice of Commencement. Contractor shall provide Owner and Engineer with proof of having performed these duties before any progress payments or final payment shall be considered due and payable to the Contractor.
- F. Where professional engineering and/or architectural services are required in connection with any of the components required by the Contract, all Bidders and component suppliers must make certain that there is full compliance with all applicable laws of the State of Georgia and any other state governing professional engineering and/or



architecture. The Owner and Engineer do not warrant that any entity listed as an acceptable manufacturer is or will be in compliance with such laws.

G. Any fines levied against the Owner for failure of Contractor to properly maintain required NPDES erosion and sediment control measures or any other related requirements will be deducted as set-offs from payments due Contractor.

#### 6.10 *Taxes*

A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

B. The Contractor shall provide a written tabulation, plus other documentation as may be required, of all taxes, including sales tax, paid by the Contractor to assist the Owner in obtaining sales and/or use tax refunds for eligible machinery and equipment used for the primary purpose of reducing or eliminating air or water pollution as provided for in O.C.G.A. Section 48-8-3 (36) and (37). Such written tabulation shall be included with each partial payment request. Additionally, the tabulation shall be documented with copies of invoices indicating the amount of tax paid, with all blanks completed on the invoice, and with a description of the function of the item included in the tabulation. All taxes will be paid by the Contractor. All refunds will accrue to the Owner.

#### 6.11 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas:*

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.
2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.
3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified

hereunder to the extent caused by or based upon Contractor's performance of the Work.

- B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

#### 6.12 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site Record Documents as specified in the Contract Documents ~~one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference.~~ Upon completion of the Work, these record documents, Samples, and Shop Drawings ~~will~~ shall be delivered to Engineer for Owner.

#### 6.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all ~~necessary~~ precautions for the safety of, and shall provide the ~~necessary~~ protection to prevent pollution of or damage, injury or loss to:
  - 1. all persons on the Site or who may be affected by the Work;
  - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and



3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
  - C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
  - D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
  - E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
  - F. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).
  - G. The property, improvements or facilities at the site shall be replaced or restored to a condition as good as when Contractor entered upon the Site. In case of failure on the part of Contractor to restore such property, or make good such damages or injury, the Owner may, after 48 hours written notice, or sooner in the case of an emergency, proceed to repair, rebuild, or otherwise restore such property, improvements or facilities as may be deemed necessary. The cost thereof will be deducted from any monies due or which may become due Contractor under this Contract.

#### 6.14 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

#### 6.15 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

#### 6.16 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

#### 6.17 *Shop Drawings, ~~and~~ Samples and Other Submittals*

- A. Contractor shall submit ~~Shop Drawings and Samples~~Submittals to Engineer for review and approval in accordance with the accepted or adjusted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

##### 1. *Shop Drawings:*

- a. Submit number of copies specified in the ~~General Requirements~~Specifications.
- b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

##### 2. *Samples:*

- a. Submit number of Samples specified in the Specifications.
- b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.

B. Where a ~~Shop Drawing or Sample~~ any Submittal is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. *Submittal Procedures:*

1. Before submitting each Shop Drawing or Sample, Contractor shall have:
  - a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
  - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
  - c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
  - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
2. Each Shop Drawing and Sample submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.
3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. *Engineer's Review:*

1. Engineer will return as incomplete or will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval or disapproval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Engineer's review and approval or disapproval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures:*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

F. Excessive Submittal Resubmission: Engineer will record time required by Engineer for excessive Submittal review occasioned by Contractor's resubmission, in excess of two resubmissions of any required Submittal, caused by unverified, unchecked or unreviewed, incomplete, inaccurate or erroneous, or nonconforming Submittals. Upon receipt of Engineer's accounting of time and costs, Contractor will reimburse Owner for the charges of Engineer's review for excessive resubmissions through set-offs from the recommended Owner payments to Contractor as established in Paragraph 14.02.D. of these General Conditions.

G. In the event that Contractor provided a submittal for a previously approved item, whether such is as a substitution or in addition to the previously approved item, Contractor shall reimburse Owner for Engineer's charges for such time as may be required to perform all reviews of the substitute item, unless the change is specifically requested by the Owner.

6.18 *Continuing the Work*

- A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
  2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
1. observations by Engineer;
  2. recommendation by Engineer or payment by Owner of any progress or final payment;
  3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
  4. use or occupancy of the Work or any part thereof by Owner;
  5. any review and approval of a ~~Shop Drawing or Sample s~~Submittal or the issuance of a notice of acceptability by Engineer;
  6. any inspection, test, or approval by others; or
  7. any correction of defective Work by Owner.

#### 6.20 *Indemnification and Liability*

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly

employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable, regardless of whether or not caused in part by any negligence or omission of a person or entity indemnified hereunder or whether liability is imposed upon such indemnified party by Laws and Regulations regardless of the negligence of any such person or entity .

- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor ~~under Paragraph 6.20.A~~ shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
1. the negligent preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
  2. negligently giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

D. Contractor, Subcontractors, Suppliers and others on the Project, or their sureties, shall maintain no direct action against the Engineer, their officers, employees, affiliated corporations, consultants, and subcontractors, for any claim arising out of, in connection with, or resulting from the engineering services performed. Only the Owner will be the beneficiary of any undertaking by the Engineer.

#### 6.21 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.
- B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related



to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

## **ARTICLE 7 – OTHER WORK AT THE SITE**

### *7.01 Related Work at Site*

- A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:
  - 1. written notice thereof will be given to Contractor prior to starting any such other work; and
  - 2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.
- B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

- C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

#### 7.02 *Coordination*

- A. If Owner ~~intends to contract~~s with others for the performance of other work on the ~~Project at the~~ Site, the following will be set forth in Supplementary Conditions:
1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;
  2. the specific matters to be covered by such authority and responsibility will be itemized; and
  3. the extent of such authority and responsibilities will be provided.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination with other contractors.

#### 7.03 *Legal Relationships*

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.
- B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.

#### 7.04 *Claims Between Contractors*

- A. Should Contractor cause damage to the work or property of any separate contractor at the site, or should any claim arising out of Contractor's performance of the work at the site be made by any separate contractor against Contractor, Owner, Engineer, or any other person, Contractor shall promptly attempt to settle with such other contractor by agreement, or to otherwise resolve the dispute by mediation, arbitration, or at law.
- B. Contractor shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold Owner, Engineer, and the officers, directors, employees, agents, and other consultants of each and any of them harmless from and against all claims, costs, losses



and damages, (including, but not limited to, all fees and charges of engineers, architects, attorneys and other professionals and all court or arbitration or other dispute resolution costs) arising directly, indirectly or consequentially out of or resulting from any action, legal or equitable, brought by any separate contractor against Owner, Engineer, or the officers, directors, employees, agents, and other consultants of each and any of them to the extent based on a claim arising out of Contractor's performance of the Work. Should a separate contractor cause damage to the Work or property of Contractor or should the performance of work by any separate contractor at the site give rise to any other claim, Contractor shall not institute any action, legal or equitable, against Owner, Engineer, or the officers, directors, employees, agents, and other consultants of each and any of them or permit any action against any of them to be maintained and continued in its name or for its benefit in any court or before any mediator or arbitrator which seeks to impose liability on or to recover damages from Owner, Engineer, or the officers, directors, employees, agents, or other consultants of each and any of them on account of any such damage or claim.

C. If Contractor is delayed at any time in performing or furnishing Work by any act or neglect of a separate contractor, and Owner and Contractor are unable to agree as to the extent of any adjustment in Contract Times attributable hereto, Contractor may make a claim for an extension of times in accordance with Article 12. An extension of the Contract Times shall be Contractor's exclusive remedy with respect to Owner, and/or Engineer and the officers, directors, employees, agents, or other consultants of each and any of them for any delay, disruption, interference or hindrance caused by any separate contractor. This Paragraph does not prevent recovery from Owner, Engineer, and/or Designer for activities that are their respective responsibilities.

## **ARTICLE 8 – OWNER'S RESPONSIBILITIES**

### **8.01 *Communications to Contractor***

A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

### **8.02 *Replacement of Engineer***

A. In case of termination of the employment of Engineer, Owner shall appoint an engineer ~~to whom Contractor makes no reasonable objection,~~ whose status under the Contract Documents shall be that of the former Engineer.

### **8.03 *Furnish Data***

A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

### **8.04 *Pay When Due***

A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. Owner's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

8.06 *Insurance*

A. Owner's shall not have any responsibilities, ~~if any,~~ with respect to purchasing and maintaining liability and property insurance ~~are set forth in Article 5.~~

8.07 *Change Orders*

A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.

8.12 *Compliance with Safety Program*

A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed pursuant to Paragraph 6.13.D.

## ARTICLE 9 – ENGINEER’S STATUS DURING CONSTRUCTION

### 9.01 *Owner’s Representative*

- A. Engineer will be Owner’s representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner’s representative during construction are set forth in the Contract Documents.

### 9.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor’s executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer’s efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer’s visits and observations are subject to all the limitations on Engineer’s authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer’s visits or observations of Contractor’s Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor’s means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

### 9.03 *Project Representative*

- A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer’s consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

### 9.04 *Authorized Variations in Work*

- A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor<sup>e</sup> as provided in Paragraph 10.05.

#### 9.05 *Rejecting Defective Work*

- A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

#### 9.06 *Shop Drawings, Change Orders and Payments*

- A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.
- B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.
- C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.
- D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

#### 9.07 *Determinations for Unit Price Work*

- A. Engineer will have authority to determine the actual quantities and classifications of Unit Price Work performed by Contractor. If Engineer exercises such authority, Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

#### 9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.
- B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.
- D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract

Documents, except that Owner shall determine whether bonds, certificates of insurance and release of liens comply with the Contract Documents.

- E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

9.10 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

**ARTICLE 10 – CHANGES IN THE WORK; CLAIMS**

10.01 *Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

1. Owner may, in anticipation of possibly ordering an addition, deletion or revision to the Work, request Contractor to prepare a proposal of cost and times to perform Owner's contemplated changes in the Work. Contractor's written proposal shall be transmitted to the Engineer promptly, but not later than fourteen days after Contractor's receipt of Owner's written request and shall remain a firm offer for a period not less than sixty days after receipt by Engineer.

2. Contractor is not authorized to proceed on an Owner contemplated change in the Work prior to Contractor's receipt of a Change Order (or Work Change Directive) incorporating such change into the Work.

3. Owner's request for proposal or Contractor's failure to submit such proposal within the required time period will not justify a claim for an adjustment in Contract Price or Contract Time (or Milestones).

4. The Owner shall not be liable to the Contractor for any costs associated with the preparation of proposal associated with the Owner's contemplated changes in the Work.

- B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that



should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

#### 10.02 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.

#### 10.03 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:

1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

#### B. In signing a Change Order, the Owner and Contractor acknowledge and agree that:

1. The stipulated compensation (Contract Price or Contract Time, or both) set forth in the Change Order includes payment for:
  - a. the Cost of the Work covered by the Change Order,
  - b. Contractor's fee for overhead and profit,
  - c. interruption of Progress Schedules,
  - d. delay and impact, including cumulative impact, on other work under the Contract Documents, and

- e. extended home office and jobsite overhead;
2. the Change Order constitutes full mutual accord and satisfaction for the change to the Work;
3. No reservation of rights to pursue subsequent claims on the Change Order will be made by either party; and
4. No subsequent claim or amendment of the Contract Documents will arise out of or as a result of the Change Order.

#### 10.04 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

#### 10.05 *Claims and Disputes*

- A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.
- B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than ~~30~~10 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with written supporting data shall be delivered to the Engineer and the other party to the Contract within ~~60~~20 days (and monthly thereafter for continuing events) after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).
- C. *Engineer's Action:* Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:



1. deny the Claim in whole or in part;
  2. approve the Claim; or
  3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.
- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

## ARTICLE 11 – COST OF THE WORK; ~~ALLOWANCES~~; UNIT PRICE WORK

### 11.01 *Cost of the Work*

- A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, ~~bonuses~~, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
  - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
  - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
  - c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
    1. Full rental cost for rented, leased, and/or owned equipment shall not exceed the rates listed in the Rental Rate Blue Book published by Equipment Watch, a unit of Primedia, Inc., as adjusted to the regional area of the Project. The most recent published edition in effect at the commencement of the actual equipment use shall be used.

2. Rates shall apply to equipment in good working condition. Equipment not in good condition, or larger than required, may be rejected by Engineer or accepted at reduced rates.

3. Equipment in Use: Actual equipment use time documented by the Engineer shall be the basis that the equipment was on and utilized at the Project site. In addition to the leasing rate above, equipment operational costs shall be paid at the estimated operating cost, payment category (and the table below), and associated rate set forth in the Blue Book if not already included in the lease rate.

The hours of operation shall be based upon actual equipment usage to the nearest full hour, as recorded by the Engineer.

<u>Actual Usage</u>	<u>Blue Book Payment Category</u>
<u>Less than 8 hours</u>	<u>Hourly Rate</u>
<u>8 or more hours but less than 7 days</u>	<u>Daily Rate</u>
<u>7 or more days but less than 30 days</u>	<u>Weekly Rate</u>
<u>30 days or more</u>	<u>Monthly Rate</u>

4. Equipment when idle (Standby): Idle or standby equipment is equipment on-site or in transit to and from the Work site and necessary to perform the Work under the modification but not in actual use. Idle equipment time, as documented by the Engineer, shall be paid at the leasing rate determined in 11.01.A.5.c., excluding operational costs.

5. Where a breakdown occurs on any piece of equipment, payment shall cease for that equipment and any other equipment idled by the breakdown. If any part of the Work is shutdown by the Owner, standby time will be paid during non-operating hours if diversion of equipment to other Work is not practicable. Engineer reserves the right to cease standby time payment when an extended shutdown is anticipated.

- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
- e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
- f. Losses and damages (and related expenses) caused by damage to any of the Work that has been completed and accepted by the Owner, not compensated by insurance or otherwise, sustained by Contractor in connection with the

performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D.), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee. If, however, any such loss or damage to the Work that has been accepted by Owner requires reconstruction and Contractor is placed in charge thereof, Contractor shall be paid for services, a fee proportionate to that stated in Paragraph 12.01.c.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.
2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.

- C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.
- D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

## 11.02 ~~Deleted~~ Allowances

~~A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.~~

### ~~B. Cash Allowances:~~

#### ~~1. Contractor agrees that:~~

- ~~a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and~~
- ~~b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.~~

### ~~C. Contingency Allowance:~~

- ~~1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.~~

~~D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.~~

## 11.03 Unit Price Work

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:
  - 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
  - 2. there is no corresponding adjustment with respect to any other item of Work; and
  - 3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

## ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

### 12.01 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:
  - 1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or
  - 2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a ~~mutually agreed~~ lump sum value fixed by the Owner or by unit price values fixed by the Owner (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or
  - 3. where the Work involved is not covered by unit prices contained in the Contract Documents and ~~agreement to a lump sum is not reached~~ where the methods under Paragraph 12.01.B.2. are not selected by the Owner, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).

C. *Contractor's Fee*: The Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or
2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
  - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
  - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent based on subcontractor's actual Cost of the Work;
  - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor; except the maximum total allowable cost to Owner shall be the Cost of the Work plus a maximum collective aggregate fee for Contractor and all tiered Subcontractors of 26.8 percent.
  - d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
  - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
  - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

#### 12.02 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

#### 12.03 *Delays*



- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times ~~will~~ may be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, quarantine restrictions, strikes, freight embargoes, acts of war (declared or not declared), or acts of God.
- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor ~~shall~~ may be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.
- D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.
- E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

## **ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK**

### *13.01 Notice of Defects*

- A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article 13.



### 13.02 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

### 13.03 *Tests and Inspections*

- A. Contractor is responsible for the initial and subsequent inspections of Contractor's Work to ensure that the Work conforms to the requirements of the Contract Documents. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests. Contractor shall establish an inspection program and a testing plan acceptable to the Engineer and shall maintain complete inspection and testing records available to Engineer.
- B. Owner shall employ and pay for the services of an independent testing laboratory to perform all non-contractor inspections, tests, or approvals required by the Contract Documents except:
  - 1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;
  - 2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in Paragraph 13.04.C; and
  - 3. as otherwise specifically provided in the Contract Documents.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.
- E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation.

F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

G. Tests required by Contract Documents to be performed by Contractor and that require test certificates to be submitted to Owner or Engineer for acceptance shall be made by an independent testing laboratory or agency licensed or certified in accordance with Laws and Regulations and applicable state and local statutes. In the event state license or certification is not required testing laboratories or agencies shall meet the following applicable requirements:

1. "Recommended Requirements for Independent Laboratory Qualification", published by the American Council of Independent Laboratories.

2. Basic requirements of ASTM E329, "Standard of Recommended Practice for Inspection and Testing Agencies for Concrete and Steel as Used in Construction" as applicable.

3. Calibrate testing equipment at reasonable intervals by devices of accuracy traceable to either the National Bureau of Standards or accepted values of natural physical constants.

#### 13.04 *Uncovering Work*

A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.

B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.

C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.

- D. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

#### 13.05 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

B. If Owner stops Work under Paragraph 13.05.A. Contractor shall not be entitled to an extension of Contract Time or increase in Contract Price.

#### 13.06 *Correction or Removal of Defective Work*

- A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

C. Contractor shall promptly segregate and remove rejected products from the Site.

D. If rejected products or Work is not removed within 48 hours, the Engineer will have the right and authority to stop the Work immediately and will have the right to arrange for the removal of said rejected products or Work at the cost and expense of the Contractor.

#### 13.07 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as

contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. repair such defective land or areas; or
  2. correct such defective Work; or
  3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
  4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

F. Repetitive malfunction of an equipment or product item shall be cause for replacement and an extension of the correction period to a date one year following acceptable replacement. A repetitive malfunction shall be defined as the third failure of an equipment or product item following original acceptance.

#### 13.08 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and

other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

### 13.09 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time as defined by the Engineer after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.
- C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

## ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

### 14.01 *Schedule of Values*

- A. The Schedule of Values established as provided in Paragraph 2.07.A and as modified will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer/Owner. Progress payments on account of Unit Price Work will be based on the number of units completed.

### 14.02 *Progress Payments*

#### A. *Applications for Payments:*

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
3. The amount of retainage with respect to progress payments will be as stipulated below;in the Agreement.
  - a. Retainage is withheld from progress payments in compliance with O.C.G.A. §13-10-81.
  - b. The Owner shall retain from each progress payment ten percent (10%) of the estimated value of the Work performed until the progress payments, including retainage, total fifty percent (50%) of the Contract price. Thereafter, no further retainage shall be withheld so long as Contractor is making satisfactory progress to insure completion of the Work within the time specified. The Owner may reinstate the ten percent (10%) retainage in the event the Owner and/or Engineer determines that the Contractor is not making satisfactory progress to complete the work within the time specified in this agreement or in the event that the Owner and/or Engineer provides a specific cause for such withholding.



- c. Retainage will be invested in the Georgia Fund 1 at the current market rate. Simple interest will be earned monthly for the retained amount utilizing the previous month's net earning rate.
- d. Upon Substantial Completion of the work and upon application by Contractor and approval by the Owner and Engineer, the Owner may reduce retainage to an amount equal to two hundred percent (200%) of the value of each remaining incomplete minor item as determined by the Owner and Engineer.
- e. The final payment, the remaining retainage and the interest earned will not become due until the Contractor submits the following documents to the Owner and Engineer:
  - 1. An affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the Work have been paid or otherwise satisfied;
  - 2. The surety's consent to final payment;
  - 3. The Contractor's signed and sealed final change order to close the Contract; and
  - 4. Any other data reasonably required by the Owner and/or Engineer establishing payment or satisfaction of all obligations, including releases, waivers of liens, and documents of satisfaction of debts.
- f. In the event a Subcontractor refuses to furnish a release or waiver as required by the Owner and Engineer, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such loss. In the event any lien or indebtedness remains unsatisfied after all payments are made, the Contractor shall refund to the Owner all monies the Owner may become compelled to pay in discharging such lien or other indebtedness, including all costs and reasonable attorneys' fees.

**B. Review of Applications:**

- 1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
- 2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

- a. the Work has progressed to the point indicated;
  - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and
  - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
- a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or
  - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
- a. to supervise, direct, or control the Work, or
  - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
  - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
  - d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or
  - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment



recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

- a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
- b. the Contract Price has been reduced by Change Orders;
- c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
- d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

*C. Payment Becomes Due:*

1. ~~Ten~~ Thirty days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

*D. Reduction in Payment:*

1. Owner may refuse to make payment of the full amount recommended by Engineer because:
  - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
  - b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
  - c. there are other items entitling Owner to a set-off against the amount recommended; or
  - d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.
3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as

determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

4. Items entitling Owner to retain set-offs from the amount recommended, include but are not limited to:

a. Owner compensation to Engineer at an estimated average rate as specified in the Supplementary Conditions per each extra personnel hour for labor plus expenses because of the following Contractor-caused events:

(1) Delays necessitating a time extension for the performance of Engineer's services;

(2) Witnessing retesting of corrected or replaced defective Work;

(3) Return visits to manufacturing facilities to witness factory testing or retesting;

(4) Submittal reviews in excess of three reviews by Engineer for substantially the same Submittal;

(5) Evaluation of proposed substitutes and in making changes to Contract Documents occasioned thereby;

(6) Hours worked by Contractor, in excess of normal work hours as defined by Article 6.02 of the General Conditions, necessitating Engineer to work overtime;

(7) Return visits to the Project by Engineer for Commissioning Activities not performed on the initial visit;

(8) Fines levied against the Owner for Contractor's performance of NPDES Erosion and Sedimentation Control Measures or other permit violations.

(9) The repair, rebuilding or restoration of property improvements or facilities by the Owner as outlined in Paragraph 6.13.

b. Liability for liquidated damages incurred by Contractor as set forth in the Agreement.

E. Prompt Payment Clause

1. Owner and Contractor agree that all partial payments and final payments shall be subject to the Georgia Prompt Pay Act, as originally enacted and amended, and as set forth in O.C.G.A. 13-11-1 through 13-11-11, except as provided below to the extent authorized by law.
2. Interest Rate: For purposes of computing interest on late payments, the rate of interest shall be one-half percent per month or a pro-rata fraction thereof on the unpaid balance as may be due.
3. Payment Periods:
  - a. When Contractor has performed in accordance with the provisions of these Contract Documents, the Owner shall pay Contractor within 30 days of receipt by the Owner or the Owner's representative of any properly completed Application for Payment, based upon work completed or service provided pursuant to the terms of these Contract Documents.
  - b. When a subcontractor has performed in accordance with the provisions of its subcontract and the subcontract conditions precedent to payment have been satisfied, Contractor shall pay to that subcontractor and each subcontractor shall pay to its subcontractor, within ten days of receipt by Contractor or subcontractor of each periodic or final payment, the full amount received for such subcontractors work and materials based on work completed or service provided under the subcontract, less retainage expressed as a percentage, but such retainage shall not exceed that retainage being held by the Owner, provided that the subcontractor has provided or provides such satisfactory reasonable assurances of continued performance and financial responsibility to complete its work as contractor in its reasonable discretion may require, including but not limited to a payment and performance bond.
4. Interest on Late Payment: Except otherwise provided in these Contract Documents and/or in O.C.G.A. 13-11-5, if a periodic or final payment to Contractor is delayed by more than the time allotted in Paragraph 14.02.E.3b, or if a periodic or final payment to a subcontractor is delayed more than ten days after receipt of periodic or final payment by Contractor or Subcontractor, the Owner, Contractor, or subcontractor, as the case may be, shall pay interest to its Contractor, or subcontractor beginning on the day following the due dates as provided in Paragraph 14.02.E.3b, at the rate of interest as provided herein. Interest shall be computed per month or a pro-rata fraction thereof on the unpaid balance. There shall be no compounded interest. No interest is due unless the person or entity being charged interest received "Notice" as provided in Paragraph 14.02.E.5. Acceptance or progress payments or final payment shall release all claims for interest on said payments.

5. Notice of Late Payment and Request of Interest: Any person or entity asserting entitlement to interest on any periodic or final payment pursuant to the provisions of this Prompt Payment Clause shall provide “notice” to the person or entity being charged interest of the charging party’s claim to interest on late payment. “Notice” shall be in writing, served by U.S. Certified Mail – Return Receipt Requested at the time the properly completed Application for Payment is received by the Owner or Owner’s representative, and shall set forth the following:
  - a. A short and concise statement that interest is due pursuant to the provisions of the Georgia Prompt Pay Act and this Prompt Payment Clause;
  - b. The principal amount of the periodic or final payment which is allegedly due to the charging party; and
  - c. The first day and date upon which the charging party alleges that said interest will begin to accrue, pursuant to the provisions of the Georgia Prompt Pay Act and this Prompt Payment Clause.
6. These “Notice” provisions are of the essence; therefore, failure to comply with any requirement as set forth in the Prompt Payment Clause precludes the right to interest on any alleged late payment to which said “Notice” would otherwise apply.
7. Integration with the Georgia Prompt Pay Act: Unless otherwise provided in these Contract Documents, the parties hereto agree that these provisions of this Prompt Payment Clause supersede and control all provisions of the Georgia Prompt Pay Act (O.C.G.A. 13-11-1 through 13-11-11 (1994)), as originally enacted and as amended, and that any dispute arising between the parties hereto as to whether or not the provisions of this contract or the Georgia Prompt Pay Act control will be resolved in favor of these Contract Documents and its terms.

#### 14.03 *Contractor’s Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.
- B. No materials or supplies for the Work shall be purchased by Contractor or subcontractor subject to any chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller. Contractor warrants that Contractor has good title to all materials and supplies used by Contractor in the Work, free from all liens, claims or encumbrances.
- C. Contractor shall indemnify and save Owner harmless from all claims growing out of the lawful demands for payment by subcontractors, laborers, workmen, mechanics, material men, and furnishers of machinery and parts thereof, equipment, power tools, and all supplies, including commissary, incurred in the furtherance of the performance

of this Contract. Contractor shall, at Owner's request, furnish satisfactory evidence that all obligations of the nature hereinabove designated have been paid, discharged, or waived. If Contractor fails to do so, then Owner may, after having served written notice on the said Contractor either pay unpaid bills, of which Owner has written notice, direct, or withhold from Contractor's unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to Contractor shall be resumed, in accordance with the terms of this Contract, but in no event shall the provisions of this sentence be construed to impose any obligations upon Owner to either Contractor or to Contractor's Surety. In paying any unpaid bills of Contractor, Owner shall be deemed the agent of Contractor and any payment so made by Owner shall be considered as payment made under the Contract by Owner to Contractor and Owner shall not be liable to Contractor for any such payment made in good faith.

#### 14.04 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion. Specific items of Work that must be completed prior to the Engineer's issuance of a certificate of Substantial Completion include, but are not limited to, the following:
1. Correction of all deficient Work items listed by all state, local, and other regulatory agencies or departments.
  2. All submittals must be received and approved by the Engineer, including but not necessarily limited to, the following:
    - a. Record documents.
    - b. Factory test reports, where required.
    - c. Equipment and structure test reports.
    - d. Manufacturer's Certificate of Proper Installation.
    - e. Operating and maintenance information, instructions, manuals, documents, drawings, diagrams, and records.
    - f. Spare parts lists.
  3. All additional warranty or insurance coverage requirements have been provided.
  4. All manufacturer/vendor-provided operator training is complete and documented.
  5. Other items of Work specified elsewhere as being prerequisite for Substantial Completion.

- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.
- E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

#### 14.05 *Partial Utilization*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
  - 1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.

2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

#### 14.06 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

#### 14.07 *Final Payment*

##### A. *Application for Payment:*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments. Under no circumstances will Contractor's application for final payment be accepted by the Engineer until all Work required by the Contract Documents has been completed.
2. The final Application for Payment shall be accompanied (except as previously delivered) by:
  - a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;
  - b. consent of the surety, if any, to final payment;
  - c. a list of all Claims against Owner that Contractor believes are unsettled; and



- d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. *Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying all documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, ~~within ten days after receipt of the final Application for Payment,~~ indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. ~~At the same time~~ Thereupon Engineer will ~~also~~ give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment. If the Application for Payment and accompanying documentation are appropriate as to form and substance, Owner will in accordance with the applicable State or local General Law, pay Contractor the amount recommended by Engineer.

C. *Payment Becomes Due:*

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*



- A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

#### 14.09 *Waiver of Claims*

- A. The making and acceptance of final payment will constitute:
1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
  2. a waiver of all Claims by Contractor against Owner ~~other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.~~

### **ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION**

#### 15.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor ~~shall~~may be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

#### 15.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will justify termination for cause:
1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress

Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);

2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
  3. Contractor's repeated disregard of the authority of Engineer; ~~or~~
  4. Contractor's violation in any substantial way of any provisions of the Contract Documents;
  5. If Contractor abandons the Work, or sublets this Contract or any part thereof, without the previous written consent of Owner, or if the Contract or any claim thereunder shall be assigned by Contractor otherwise than as herein specified;
  6. Contractor is adjudged bankrupt or insolvent;
  7. Contractor makes a general assignment for the benefit of creditors;
  8. A trustee or receiver is appointed for Contractor or for any of Contractor's property;
  9. Contractor files a petition to take advantage of any debtor's relief act, or to reorganize under the bankruptcy or applicable laws;
  10. Contractor repeatedly fails to supply sufficient skilled workmen, materials or equipment;
  11. Contractor fails to make satisfactory progress toward timely completion of the work; or
  12. Contractor repeatedly fails to make prompt payments to subcontractors or material suppliers for labor, materials or equipment.
- B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor, unless Contractor otherwise cures the deficiency in accordance with Paragraph 15.02.D.
1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);
  2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and
  3. complete the Work as Owner may deem expedient.

- C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.
- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.
- E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.
- F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

G. Any termination by Owner pursuant to Paragraph 15.02 may result in the disqualification of Contractor for bidding on future contracts of Owner.

### 15.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate or discontinue, in whole or in part, the Contract. In such case, Contractor shall be paid for (without duplication of any items):
1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, ~~including fair and reasonable sums for overhead and profit on such Work;~~
  2. direct expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, ~~plus fair and reasonable sums for overhead and profit on such expenses;~~

3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; ~~and~~
  4. reasonable expenses directly attributable to termination; ~~and-~~
  5. ten percent overhead and profit for those costs agreed to in Paragraphs 15.03.A.1 through 15.03.A.4 above.
- B. Contractor shall submit within 30 calendar days after receipt of notice of termination a written statement setting forth its proposal for an adjustment to the Contract Price to include only the incurred costs described in this clause. Owner shall review, analyze, and verify such proposal and negotiate an equitable amount and the Contract may be modified accordingly.
- C. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

#### 15.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

## ARTICLE 16 – DISPUTE RESOLUTION

### 16.01 *Methods and Procedures*

- ~~A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.~~
- ~~B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.~~
- ~~C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:~~
- ~~1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or~~
  - ~~2. agrees with the other party to submit the Claim to another dispute resolution process; or~~
  - ~~3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.~~

## ARTICLE 17 – MISCELLANEOUS

### 17.01 *Giving Notice*

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or
  2. delivered at or sent by registered or certified mail, postage prepaid, or by facsimile transmission and followed by written confirmation, to the last business address known to the giver of the notice.
- ~~B. All notices required of Contractor shall be performed in writing to the appropriate entity.~~
- ~~C. Electronic mail and messages will not be recognized as a written notice.~~
- ~~D. If the Contractor does not immediately notify the Owner in writing of the belief that a field order, additional work by other contractors or the Owner, or subsurface, latent, or~~

unusual unknown conditions entitles the Contractor to a Change Order, no consideration for time or money will be given the Contractor.

#### 17.02 *Computation of Times*

- A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

#### 17.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

#### 17.04 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

#### 17.05 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located. Each and every provision of this Agreement shall be construed in accordance with and governed by Georgia law. The parties acknowledge that this Contract is executed in Gwinnett County, Georgia and that the Contract is to be performed in Gwinnett County, Georgia. Each party hereby consents to the Gwinnet Superior Court's sole jurisdiction over any dispute which arises as a result of the execution or performance of this Agreement, and each party hereby waives any and all objections to venue in the Gwinnett County Superior Court.

#### 17.06 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

#### 17.07 *Addresses*

- A. Both the address given in the Bid form upon which this Agreement is founded, and Contractor's office at or near the site of the Work are hereby designated as places to

either of which notices, letters, and other communications to Contractor shall be certified, mailed, or delivered. The delivering at the above named place, or depositing in a postpaid wrapper directed to the first-named place, in any post office box regularly maintained by the post office department, of any notice, letter or other communication to Contractor shall be deemed sufficient service thereof upon date of such delivery or mailing. The first-named address may be changed at any time by an instrument in writing, executed by Contractor, and delivered to and acknowledged by the Owner and Engineer. Nothing herein contained shall be deemed to preclude or render inoperative the service of any notice, letter, or other communication upon Contractor personally.

#### 17.08 Forms and Record

- A. The form of all Submittals, notices, change orders and other documents permitted or required to be used or transmitted under the Contract Documents shall be determined by the Engineer.
- B. Contractor shall maintain throughout the term of the Contract, complete and accurate records of all Contractor's costs which relate to the work performed, including the extra work, under the terms of the Contract. The Owner, or its authorized representative, shall have the right at any reasonable time to examine and audit the original records.
- C. Records to be maintained and retained by Contractor shall include, but not be limited to:
1. Payroll records accounting for total time distribution of Contractor's employees working full or part time on the work;
  2. Cancelled payroll checks or signed receipts for payroll payments in cash;
  3. Invoices for purchases, receiving and issuing documents, and all other unit inventory records for Contractor's stores, stock, or capital items;
  4. Paid invoices and cancelled checks for materials purchase, subcontractors, and any other third parties' charges;
  5. Original estimate and change order estimate files and detailed worksheets;
  6. All project-related correspondence; and
  7. Subcontractor and supplier change order files (including detailed documentation covering negotiated settlements).
- D. Owner shall also have the right to audit: any other supporting evidence necessary to substantiate charges related to this agreement (both direct and indirect costs, including overhead allocations as they may apply to costs associated with this agreement); and any records necessary to permit evaluation and verification of Contractor compliance with contract requirements and compliance with provisions for pricing change orders, payments, or claims submitted by Contractor or any payees thereof. Contractor shall also be required to include the right to audit provision in the contracts (including those



of a lump-sum nature) of all subcontractors, insurance agents, or any other business entity providing goods and services.

17.09 Assignment

A. 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 case 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 Contractor shall be subject to prior liens of all persons, firms and corporations for services rendered or materials supplied for the performance of the Work called for under this Contract.

END OF SECTION



## Supplementary Conditions

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, EJCDC C-700 (2007 Edition, with Gwinnett County Department of Water Resources (GCDWR) Modifications 06-01-16. All provisions which are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

The provisions in this Section of the Specifications shall govern in the event of any conflict between this Section and the General Conditions.

### SC-1.01 *Definitions*

SC-1.01.A.16.1 Delete Paragraph 1.01.A.16.1 in its entirety.

SC-1.01.A.29 Add the following to end of paragraph:

Owner designates the Director of the Gwinnett County Department of Water Resources to exercise all Owner authority identified in these contract Documents, except that of approval and execution of change orders. Owner is further defined as GCDWR, its authorized agents and employees as designated at a time of GCDWR's choosing. GCDWR reserves the right to revoke, in part or in whole, the agency of any party.

### SC-2.02 *Copies of Documents*

SC-2.02 Delete Paragraph 2.02.A in its entirety and insert the following in its place:

- A. Owner will furnish to Contractor up to four printed or hard copies of the Contract Documents, one counterpart of the executed Contract Agreement, and one set in electronic format. Additional copies will be furnished upon request at the cost of reproduction.

### SC-4.02 *Subsurface and Physical Conditions*

SC-4.02 Delete Paragraphs 4.02.A and 4.02.B in their entirety and insert the following:

- A. No reports of explorations or tests of subsurface conditions at or contiguous to the Site, or drawings of physical conditions relating to existing surface or subsurface structures at the Site, are known to Owner.

SC-4.06 Delete Paragraphs 4.06.A and 4.06.B in their entirety and insert the following:

- A. No reports or drawings related to Hazardous Environmental Conditions at the Site are known to Owner.

B. Not Used.

SC-5.04 *Contractor's Liability Insurance*

SC-5.04. Delete Paragraph 5.04.C in its entirety and insert the following:

C. The limits of liability for the insurance required by paragraph 5.04.B.2 of the General Conditions shall provide coverage specified in the Owner's Insurance Requirements, included in these Contract Documents, or greater where required by Laws and Regulations.

SC-5.06 *Property Insurance*

SC-5.06 Delete Paragraph 5.06.A in its entirety and insert the following in its place:

A. Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof. Contractor shall be responsible for any deductible or self-insured retention. This insurance shall be provided as required by the Owner's Insurance Requirements.

SC-6.02 *Labor; Working Hours*

SC-6.02 Add the following subparagraph 6.02.D.1:

1. The following rates or most current rates will apply for the overtime work on behalf of the Owner:

<u>Labor Grade</u>	<u>Rate</u>
N/A	

SC-6.06 *Concerning Subcontractors, Suppliers, and Others*

SC-6.06 Add the following subparagraphs 6.06.B.1:

1. Subcontractors, Suppliers, and Others providing the following services are to be submitted to the Owner for review and approval prior to the Effective Date of the Agreement:

a. Per Engineer and Owner request.

SC-6.06 Delete Paragraph 6.06.J in its entirety and insert the following:

J. The Contractor shall perform a minimum percentage of the onsite labor with its own employees as directed by the Owner on a per-assignment basis.

SC-6.08 *Permits*

SC-6.08 Add the following subparagraphs 6.08.B.1:

1. The Owner will provide the following Permits:
  - a. United States Army Corps of Engineers Clean Water Act (latest version) Section 404 permit.
  - b. State of Georgia Environmental Protection Division Stream Buffer Variance.
  - c. Gwinnett County Land Disturbing Permit.

SC-6.13 *Safety and Protection*

SC-6.13 Delete the second sentence of Paragraph 6.13.C.

SC-6.13.H following Paragraph 6.13.G, add the following:

H. Contractor's Plan for Safety Precautions and Programs

1. Before any Work at the site is started, Contractor shall have prepared Contractor's written plan for Project-specific safety precautions and programs, complete with respect to procedures and actions that the Contractor intends Contractor and all others as provided in Paragraphs 6.13.A.1 and 13.02.A, to follow in order for Contractor and all others to comply with all applicable Laws and Regulations. Contractor's plan for safety precautions and programs shall have been approved and endorsed by Contractor's designated safety representative required in Paragraph 6.14.A.
2. Contractor shall revise Contractor's plan for safety precautions and programs at appropriate times to reflect changes in construction conditions, the Work, Contractor's means, methods, techniques, sequences and procedures of construction, and the requirements of paragraph 13.02.A. Contractor shall disseminate the original plan and revisions to all others indicated in Paragraphs 6.13.A and 13.02.A.
3. Contractor's plan for safety precautions and programs will not require more stringent safety requirements, training or other qualifications for all others, including those specified in Paragraph 13.02.A and their employees, than Contractor sets forth for comparable activity and responsibility of Contractor, Subcontractors, and Suppliers and their respective employees.

SC-9.03 *Project Representative*

SC-9.03 Add the following new paragraphs immediately after Paragraph 9.03.A:

- B. The Resident Project Representative (RPR) will be Engineer's employee or agent at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions. RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall be only through or with the full knowledge and approval of Contractor. The RPR shall:

1. *Schedules:* Review the progress schedule, schedule of Shop Drawing and Sample submittals, and schedule of values prepared by Contractor and consult with Engineer concerning acceptability.
2. *Conferences and Meetings:* Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences and other project-related meetings, and prepare and circulate copies of minutes thereof.
3. *Liaison:*
  - a. Serve as Engineer's liaison with Contractor, working principally through Contractor's authorized representative, assist in providing information regarding the intent of the Contract Documents.
  - b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
  - c. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.
4. *Interpretation of Contract Documents:* Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.
5. *Shop Drawings and Samples:*
  - a. Record date of receipt of Samples and approved Shop Drawings.
  - b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.
6. *Modifications:* Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.
7. *Review of Work and Rejection of Defective Work:*
  - a. Conduct on-Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.
  - b. Report to Engineer whenever RPR believes that any part of Contractor's work in progress will not produce a completed Project that conforms generally to the Contract Documents or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of work in progress that RPR believes should be

corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.

8. *Inspections, Tests, and System Startups:*

- a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.
- b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.

9. *Records:*

- a. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.
- b. Maintain records for use in preparing Project documentation.

10. *Reports:*

- a. Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the progress schedule and schedule of Shop Drawing and Sample submittals.
- b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.
- c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, damage to property by fire or other causes, or the discovery of any Hazardous Environmental Condition.

11. *Payment Requests:* Review Applications for Payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the schedule of values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.

12. *Certificates, Operation and Maintenance Manuals:* During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Specifications to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.

13. *Completion:*

- a. Participate in a Substantial Completion inspection, assist in the determination of Substantial Completion and the preparation of lists of items to be completed or corrected.
- b. Participate in a final inspection in the company of Engineer, Owner, and Contractor and prepare a final list of items to be completed and deficiencies to be remedied.
- c. Observe whether all items on the final list have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the Notice of Acceptability of the Work.

C. The RPR shall not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including “or-equal” items).
2. Exceed limitations of Engineer’s authority as set forth in the Contract Documents.
3. Undertake any of the responsibilities of Contractor, Subcontractors, Suppliers, or Contractor’s superintendent.
4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor’s work unless such advice or directions are specifically required by the Contract Documents.
5. Advise on, issue directions regarding, or assume control over safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.
8. Authorize Owner to occupy the Project in whole or in part.

SC-9.11 Following Paragraph 9.10.A add the following:

SC-9.11 Engineer/Designer Coordination

A. The Engineer shall call for the services of the Designer in the following activities:

1. When, in the opinion of the Engineer, the Engineer does not have sufficient knowledge to perform the review, performing technical reviews of shop drawings, product data and samples, after the Engineer has reviewed and deemed them acceptable for a detailed review.
2. Interpreting the intent of the Contract Documents, when in the opinion of the Engineer, the intent is not apparent.

3. Reviewing proposed change orders, when such changes may affect the intent of the original design.
  4. Responding to the Contractor's Requests for Information, when in the opinion of the Engineer, the Engineer does not have sufficient knowledge to respond to the request.
  5. Reviewing changes to the Project, which have first been reviewed and recommended by the Engineer for acceptance, as to their effect on the intent of the original design.
  6. Performing a final pre-start-up inspection.
  7. Observing the final testing and start-up of the Project.
  8. Determining that the Project is ready for final acceptance.
  9. Performing technical reviews of operation and maintenance manuals, after the Engineer has reviewed and deemed them acceptable for a detailed review.
  10. Attending progress meetings at the request of the Owner or Engineer.
- B. The Engineer shall provide the Designer with the following:
1. Minutes of all meetings between the Engineer and Contractor.
  2. An updated Schedule of Submittals, as prepared by the Contractor.
  3. A copy of all the Engineer's responses to Requests for Information.
- C. All communication between the Designer and the Contractor shall go through the Engineer. There shall be no duties or responsibilities between the Contractor and Designer.
- D. The Owner shall decide all conflicts between the Engineer and Designer when the conflicts are based on opinion or interpretation of the Contract Documents.

SC-12.03 *Delays*

- SC-12.03. C. Add the following paragraphs to the end of Paragraph 12.03.C:
1. If the basis exists for an extension of time in accordance with Paragraphs 12.03.A. and 12.03.C. of the General Conditions, an extension of time on the basis of weather may be granted only for the number of Weather Delay Days in excess of the number of days listed as the Standard Baseline for that month.
  2. The Owner has reviewed weather data available from the National Oceanic and Atmospheric Administration (NOAA) and determined a Standard Baseline of average climatic range for Gwinnett County, Georgia. Standard Baseline is as follows:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
14	14	10	7	6	3	4	2	2	3	5	9

3. Standard Baseline shall be regarded as the normal and anticipatable number of calendar days for each month during which construction activity shall be expected to be prevented and/or suspended by cause of adverse weather. Suspension of construction activity for the number of days each month, as listed in the Standard Baseline, is included in the Work and is not eligible for extension of Contract Time.
4. Adverse weather is defined as the occurrence of one or more of the following conditions, which prevents exterior construction activity or access to the site within twenty-four (24) hours:
  - a. Precipitation (rain, snow, or ice) in excess of one-tenth inch (0.10”) liquid measure,
  - b. Temperatures which do not rise above 32 degrees F by 10:00 a.m., local time,
  - c. Temperatures which do not rise above that specified for the day’s construction activity by 10:00 a.m., local time, if any is specified,
  - d. Sustained wind in excess of twenty-five (25) m.p.h.
  - e. Standing snow in excess of one inch (1.00”).
5. Adverse weather may include, if appropriate, “dry-out” or “mud” days:
  - a. For rain days above the Standard Baseline
  - b. Only if there is a hindrance to site access or site work, such as excavation, backfill, and footings; and,
  - c. At a rate no greater than one (1) make-up day for each day, or consecutive days, of rain beyond the Standard Baseline that total one inch (1.00”) or more, liquid measure, unless specifically recommended otherwise by the Engineer.
6. A Weather Delay Day may be counted if adverse weather prevents work on the project for fifty percent (50%) or more of the Contractor’s scheduled work day, including a weekend day(s), if Contractor has approved, scheduled construction activity that day.
7. Contractor shall take into account that certain construction activities are more affected by adverse weather and seasonal conditions than other activities, and that “dry-out” or “mud” days are not eligible to be counted as Weather Delay Day until the Standard Baseline is exceeded. Hence, Contractor should allow for an appropriate number of additional days associated with the Standard Baseline days



in which such applicable construction activities are expected to be prevented and suspended. If the project includes construction of a building, no extension will be made for days of adverse weather occurring after building is “dried in”.

8. Use a copy of the Weather Delay Monthly Report found in the Specifications General Requirements Section 01 00 00, Paragraph 3.45.B., indicating for each calendar month, the days on which construction activity affecting the critical path of the Work was prevented by adverse weather conditions, as outlined in Paragraph 12.03.C.4. Mark the column for the general cause; and under “Specific Description”, indicate corresponding measurement of precipitation, temperature, wind, or other influencing factors, and list the construction activity that was scheduled and delayed. At the end of the month, at the bottom of the form, add up the number of delay days and enter in the box next to row “(a)”, enter the Standard Baseline days for that corresponding month in the box next to row “(b)”. Subtract row (b) value from row (a) value and enter that value in the last box next to “Claimable Days”, enter **-0-**, if a negative number. Submit a copy of the completed Weather Delay Monthly Report with the next application for payment and with subsequent claim for Time Extension. Claims for time extension based upon weather delays will be denied if a submitted Report does not corroborate the claim, or if no report was submitted when it was required in accordance with this paragraph.
9. Submit daily jobsite logs showing which, and to what extent, construction activities have been affected by weather on a monthly basis.
10. To support claim for time extension, submit actual weather data obtained from nearest NOAA weather station, or other independently verified source approved by Owner’s representative at beginning of the project.
11. Use Standard Baseline data provided in Paragraph 12.03.C.2, when documenting actual delays due to adverse weather in excess of the average climatic range.
12. Organize claim and documentation to facilitate evaluation on a basis of calendar month periods, and submit in accordance with the procedures for Claims established in Articles 12.02 and 10.05 of the General Conditions.
13. If an extension of the Contract Time is appropriate, it shall be implemented in accordance with the provisions of Articles 8.07, 10.03, 10.05, and 12.02 of the General Conditions.

SC-14-02.A.1 Following this Paragraph add the following:

- a. “Other documentation” shall be accepted only if a written price quote from the vendor is submitted with the Application for Payment and the bill of sale and/or invoice stating that the actual amount paid by the Contractor is submitted within 30 days of the Application for Payment.

SC-14.02 Progress Payments

SC-14.02.A.3.b Delete 14.02.3.b in its entirety and replace with the following:

- b. The Owner shall retain an amount not exceeding five percent (5%) of the gross value of the completed work as may be provided for in the contract.

SC-14.02.D. *Reduction in Payment:*

SC-14.02.D After paragraph 14.02.D. 4.b, add the following:

- d. The following rates or most current rates will apply for the additional services performed by the Engineer on behalf of the Owner:

<u>Labor Grade</u>	<u>Rate</u>
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N/A	
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SC-ARTICLE 17 – MISCELLANEOUS

SC-17.09 After 17.09 add the following:

17.10 *Delinquent Contractors*

- A. The Owner shall not pay any claim, debt, demand or account whatsoever to any person firm or corporation who is in arrears to the Owner for taxes. The Owner shall be entitled to a counterclaim and offset for any such debt in the amount of taxes in arrears, and no assignment or transfer of such debt after the taxes become due shall affect the right of the Owner to offset any taxes owed against said debt.

## Part 1 General

### 1.1 Summary

- A. Section includes provisions which are not addressed elsewhere in the Contract Documents.
- B. Where so stated in these Contract Documents, GCDWR shall mean the Gwinnett County Department of Water Resources.

### 1.2 Contractor's Readiness

- A. Contractor shall provide labor, equipment, and materials as needed to assist GCDWR with the scope of work as determined by GCDWR. It will be GCDWR's sole decision as to the extent of the Work and the total scope for each project. During the contract period, the Contractor shall maintain sufficient local presence and personnel, equipment, general construction-related supplies, and materials to provide an effective workforce for performing and completing up to two concurrent projects. The Contractor shall mobilize for an assigned project within 14 days of Notice to Proceed, unless otherwise directed by GCDWR.

### 1.3 Buildings and Shanties

- A. No provision shall be allowed for employee housing during the Work on land owned or leased by GCDWR, unless a permit is secured in writing from GCDWR. Should permission be asked and granted, the Contractor shall comply with all regulations regarding the construction and maintenance of such buildings.

### 1.4 Emergency Response

- A. The Contractor shall respond within four hours to any emergency that may arise in connection with the Work on a twenty-four hour per day, seven days per week basis. Should GCDWR maintenance forces be called upon by GCDWR to rectify a problem created by the Contractor, the Contractor shall be responsible for all costs incurred by GCDWR, plus twenty-five percent. This charge is subject to change depending upon the severity of the emergency and will be determined by GCDWR.

### 1.5 Intoxicating Substances

- A. The Contractor shall neither permit nor suffer the introduction or use of intoxicating substances, such as but not limited to, alcohol or illegal drugs upon or about the Work jobsite.

### 1.6 Lighting

- A. Adequate lighting, whether natural or artificial, shall be provided and maintained during periods of Work. Contractor shall provide adequate lighting for safety and

performance of construction operations and provide the necessary safety and other facilities required for work during normal working hours and for work at night.

## 1.7 Measures and Weights

- A. Whenever so requested or as deemed necessary by GCDWR, the Contractor shall provide accurate scales, adequate equipment, and the necessary assistance for weighing and/or measuring materials for the installed Work as specified. It is understood and agreed that a “ton” shall mean the short ton of two thousand pounds.
- B. Bulk Density: When not specified otherwise by these Specifications or specified by a referenced standard, the bulk density for payment and other purposes shall be 165 pounds per dry cubic foot for all classified stone.

## 1.8 Roadway Right-Of-Way, Working Facilities, And Easements

- A. GCDWR will designate available parking, access, and staging areas on a per-project basis. Should the Contractor desire or require expanding the limits of Work, written request must be submitted to GCDWR detailing space required and information substantiating need for additional space.

## 1.9 Sound Attenuation

- A. The Contractor shall, during the course of the Work, comply with Gwinnett County Noise Ordinance unless these Specifications provide a stricter standard, in which case the stricter provision shall govern.
- B. Work operations, machinery, equipment, and material handling shall be performed in such a manner as to avoid and eliminate unnecessary noise. Noise deemed unacceptable by GCDWR shall be immediately terminated.
- C. See Section 01 50 00, Article 1.11.

## 1.10 Use of Streets

- A. Access: During the progress of the Work, the Contractor shall make ample provisions for both vehicular and foot traffic on public roadways except during periods of road closures approved by GCDWR. The Contractor shall provide free access to all driveways, fire hydrants, water and gas valves, and other similar features, located along the line of Work. Gutters and waterways must be kept open or other provisions made for the removal or conveyance of stormwater.
- B. Street intersections may not be blocked, except for one-half the roadway at any given time, and the Contractor shall install and maintain temporary driveways, bridges, and crossings, such as in the opinion of GCDWR are necessary to reasonably accommodate the public.
- C. Streets shall not be entirely blocked, and the Contractor must limit its operations as to provide, at all times, a minimum of one suitable unobstructed and well-maintained

lane for traffic on all improved streets. The Contractor shall install and maintain temporary driveways, bridges, crossings, and roadways, or detours as in the opinion of GCDWR are necessary to reasonably accommodate the public and/or for Work operations of adequate thickness, width, and proper drainage suitable for traffic at no cost to GCDWR.

- D. Traffic Control: Adequate signs, barricades, and lights, in accordance with the standards of the GDOT and the FHWA Manual on Uniform Traffic Control Devices (MUTCD), most recent edition, necessary to protect the public shall be provided.
- E. Flaggers to direct traffic shall be employed continuously during periods when only one-way traffic can be maintained or when equipment is operated back and forth across the pavement areas.
  - 1. All flaggers shall meet the requirements of the MUTCD and shall have received training and certification from either the National Safety Council or the American Traffic Safety Services Association (ATSSA).
  - 2. Flaggers shall utilize two-way radios, field telephones, or pilot vehicles when not within sight distance of each other, or when directed by GCDWR.
  - 3. Flagger's appearance and equipment shall meet the requirements of the MUTCD and GDOT Special Provision 150.3.07.C
- F. Roadway disturbances shall not be left unfilled overnight, except in emergencies, and in such cases adequate precautions shall be exercised to protect traffic.
- G. Procedural Rules: Work in roads shall be in accordance with the rules and regulations of the controlling agency.
- H. In the event of the Contractor's failure to comply with these provisions, GCDWR may cause the same to be done, and shall deduct the cost of such Work from any monies due or to become due the Contractor under this agreement, but the performance of such Work by GCDWR or at its insistence, shall serve in no way to release the Contractor from their general or particular liability for the safety of the public or of the Work.

## 1.11 Utility Relocations or Modifications

- A. Should, in the course of the Work, a need arises to relocate or modify a portion of GCDWR's existing piping system, the Contractor shall immediately notify GCDWR for approval to proceed with such Work in accordance with the Contract Documents, or as directed by GCDWR. Removal of the existing piping system shall include, but not be limited to, the removal of its bulkheads, thrust restraints, piping appurtenances, concrete, and/or masonry that was exposed by excavation in part or whole, except for tie-rods beyond the limits of trenching. Without exception, any part of an existing restraint system relevant to the remaining existing piping system shall remain and be supplemented with additional restraint to maintain an unimpaired piping system. The cost for such Work shall be as stipulated by the Prices in the Unit Price Schedule, for the various items of the Work or by Change Order.

## 1.12 Water Supply

- A. GCDWR will make available, at no cost to the Contractor, all water required to execute the Work. The Contractor shall be responsible for identifying the potential sources of the water, the retrieval, transport, and delivery of such water with all means to protect and maintain the integrity of GCDWR water system at its own cost in accordance with all applicable rules and regulations. When water is required for the Work, the Contractor shall obtain a hydrant water meter from GCDWR Customer Service. The Contractor shall submit a monthly hydrant usage report, not later than the 2nd of each month including details of all water usage for tracking purposes.

## Part 2 Products

(Not Used)

## Part 3 Execution

(Not Used)

END OF SECTION

## Part 1 General

### 1.1 Work Covered by Contract Documents

- A. The Work to be performed under this Contract shall consist of furnishing all labor, materials, tools, equipment, and incidentals and performing all work required for watershed improvement projects in a complete and functioning manner including the following Work:
1. Furnish and install all necessary in-stream structures, riparian plantings, pipes, structures, and appurtenances to complete the Work, or as directed by GCDWR.
  2. Perform the necessary baseflow dewatering or temporary diversion for execution of the Work, while allowing baseflow to continue through the watershed improvement project and around the work area. Baseflow discharge will be provided in the Contract Documents.
  3. Backfill, compact, and stabilize all Work within roadways in compliance with the Contract Documents.
  4. Clear easements as necessary for installation, maintenance, repair, and/or rehabilitation of the watershed improvement project and maintain erosion control measures throughout the duration of the project.
  5. Restore all disturbed areas including roadways, driveways, parking areas, curbs, curb and gutter, sidewalks, yards, ornamental plantings, etc.
  6. Install and maintain timber mats in and out of the right-of-way to protect assets, such as curb and gutter, during construction.
  7. Maintain traffic throughout the duration of construction.
  8. Clean-up the project work area and return the area to its preconstruction conditions.
  9. Furnish and provide all other labor, materials, equipment, and other incidentals required to complete the Work as shown on the Drawings or otherwise specified in the Contract Documents.

### 1.2 Scheduling and Sequence of Work

- A. Furnish, install and maintain erosion control measures.
- B. Positive drainage for existing stormwater conveyance systems must remain in service throughout the duration of the Work. Provide dewatering or temporary diversion(s) as required.

- C. Construct the Work as indicated on the Contract Drawings.
- D. Once the Contractor has successfully completed construction, the Work is in service, and all disturbed areas have been restored, then the erosion control measures may be removed.

### 1.3 Use of Premises

- A. Confine operations at the site to areas permitted by law, ordinances, permits, and Contract Documents.
- B. Do not unreasonably encumber premises with materials and equipment.
- C. Maintain the premises in clean and safe conditions at all times.
- D. Maintain access for emergency service personnel and school bus traffic at all times during construction.
- E. If Contractor operations will block driveway access for residents or other property or facility users, the Contractor shall notify GCDWR so that GCDWR can notify the residents/users in advance to allow for removal of vehicles. The Contractor shall also maintain, on-site, suitable steel plates for use in allowing vehicle access across open trenches and place plates as required allowing vehicular traffic to pass.
- F. Provide access to/for GCDWR's authorized persons and the police, fire, or other departments having legal jurisdiction to the site always and provide cooperation in their work.

### 1.4 Communication

- A. All communications from Contractor shall be documented in writing. Use prescribed forms as required by GCDWR or by email.

## Part 2 Products

(Not Used)

## Part 3 Execution

(Not used)

END OF SECTION



## Part 1 General

### 1.1 Summary

- A. This section provides an overview for the basis for determining payment. Payment shall be made for each Pay Item based on the description in this section and in accordance with its relevant specification sections.
- B. The Unit Price Schedule lists each item for which payment will be made. No payment will be made for any items other than those listed in the Unit Price Schedule.
- C. Prices included on the Unit Price Schedule shall be full compensation for all materials, labor, equipment, tools, construction equipment and machinery, materials testing, utilities, mobilization, demobilization, transportation, taxes, overhead, markup, incidentals, and services necessary for the execution and completion of the Work in the Contract Documents to be performed under this Contract. For the Work described, the unit price, actual used and complete in-place quantities of each Unit Price Item shall be measured in the field and confirmed by GCDWR, upon completion of construction in the manner set forth for each item in this and other sections of the Specifications. Payment for all items listed on the Unit Price Schedule will constitute full compensation for all Work shown and specified to be performed.
- D. The Contractor shall assist and fully cooperate with GCDWR to determine proper measurement for each item providing complete and reasonable backup documentation as requested by GCDWR to substantiate payment due.
- E. Any and all work required to complete the Work called for in the Contract Documents shall be included in the various Unit Price Items whether or not such work is specifically called for, including furnishing all labor, equipment, tools and materials, which are not furnished by GCDWR, and performing all operations required to complete the Work satisfactorily in place as specified and as indicated on the Drawings. The individual Unit Price Item descriptions are not exhaustive and do not detail each specific item needed to complete the Work of that Unit Price Item. Any necessary labor, materials, equipment, tools, appurtenances, or other items not mentioned but required to complete the Work shall be considered incidental to Contract, and as such, shall be included in the appropriate Unit Price Item prices.

### 1.2 Descriptions

- A. Measurement of an item of work will be by the unit indicated in the Unit Price Schedule.
- B. Final payment quantities may be determined in part from the record drawings. The record drawing lengths, dimensions, and quantities shall be determined by a survey after the completion of all required work. Said survey shall conform to Section 01 78 39 – Project Record Documents of these Specifications. The precision of final payment quantities shall match the precision shown for that item in the Unit Price Schedule.

- C. Payment will be made by extending unit prices multiplied by quantities provided and then summing the extended prices to reflect actual work. Such price and payment shall constitute full compensation to the Contractor for furnishing all plant, labor, equipment, tools, and materials not furnished by GCDWR, and for performing all operations required to provide to GCDWR the entire Project complete in place as specified and as indicated on the Drawings.
- D. "Products" shall mean materials or equipment permanently incorporated into the work.

### 1.3 Pay Items

- A. Pay Items 01 through 178 as described herein and in the respective specification sections, together with any supplemental pay items that may also be included, comprise the Total Base Price as listed on the Unit Price Schedule.

### 1.4 Partial Payments

- A. Partial payment(s) may be made for a partially-completed unit price item.
- B. Partial payment shall only be made when the partial units are completed. For example, if 100 linear feet (LF) of a 200-LF long stormwater conduit has been installed, payment will only be made if the 100 linear has been installed, properly bedded and backfilled, and that portion otherwise completed in accordance with the applicable specification.

### 1.5 Payment for Labor and Materials for Owner-approved work related to unforeseen field conditions or specialized project-required items.

- A. Payment for Labor and Materials for Owner-approved work related to unforeseen field conditions or specialized project-required items at cost plus [maximum ten percent (10%)].
- B. Gwinnett County will reimburse equipment rentals (if required) at cost only, no markup allowed. All equipment rentals require preapproval by County staff.
- C. Materials and parts shall be new, of a quality conforming to current engineering and manufacturing standards, free of defects, and suitable for the intended use.
- D. The County reserves the right to provide materials, parts, and supplies for any authorized work item.
- E. Any material purchased by the Contractor and not used shall be returned to the appropriate County representative.
- F. Materials required will be listed on the invoice and charged at the stated percentage mark-up over Contractor's cost.
- G. The Contractor agrees to provide documentation of costs for parts and materials upon

request.

- H. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 178.

## 1.6 Bid Items – Division 01: General Requirements

- A. PAY ITEM 01 - ORANGE BARRIER FENCING: Specification 01 56 26, Temporary Fencing

1. Method of Measurement: Orange barrier fence shall be measured for the actual linear feet installed, measured as installed in place along the bottom of the fence or as directed by GCDWR.
2. Basis of Payment:
  - a. The unit price shall include all labor, equipment, and materials necessary for furnishing, placing, maintenance, removal, inspection, monitoring, and reporting on the erosion and sedimentation controls.
  - b. No additional payment shall be made for maintenance or replacement of orange barrier fence.

- B. PAY ITEM 02 – TEMPORARY CHAIN LINK FENCING: Specification 01 56 26 Temporary Fencing

1. Method of Measurement: Temporary chain link fencing shall be measured for the actual linear feet installed, measured as installed in place along the bottom of the fence from the outside of end posts for each continuous run of fence or as directed by GCDWR.
2. Basis of Payment:
  - a. The unit price shall include all labor, equipment, and materials necessary for furnishing, placing, maintenance during construction, removal, and incidentals required to complete the Work.
  - b. No additional payment shall be made for maintenance or replacement of temporary chain link fencing.

- C. PAY ITEM 03: TEMPORARY WELDED WIRE FENCING: Specification 01 56 26 Temporary Fencing

1. Method of Measurement: Temporary welded wire fencing shall be measured for the actual linear feet installed, measured as installed in place along the bottom of the fence from the outside of end posts for each continuous run of fence or as directed by GCDWR.

2. Basis of Payment:

- a. The unit price shall include all labor, equipment, and materials necessary for furnishing, placing, maintenance during construction, removal, and incidentals required to complete the Work.
- b. No additional payment shall be made for maintenance or replacement of temporary welded wire fencing.

## 1.7 Bid Items – Division 02: Existing Conditions

A. PAY ITEM 04 – BENTONITE: Specification 02 32 19, Exploratory Excavation

B. Method of Measurement:

1. Bentonite shall be measured for payment by the number of pounds installed based on weighted delivery tickets or bag labels and complete in place as shown on the Contract Documents or as directed by GCDWR.
2. Bentonite placed beyond the limits defined in the Contract Documents will not be included in the measurement for payment, unless GCDWR directs or has directed placement beyond limits.

C. PAY ITEM 05 – PARTIAL DEPTH PAVEMENT REMOVAL (MILLING): Specification Section 02 41 13, Selective Site Demolition

1. Method of Measurement:

- a. Partial Depth Asphalt Pavement removal shall be measured for the actual cubic yards of pavement removed from the site and disposed of at an inert waste disposal facility or at a recycling facility.
- b. Any damage or replacement beyond the specified limits of these items shall be the responsibility of the Contractor and shall not be measured for payment. No additional payment will be made for removal of temporary pavement, and the cost thereof shall be considered as being incidental to the Work of this Contract.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all necessary tools, equipment, labor, including saw cuts, and materials to remove, handle, load, dispose, and backfill as necessary to fill voids left by pavement to complete the Work.
- b. Payment will not be approved without submission of GCDWR approved Disposal Ticket from an inert waste disposal facility or recycling facility and Vehicle Capacity Certification.

D. PAY ITEM 06 – FULL DEPTH PAVEMENT REMOVAL: Specification Section 02 41 13, Selective Site Demolition

1. Method of Measurement:

- a. Full Depth Asphalt Pavement removal shall be measured for the actual cubic yards of pavement removed from the site and disposed of at an inert waste disposal facility or at a recycling facility.
- b. Any damage or replacement beyond the specified limits of these items shall be the responsibility of the Contractor and shall not be measured for payment. No additional payment will be made for removal of temporary pavement, and the cost thereof shall be considered as being incidental to the Work of this Contract.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all necessary tools, equipment, labor, including saw cuts, and materials to remove, handle, load, dispose, and backfill as necessary to fill voids left by pavement to complete the Work.
- b. Payment will not be approved without submission of GCDWR approved Disposal Ticket from an inert waste disposal facility or recycling facility and Vehicle Capacity Certification.

E. PAY ITEM 07 – CONCRETE PAVEMENT REMOVAL: Specification Section 02 41 13, Selective Site Demolition

1. Method of Measurement:

- a. Concrete Pavement removal shall be measured for the actual cubic yards of pavement removed from the site and disposed of at an inert waste disposal facility or at a recycling facility.
- b. Any damage or replacement beyond the specified limits of these items shall be the responsibility of the Contractor and shall not be measured for payment. No additional payment will be made for removal of temporary pavement, and the cost thereof shall be considered as being incidental to the Work of this Contract.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all necessary tools, equipment, labor, including saw cuts, and materials to remove, handle, load, dispose, and backfill as necessary to fill voids left by pavement to complete the Work.
- b. Payment will not be approved without submission of GCDWR approved Disposal Ticket from an inert waste disposal facility or recycling facility

and Vehicle Capacity Certification.

F. PAY ITEM 08 – REMOVAL OF EXISTING CURB OR CURB AND GUTTER, ANY TYPE: Specification Section 02 41 13, Selective Site Demolition

1. Method of Measurement:

- a. Curb and Gutter removal shall be measured for the actual linear feet of curb and gutter removed from the site and disposed of at an inert waste disposal facility or at a recycling facility.
- b. Any damage or replacement beyond the specified limits of these items shall be the responsibility of the Contractor and shall not be measured for payment. No additional payment will be made for removal of temporary pavement, and the cost thereof shall be considered as being incidental to the Work of this Contract.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all necessary tools, equipment, labor, including saw cuts, and materials to remove, handle, load, dispose, and backfill as necessary to fill voids left by curb and gutter to complete the Work.
- b. Payment will not be approved without submission of GCDWR approved Disposal Ticket from an inert waste disposal facility or recycling facility and Vehicle Capacity Certification.

G. PAY ITEM 09 – REMOVAL OF EXISTING STORMWATER DRAINAGE PIPE, SEPARATE TRENCH: Specification Section 02 41 13, Selective Site Demolition

1. Method of Measurement:

- a. The removal of existing pipe shall be measured by the actual linear feet of pipe.
- b. No separate measurement shall be made for the removal of stormwater drainage pipe where replacement storm drain is proposed along the same alignment.
- c. No separate measurement shall be made for the abandonment of existing stormwater drainage pipe – in-place.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all types and sizes removed shall include all necessary tools, equipment, labor, and materials to remove, backfill, load, handle, haul away, and dispose to complete the Work.

- b. The unit price shall include compensation for excavation to depths of four (4) feet to the crown of the stormwater drainage pipe to be removed. Excavation beyond this depth shall be eligible for separate payment per Part 3.15 of Section 31 23 00 Excavation and Fill.
  - c. Payment will not be approved without submission of GCDWR-approved Disposal Ticket from the waste disposal facility or recycling facility.
  - d. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 9A through 9D.
  - e. The work performed and materials furnished in accordance with the removal of stormwater drainage pipe where replacement storm drain is proposed along the same alignment are subsidiary to the installation of proposed Stormwater Gravity Pipe and shall be incidental to the Unit Price per linear foot of pipe complete in place and the Unit Price per cubic yard of inert waste removed from the Site per Sections 02 42 00 and 33 42 11. No other compensation will be allowed.
  - f. Flowable fill used for abandonment of existing stormwater drainage pipe – in place shall be measured for payment under the applicable Unit Price Item for Flowable Fill as described in Section 31 23 23.33 – Flowable Fill.
- H. PAY ITEM 10 – REMOVAL OR ABANDONMENT OF EXISTING DRAINAGE STRUCTURES: Specification Section 02 41 13, Selective Site Demolition
- 1. Method of Measurement: The removal or abandonment of existing drainage structures shall be measured by each actual structure removed or abandoned in-place. There will be no additional payment for excavating and backfilling of existing drainage structures that are removed.
  - 2. Basis of Payment:
    - a. The unit price shall be compensation in full for all necessary tools, equipment, labor, materials, and incidentals to remove, backfill, load, handle, haul away, and dispose or abandon existing drainage structures to complete the Work.
    - b. Payment will not be approved without submission of GCDWR approved Disposal Ticket from the waste disposal facility or recycling facility.
    - c. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 10A through 10F.
- I. PAY ITEM 11 – FENCE REMOVAL: Specification Section 02 41 13, Selective Site Demolition
- 1. Method of Measurement: Fence removal shall be measured for the actual linear feet removed, measured along the bottom of the existing fence from the outside of end posts for each continuous run of fence or as directed by GCDWR.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, and incidentals necessary to remove posts, fasteners, tie wire, wire fabric, and trench wire fabric as directed by GCDWR.
- b. Payment shall be for all removal of fencing including loading and haul off.
- c. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 11A through 11D.
- d. Pre-existing silt fence removal is addressed in Section 02 42 00 – Removal of Surplus and Waste Material.

J. PAY ITEM 12 – SELECTIVE TREE REMOVAL (Per Tree and Daily Rate):  
Specification Section 02 41 13, Selective Site Demolition

1. Method of Measurement:

- a. Selective tree removal shall be measured per tree or daily rate as described in the Contract Documents or as directed by GCDWR.
- b. Selective tree removal shall be measured by the number of trees removed per each size classification shown on the Unit Price Schedule.
- c. Selective tree removal daily rate shall be measured for each half day (up to four hours) or full day (more than four hours within a calendar day) for which selective tree removal was performed, as designated by GCDWR.
  - 1) Duration of selective tree removal shall be measured using the designated crew's working hours, not as a sum of the individual members' hours within the crew. For the purposes of payment, a crew shall consist of at least three persons performing work on such assignment.
  - 2) Selective tree removal outside of the limits of the designated tree removal area where selective tree removal was performed without prior approval by GCDWR shall not be included in measurement for payment and the Contractor may be responsible for replacement/restoration at their expense.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all necessary tools, labor, equipment, materials, handling, on-site and off-site hauling, and incidentals necessary to complete the Work. All selective tree removal debris shall be removed, loaded, hauled away, and disposed off-site. Any removal of vegetative debris associated with this activity will be considered incidental to the cost of this activity.



- b. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 12A through No. 12F.
- K. PAY ITEM 13 – STUMP GRINDING: Specification Section 02 41 13, Selective Demolition
- 1. Method of Measurement: Stump grinding shall be measured in accordance with the number of stumps ground per each size classification shown on the Unit Price Schedule.
  - 2. Basis of Payment:
    - a. The unit price shall be compensation in full for all necessary tools, labor, equipment, and materials required to grind the stump, waste removal from the site, and all other incidentals required to complete the Work.
    - b. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 13A through No. 13C.
- L. PAY ITEM 14 – SOLID WASTE DISPOSAL: Specification 02 42 00, Removal of Surplus and Waste Material
- 1. Method of Measurement:
    - a. Solid waste disposal shall be measured for the actual weight in tons removed from the site.
    - b. Material generated from fencing removal activities are not eligible for measurement under this pay item.
    - c. Quantities eligible for payment includes those quantities which are disposed of as recycled material as defined above.
    - d. No additional payment shall be made for removal of materials considered as being removed, loaded, hauled away, and disposed under other Pay Items.
    - e. No payment will be made for disposal of surplus material, whether disposed of as inert waste, solid waste, recycled material or salvaged for Contractor.
    - f. No payment will be made for the disposal of any material that is salvaged for Contractor.
  - 2. Basis of Payment:
    - a. The unit price shall be compensation in full for all necessary tools, equipment, labor, and materials to remove, handle, load, haul away, dispose, and backfill as necessary to fill voids left by waste to complete the Work.

- b. Payment will not be approved without submission of GCDWR approved Disposal Ticket from solid waste disposal facility.
- M. PAY ITEM 15 – INERT WASTE DISPOSAL: Removal of Surplus and Waste Material, Specification 02 42 00
- 1. Method of Measurement:
    - a. Inert waste disposal shall be measured for the actual cubic yards removed from the site and shall be measured at the time of haul away.
    - b. Handling and disposal of waste associated with other site clearing pay items is not included in the measurement for this pay item and shall remain separated at all times from the inert waste to be measured under this pay item.
    - c. Material generated from excavation and fill activities are not eligible for measurement under this pay item.
    - d. Material generated from pavement removal and stormwater drainage pipe and structure removal are not eligible for measurement under this pay item.
    - e. Quantities eligible for payment include those quantities which are disposed of as recycled material as defined above.
    - f. No additional payment shall be made for removal of materials considered as being removed, loaded, hauled away, and disposed under other Pay Items.
    - g. No payment will be made for disposal of surplus material, whether disposed of as inert waste, solid waste, recycled material or salvaged for Contractor.
    - h. No payment will be made for the disposal of any material that is salvaged for Contractor.
  - 2. Basis of Payment:
    - a. The unit price shall be compensation in full for all necessary tools, equipment, labor, and materials to remove, handle, load, haul away, dispose, and backfill as necessary to fill voids left by waste to complete the Work.
    - b. Payment will not be approved without submission of Vehicle Capacity Certifications.
    - c. Payment will not be approved without submission of Disposal Ticket from inert waste disposal facility and GCDWR approval thereof.

## 1.8 Bid Items – Division 03: Concrete

### A. PAY ITEM 16 – CONCRETE STRUCTURES, CAST-IN-PLACE, INCLUDING REINFORCING STEEL: Specification 03 30 00, Cast-In-Place Concrete

1. Method of Measurement: Cast-in-place concrete structures with reinforcing steel shall be measured per cubic yard of each separate class of concrete installed, complete-in-place.
2. Basis of Payment:
  - a. The Unit Price for cast-in-place concrete structures shall include excavation, backfill, concrete, reinforcing steel, gates, covers, steps as applicable, materials testing, and all other labor, materials, equipment, and other incidentals required to complete the Work.
  - b. Costs associated with this activity shall be included in the Unit Price Schedule, Pay Item No. 16A through No. 16D.

### B. PAY ITEM 17 – FLAT WORK CONCRETE, CAST-IN-PLACE: Specification 03 30 00, Cast-In-Place Concrete

1. Method of Measurement:
  - a. Cast-in-place concrete structures shall be measured per cubic yard of each separate class of concrete installed, complete-in-place.
  - b. Sidewalks shall be measured for payment in accordance with Section 32 16 00 – Curbs, Gutters, and Sidewalks and shall not be included for measurement under this pay item.
  - c. Concrete flumes used for storm water conveyance shall be measured for payment in accordance with Section 33 42 30 – Storm Drain Structures and shall not be included for payment under this pay item.
2. Basis of Payment:
  - a. The Unit Price for cast-in-place concrete structures shall include excavation, backfill, concrete, reinforcing steel, gates, covers, steps as applicable, materials testing, and all other labor, materials, equipment, and other incidentals required to complete the Work.
  - b. Costs associated with this activity shall be included in the Unit Price Schedule, Pay Item No. 17A through No. 17D.

### C. PAY ITEM 18 – GROUTING (NON-PRESSURE): Specification 03 62 00, Non-Shrink Grouting

1. Method of Measurement: Grouting shall be measured per cubic yard of material

placed as directed by GCDWR, measured to the nearest tenth (0.1) cubic yard.

2. Basis of Payment:

- a. The Unit Price shall include furnishing and placing grouting and all other labor, materials, equipment, and incidentals required to complete the Work.
- b. No additional payment shall be made under this item for grouting of new stormwater pipe connections to new or existing storm drainage structures.

## 1.9 Bid Items – Division 05: Metals

A. PAY ITEM 19 – GALVANIZED METAL RAILING: Specification Section 05 52 00, Metal Railings

1. Method of Measurement: Measurement shall be made using the actual of linear feet of railing installed and accepted into the final Work, as measured along each top rail, mid rail, and bottom rail installed, as specified in the Contract Documents, or as directed by GCDWR.
2. Basis of Payment:
  - a. The unit price shall be compensation in full for the work and shall include shop assembly, fabrication, galvanizing, touch up painting, delivery, stockpiling for installation and the furnishing of all materials, labor, tools, and appliances necessary to complete the Work as herein specified, shown, or ordered. Included shall be any costs of furnishing necessary work beyond the limits of measurement as defined under these Specifications.
  - b. Included shall be the cost of paint materials where exterior coatings are specified in the Contract Documents.
  - c. The application of exterior paint coatings shall be eligible for payment as described under Specification Section 32 01 30 – Labor Rates

## 1.10 Bid Items – Division 10: Specialties

A. PAY ITEM 20 – TEMPORARY PROJECT SIGN: Specification 10 14 00, Signage

1. Method of Measurement: Project sign shall be measured per each, complete in place.
2. Basis of Payment:
  - a. The Unit Price shall include all work necessary to install the sign including, but not limited to, the purchase, delivery to the work site, onsite storage, painting, installing, cleanup, and removal.

- b. No additional payment will be made for maintenance and replacement.
  - c. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 20A through No. 20C.
- B. PAY ITEM 21 – INTERPRETIVE SIGN: Specification 10 14 00, Signage
- 1. Method of Measurement: Project sign shall be measured per each, complete in place.
  - 2. Basis of Payment:
    - a. The Unit Price shall include all work necessary to install the sign including, but not limited to, the purchase, delivery to the work site, onsite storage, painting, installing, cleanup, and removal.
    - b. No additional payment will be made for maintenance and replacement.
- C. PAY ITEM 22 – MITIGATION BOUNDARY SIGN: Specification 10 14 00, Signage
- 1. Method of Measurement: Mitigation boundary sign shall be measured per each, complete in place.
  - 2. Basis of Payment:
    - a. The Unit Price shall include all work necessary to install the sign including, but not limited to, the purchase, delivery to the work site, onsite storage, painting, installation, cleanup, and removal.
    - b. No additional payment will be made for maintenance and replacement.
- D. PAY ITEM 23 – PREFABRICATED SIGNAGE: Specification 10 14 00, Signage
- 1. Method of Measurement: Prefabricated signs shall be measured per square foot of area of the front face of the completed sign.
  - 2. Basis of Payment: The Unit Price shall include all work necessary to install the sign, including, but not limited to, purchase, delivery, onsite storage, installation, mounting, signposts, and all other labor, materials, equipment, and other incidentals required to complete the Work.
- E. PAY ITEM 24 – FISH STOCKING: Specification 10 89 01, Fish Stocking and Removal
- 1. Method of Measurement: Fish stocking shall be measured per pounds of live weight in fish stocked as defined in the Contract Documents.
  - 2. Basis of Payment:
    - a. The unit price per pound of live weight fish stocked shall include all work necessary to provide the fish, including, but not limited to the purchase,

delivery to the site, on-site storage, and delivery to the work area, placement, cleanup, labor, and equipment required to handle and provide the fish.

- b. Payment for fish stocking will not be made for completed work until Contractor has submitted to GCDWR, for approval, Record Documents of weight by species of fish stocked.

F. PAY ITEM 25 – ELECTROFISHING: Specification 10 89 01, Fish Stocking and Removal

- 1. Method of Measurement: Fish removal via electrofishing shall be measured per acre of surface area of the waterbody, or portion thereof, rounded up to the nearest half (0.5) acre.
- 2. Basis of Payment: Payment shall be compensation in full for all material, labor, equipment, tools, and incidentals necessary for removal, transport, and relocation of fish.

## 1.11 Bid Items – Division 31: Earthwork

A. PAY ITEM 26 – AGGREGATE STONE: Specification 31 05 16, Aggregates for Earthwork

- 1. Method of Measurement:
  - a. Aggregate stone shall be measured for payment by volume of stone in cubic yards, as shown on the Contract Documents or as measured in place, if GCDWR has directed or approved changes.
  - b. Classified stone placed beyond the limits defined in the Contract Documents will not be included in the measurement for payment, unless GCDWR directs or has directed placement beyond limits.
- 2. Basis of Payment:
  - a. The unit price shall be compensation in full for all tools, equipment, labor, materials, transportation, and incidentals necessary to excavate, furnish, place, compact, and maintain classified stone, as shown in Contract Documents or field ordered.
  - b. Any excavation and backfill beyond the dimensions in the Contract Documents will be considered beyond the limits of measurement and will be considered incidental to the Work.
  - c. Payment will not be approved without submission of bag labels or weighted delivery tickets.
  - d. Geotextiles shall be measured for payment as described in Section 31 32 19.16 – Geotextiles.

- e. Costs associated with this activity shall be included in the Unit Price Schedule, Pay Item No. 26A through No. 26H.
- B. PAY ITEM 27 – GEOGRID REINFORCEMENT: Specification 31 05 19.19, Geogrids and Geocells for Earthwork
- 1. Method of Measurement: Geogrid reinforcement shall be measured per square yard of geogrid material complete in place as required in the Contract Documents or otherwise directed by GCDWR.
  - 2. Basis of Payment:
    - a. The unit price shall include all labor, equipment, and materials necessary for furnishing, placing, maintenance, and inspection of geogrid reinforcement.
    - b. No additional payment shall be made for maintenance or replacement of geogrid reinforcement.
    - c. No additional payment shall be made for geogrid material placed beyond the limits shown on the Contract Documents unless directed by GCDWR.
- C. PAY ITEM 28 – GEOCELL CONFINEMENT SYSTEM, 4” CELL DEPTH: Specification 31 05 19.19, Geogrids and Geocells for Earthwork
- 1. Method of Measurement: Geocell shall be measured per square yard of geogrid material complete in place as required in the Contract Documents or otherwise directed by GCDWR.
  - 2. Basis of Payment:
    - a. The unit price shall be compensation in full for all tools, equipment, labor, materials, and incidentals necessary for furnishing, placing, anchoring, maintenance, and inspection of geocell confinement system as shown in the Contract Documents or as directed by GCDWR.
    - b. No additional payment shall be made for maintenance or replacement of geocell material.
    - c. No additional payment shall be made for geocell material placed beyond the limits shown on the Contract Documents unless directed by GCDWR.
    - d. Infill material for geocells shall be measured for payment as described in Section 31 05 16 – Aggregates for Earthwork or Section 32 91 13 – Soil Preparation under the applicable Unit Price Items.

D. PAY ITEM 29 – CLEARING AND GRUBBING, MULCH ON SITE: Specification 31 10 00, Site Clearing

1. Method of Measurement:

- a. Clearing and grubbing shall be measured per acre of area cleared and/or grubbed as measured in the horizontal plane, or portion thereof, to the nearest tenth (0.1) acre.
- b. Work outside the designated limits for this item, where clearing and grubbing – mulch on site was performed, where not shown in the Contract Documents or without prior approval by GCDWR shall not be included in the measurement for payment and the Contractor may be responsible for restoration of such area at their expense.

2. Basis of Payment:

- a. Payment shall be made at the unit price bid and shall be compensation in full for clearing and mulching the area within the limits shown in the Contract Documents or area otherwise delineated and approved by GCDWR of all trees, shrubs, and undergrowth, grubbing the work area, all handling, on-site hauling, and all other labor, materials, equipment, and other incidentals required to complete the Work.
- b. Removal of trees measuring 12-inches or greater DBH shall be eligible for payment under the pertinent Contract Unit Price in accordance with Section 02 41 13 – Selective Site Demolition.

E. PAY ITEM 30 – CLEARING AND GRUBBING, HAUL OFF SITE: Specification 31 10 00, Site Clearing

1. Method of Measurement:

- a. Clearing and grubbing shall be measured per acre of area cleared and/or grubbed and hauled off-site as measured in the horizontal plane, or portion thereof, to the nearest tenth (0.1) acre.
- b. Work outside the designated limits for this item, where clearing and grubbing – haul off site was performed, where not shown in the Contract Documents or without prior approval by GCDWR shall not be included in the measurement for payment and the Contractor may be responsible for restoration of such area at their expense.

2. Basis of Payment:

- a. Payment shall be made at the unit price bid and shall be compensation in full for clearing the area within the limits shown in the Contract Documents or area otherwise delineated and approved by GCDWR of all trees, shrubs, undergrowth, grubbing the area, all handling, on-site hauling, removal and disposal of all cleared materials from the site, and all other



labor, materials, equipment, and other incidentals required to complete the Work.

- b. Removal of trees measuring 12-inches or greater DBH shall be eligible for payment under the pertinent Contract Unit Price in accordance with Section 02 41 13 – Selective Site Demolition.

F. PAY ITEM 31 – SELECTIVE TREE PRUNING: Specification 31 10 00, Site Clearing

1. Method of Measurement:

- a. Tree pruning shall be measured for each half day (up to four hours) or full day (more than four hours within a calendar day) for which tree pruning was performed, as designated by GCDWR.
- b. Duration of tree pruning work shall be measured using the designated crew's working hours, not as a sum of the individual members' hours within the crew. For the purposes of payment, a crew shall consist of at least three persons performing work on such assignment.
- c. Tree pruning outside of the limits of the delineated tree pruning area where tree pruning was performed without prior approval by GCDWR shall not be included in measurement for payment and the Contractor may be responsible for restoration at their own expense.
- d. The Contractor shall provide GCDWR with employee and/or crew timecards which specifically document: the project site where the work was performed, the number of hours logged at the project site where the work was performed, and the day(s) in which the work was completed.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, handling, on-site hauling, and incidentals necessary to complete the Work. All cleared debris shall be removed, loaded, hauled away, and disposed off-site, unless mulching of material and deposition on-site is approved by GCDWR.
- b. Any removal of vegetative debris or on-site deposition of mulched materials associated with this activity will be considered incidental to the cost of this activity.
- c. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 31A through No. 31B.

G. PAY ITEM 32 – BRUSH CUTTING: Specification 31 10 00, Site Clearing

1. Method of Measurement:

- a. Brush cutting shall be measured for each half day (up to four hours) or

full day (more than four hours within a calendar day) for which brush cutting was performed, as designated by GCDWR.

- b. Duration of brush cutting work shall be measured using the designated crew's working hours, not as a sum of the individual members' hours within the crew. For the purposes of payment, a crew shall consist of at least three persons performing work on such assignment.
- c. Brush cutting outside of the limits of the designated brush cutting area where brush cutting was performed without prior approval by GCDWR shall not be included in measurement for payment and the Contractor may be responsible for restoration at their expense.
- d. The Contractor shall provide GCDWR with employee and/or crew timecards which specifically document: the project site where the work was performed, the number of hours logged at the project site where the work was performed, and the day(s) in which the work was completed.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials on-site and offsite hauling, and incidentals necessary to complete the Work. All cleared debris shall be removed, loaded, hauled away, and disposed off-site. Any removal of vegetative debris associated with this activity will be considered incidental to the cost of this activity.
- b. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 32A through No. 32B.

H. PAY ITEM 33 – SHRUB TRIMMING: Specification 31 10 00, Site Clearing

1. Method of Measurement:

- a. Shrub trimming shall be measured for each half day (up to four hours) or full day (more than four hours within a calendar day) for which shrub trimming was performed, as designated by GCDWR.
- b. Duration of shrub trimming work shall be measured using the designated crew's working hours, not as a sum of the individual members' hours within the crew. For the purposes of payment, a crew shall consist of at least three persons performing work on such assignment.
- c. Shrub trimming outside of the limits of designated shrub trimming area where shrub trimming was performed without prior approval by GCDWR shall not be included in measurement for payment and the Contractor may be responsible for restoration at their expense.
- d. The Contractor shall provide GCDWR with employee and/or crew timecards which specifically document: the project site where the work was performed, the number of hours logged at the project site where the

work was performed, and the day(s) in which the work was completed.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, on-site and off-site hauling, and incidentals necessary to complete the Work. All cleared debris shall be removed, loaded, hauled away, and disposed off-site. Any removal of vegetative debris associated with this activity will be considered incidental to the cost of this activity.
- b. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 33A through No. 33B.

I. PAY ITEM 34 – UNCLASSIFIED EXCAVATION AND FILL: Specification 31 23 00, Excavation and Fill

1. Method of Measurement:

- a. Excavation and fill shall be measured by the actual number of cubic yards excavated from the original location to complete the Work. Quantities will be measured based on initial native pre-excavation state. The volume of Unclassified excavation and fill, authorized and accepted by GCDWR, will be computed by the method of average end areas, or other acceptable means, using the original ground surface, the final ground surface, cross-sections, or progress surveys.
- b. Excavated material, while stored in temporary stockpiles on-site, will not be eligible to be measured for payment. Excavation and fill quantities will be eligible to be measured for payment following accepted placement of material as fill or removal from the site as spoil removal.
- c. On-site handling and filling using excavated material is incidental to this pay item. No separate measurement for payment will be made for associated with handling or filling of material within a contiguous site from which it was excavated.
- d. Material delivered to the site by GCDWR or GCDWR-authorized third party shall be handled and placed in accordance with the Contract Documents to complete the Work. Quantities will be eligible to be measured for payment under this pay item following accepted placement of material as fill.
- e. The Contractor shall provide progress surveys of the Work, verifying the field location of points and elevations shown on the Contract Documents, prior to acceptance of the amount measured for payment.
- f. Excavation and fill outside of the defined limits as described in the Contract Documents where excavation was performed without prior approval by GCDWR shall not be included in measurement for payment.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all necessary tools, equipment, labor, and materials to control groundwater and surface water, excavate, handle materials within a contiguous site, fill, compact materials at the specified elevation in the Contract Documents, coordinate compaction testing, and prepare progress surveys to complete the Work.
- b. Payment will not be approved without acceptance of a complete progress survey validating the completed Work under this pay item.
- c. Separate compensation shall be provided for the removal of excess fill or unsuitable material from the site under the pay item for Spoil Removal.
- d. No additional payment shall be made for excavation considered incidental under other Pay Items.

J. PAY ITEM 35 – IMPORTED FILL: Specification 31 23 00, Excavation and Fill

1. Method of Measurement:

- a. Imported fill shall be measured by the actual number of cubic yards of material delivered to the site and placed as fill to complete the Work. Quantities will be measured based on initial native pre-excavation state.
- b. Quantities will be eligible to be measured for payment following accepted placement of material as fill. Imported fill material stored in temporary stockpiles on-site will not become eligible to be measured for payment until final placement of material as fill.
- c. Material delivered to the site by GCDWR or GCDWR-authorized third party will not be eligible to be measured for payment under this pay item.
- d. The Contractor shall provide progress surveys of the Work, verifying the field location of points and elevations shown on the Contract Documents, prior to acceptance of the amount measured for payment.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all necessary tools, equipment, labor, and materials to deliver, handle materials on-site, control groundwater and surface water, fill, compact materials at the specified elevation in the Contract Documents, coordinate compaction testing, and prepare progress surveys to complete the Work.
- b. Payment will not be approved without acceptance of a complete progress survey validating the completed Work under this pay item.
- c. Payment will not be approved without submission of Vehicle Capacity Certifications.

K. PAY ITEM 36 – TRENCH EXCAVATION – ADDITIONAL DEPTH: Specification 31 23 00, Excavation and Fill

1. Method of Measurement:

- a. Trench excavation shall be measured by the number of cubic yards of material excavated and backfilled along the centerline of the pipe installed or removed. Quantities will be measured based on initial native pre-excavation state. The volume of trench excavation shall be computed by the actual length of pipe removed or installed and accepted, the maximum trench width as indicated on the Contract Documents, and the vertical depth as measured from the existing ground surface shown on the Contract Documents to the point of additional excavation as defined below:
  - 1) For Removal of Existing Stormwater Drainage Pipe, excavation in excess of four feet from existing ground surface to the crown of the pipe removed shall be eligible for payment under this item.
  - 2) For installation of Storm Water Gravity Pipe, excavation in excess of 10 feet from existing ground surface to the crown of pipe installed shall be eligible for payment under this item.
- b. Where no maximum trench width is indicated on the Contract Documents, the maximum trench width shall be computed as 1.5 times the outside pipe diameter plus 12 inches.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all controlling of groundwater and surface water, excavating, on-site handling, filling, compacting, hauling, and removal from site of materials associated with the specified extra depth of excavation, including all shoring and protective measures.
- b. Extra depth must be approved if not indicated on the Contract Documents as being required.
- c. No additional payment shall be made for excavation considered incidental under other Pay Items.

L. PAY ITEM 37 – CHANNEL EXCAVATION: Specification 31 23 00, Excavation and Fill

1. Method of Measurement:

- a. Channel Excavation shall be measured by the actual number of cubic yards excavated from the original location to complete the Work. Quantities will be measured based on initial native pre-excavation state. The volume of channel excavation, authorized and accepted by GCDWR,

will be computed by the method of average end areas, or other acceptable means, using the original ground surface, the final ground surface, cross-sections, or progress surveys. The cross-sectional area measured will not include liquids.

- b. Excavated material, while stored in temporary stockpiles on-site, will not be eligible to be measured for payment. Excavation and fill quantities will be eligible to be measured for payment following accepted placement of material as fill or removal from the site as spoil removal.
- c. On-site handling and filling using excavated material is incidental to this pay item. No separate measurement for payment will be made for associated with handling or filling of material within a contiguous site from which it was excavated.
- d. Material delivered to the site by GCDWR or GCDWR-authorized third party shall be handled and placed in accordance with the Contract Documents to complete the Work. Quantities will be eligible to be measured for payment under this pay item following accepted placement of material as fill.
- e. The Contractor shall provide progress surveys of the Work, verifying the field location of points and elevations shown on the Contract Documents, prior to acceptance of the amount measured for payment.
- f. Excavation and fill outside of the defined limits as described in the Contract Documents where excavation was performed without prior approval by GCDWR shall not be included in measurement for payment.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all necessary tools, equipment, labor, and materials to control groundwater and surface water, excavate, handle materials within a contiguous site, fill, compact materials at the specified elevation in the Contract Documents, coordinate compaction testing, and prepare progress surveys to complete the Work.
- b. Payment will not be approved without acceptance of a complete progress survey validating the completed Work under this pay item.
- c. Separate compensation shall be provided for the removal of excess fill or unsuitable material from the site under the pay item for Spoil Removal.
- d. Temporary Stream Bypass Pumping, if and where directed by GCDWR, shall be measured for payment as described in Section 31 23 19 – Dewatering.
- e. No additional payment shall be made for excavation considered incidental under other Pay Items.

- M. PAY ITEM 38 – ROCK EXCAVATION: Specification 31 23 00, Excavation and Fill
1. Method of Measurement: Rock excavation shall be measured by the actual number of cubic yards excavated from their original location, based on measurements and calculations of the excavated area, and removed from the site to complete the Work, as authorized by GCDWR representative at the time of haul away.
  2. Basis of Payment:
    - a. The unit price shall be compensation in full for all excavation, blasting, hoe or other hydraulic machine ramming, ripping, and all other manner of rock excavation methods, control of groundwater and surface water, fill not included in other items, handling, hauling, removal from site or as otherwise directed by GCDWR, and all other labor, materials, equipment, and incidentals required to complete the Work.
- N. PAY ITEM 39 – SPOIL REMOVAL: Specification 31 23 00, Excavation and Fill
1. Method of Measurement:
    - a. Spoil removal shall be measured by the actual number of cubic yards of excess fill or unsuitable material removed from the site to complete the Work, as authorized by GCDWR representative at the time of haul away. Measurement shall be based on the actual truck volume hauled from site.
    - b. On-site handling is incidental to this pay item. No separate measurement for payment will be made for associated with handling material within a contiguous site from which it was excavated.
    - c. Material generated from rock excavation activities is not eligible for measurement under this pay item.
  2. Basis of Payment:
    - a. The unit price shall be compensation in full for all handling, dewatering of material prior to removal, hauling, removal, and all other labor, materials, equipment, and incidentals required to complete the Work.
    - b. Payment will not be approved without submission of Vehicle Capacity Certifications.
- O. PAY ITEM 40 – POND SEDIMENT REMOVAL – WET SEDIMENT: Specification 31 23 00, Excavation and Fill
1. Method of Measurement:
    - a. Pond sediment removal shall be measured by the actual number of cubic yards of sediment removed from the site to complete the Work, as authorized by GCDWR representative at the time of haul away.



Measurement shall be based on the actual truck volume hauled from site. No distinction will be made for method of sediment removal required.

- b. On-site handling and dewatering of sediment are incidental to this pay item.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all handling, dewatering of material prior to removal, hauling, removal, and all other labor, materials, equipment, and incidentals required to complete the Work.
- b. Payment will not be approved without submission of Vehicle Capacity Certifications.
- c. Costs associated with dry sediment removal shall be measured and paid for at the applicable Unit Price for Unclassified Excavation and Fill.

P. PAY ITEM 41 – TEMPORARY STREAM BYPASS PUMPING: Specification 31 23 19, Dewatering

1. Method of Measurement:

- a. Stream Bypass Pumping shall be measured by day (up to 24 hours) of pump use for each 6-inch and 8-inch (inlet size) pump required to provide temporary bypass pumping of base flows as specified in the Contract Documents, approved Contractor pumping plan, or as directed by GCDWR, based on flow rate requirements.
- b. Measurement shall be made only for each day the pump(s) is in operation and Work is completed in accordance with the approved temporary stream bypass pumping plan and schedule within the temporary bypass area.

2. Basis of Payment:

- a. The unit prices shall include compensation for all labor, equipment, pump mobilization, transportation, fuels, and materials necessary to construct, operate, monitor, maintain, and remove temporary stream bypasses necessary to complete the Work.
- b. Payment will not be approved without submittal and approval of a Stream Bypass Pumping Plan, validating the types and sizes of pumping equipment and duration of temporary bypass pumping required to complete the Work.
- c. Temporary bypass pumping of base flows, where required pumping rates and pressures can be achieved using pumps with inlet sizes less than 6-inches shall not be measured but the cost will be considered incidental to



other items of Work.

- d. Dewatering of excavations or other areas utilizing well point systems, shall not be measured but the cost will be considered incidental to other items of work.
- e. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 41A through 41 B.

Q. PAY ITEM 42 – FLOWABLE FILL: Specification 31 23 23.33, Flowable Fill

1. Method of Measurement:

- a. Flowable fill/CLSM shall be measured and paid for per cubic yard of material placed as shown in the Contract Documents or as directed by GCDWR.
- b. Flowable fill placed outside the limits shown on Contract Documents will not be included in measurement for payment amount, unless approved by GCDWR.

2. Basis of Payment:

- a. The Unit Price shall include furnishing and placing flowable fill, and all other labor, materials, equipment, and incidentals required to complete the Work.

R. PAY ITEM 43 – ENGINEERED SOIL MEDIA: Specification 31 23 34, Engineered Soil Media

1. Method of Measurement:

- a. Engineered Soil Mix (ESM) shall be measured in cubic yards as calculated by area times depth of the material in place as conforming to the area and depths shown on the plans in the Contract Documents or as directed by GCDWR.
- b. Payment will not be made for placement of ESM in areas outside of areas or at additional depths indicated to be ESM on the plans in the Contract Documents without direction or authorization of GCDWR.

2. Basis of Payment:

- a. The unit price by compensation in full for all tools, equipment, labor, materials, and incidentals necessary for furnishing, stockpiling, hauling, placing, testing, and inspecting Engineered Soil Media as shown in the Contract Documents or as directed by GCDWR.
- b. No additional payment shall be made for removal of contaminated or otherwise unsuitable Engineered Soil Media and replacement with clean,

suitable Engineered Soil Media meeting the requirements of Section 31 23 34.

S. PAY ITEM 44 – TEMPORARY SEEDING: Specification 31 25 00, Erosion and Sedimentation Controls

1. Method of Measurement: Temporary seeding shall be measured by the actual square yards at the coverage and seeding rates specified, sown in place.
2. Basis of Payment:
  - a. Payment shall be compensation in full for all work and shall include all labor, equipment, and materials necessary for furnishing, placing, inspecting, monitoring, maintaining, removing, and reporting on the erosion and sedimentation controls.
  - b. No additional payment shall be made for maintenance or reapplication to achieve or maintain required coverage of temporary seeding.
  - c. Costs associated with permanent vegetative stabilization shall be measured and paid for at the applicable Unit Price in accordance with Section 32 92 00 – Turfs and Grasses.

T. PAY ITEM 45 – FLOCCULANTS AND COAGULANTS: Specification 31 25 00, Erosion and Sedimentation Controls

1. Method of Measurement: Flocculants and Coagulants shall be measured by the actual pounds of material installed in place for powder flocculants; the actual number of gallons of undiluted chemical utilized for liquid flocculants, or by the actual number of flocculant logs installed for block form flocculants.
2. Basis of Payment:
  - a. Payment shall be compensation in full for all work and shall include all labor, equipment, and materials necessary for furnishing, placing, inspecting, monitoring, maintaining, removing, and reporting on the erosion and sedimentation controls.
  - b. Payment will not be approved without submission of bag or container labels.
  - c. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 45A through 45C.

U. PAY ITEM 46 – TACKIFIER: Specification 31 25 00, Erosion and Sedimentation Controls

1. Method of Measurement: Tackifier shall be measured by the actual pounds of material installed in place.

2. Basis of Payment:
    - a. Payment shall be compensation in full for all work and shall include all labor, equipment, and materials necessary for furnishing, placing, inspecting, monitoring, maintaining, removing, and reporting on the erosion and sedimentation controls.
    - b. Payment will not be approved without submission of bag or container labels.
- V. PAY ITEM 47 – STONE CHECK DAM: Specification 31 25 00, Erosion and Sedimentation Controls
1. Method of Measurement: Stone check dams shall be measured by the actual cubic yards constructed in place.
  2. Basis of Payment:
    - a. Payment shall be compensation in full for all work and shall include all labor, equipment, and materials necessary for furnishing, placing, inspecting, monitoring, maintaining, removing, and reporting on the erosion and sedimentation controls.
    - b. No additional payment shall be made for maintenance or replacement of stone check dams.
- W. PAY ITEM 48 – STRAW BALES: Specification 31 25 00, Erosion and Sedimentation Controls
1. Method of Measurement: Straw bales shall be measured by the actual number of bales installed in place as checks, check dams, or other similar application as a whole bale or bales.
  2. Basis of Payment:
    - a. Payment shall be compensation in full for all work and shall include all labor, equipment, and materials necessary for furnishing, placing, inspecting, monitoring, maintaining, removing, and reporting on the erosion and sedimentation controls.
    - b. No additional payment shall be made for maintenance or replacement of straw bales.
    - c. Straw bales used for disturbed area stabilization mulching shall be measured and paid for at the applicable Unit Price in accordance with Section 32 97 00 - Landscaping.

- X. PAY ITEM 49: FILTER SOCKS: Specification 31 25 00, Erosion and Sedimentation Controls
1. Method of Measurement: Filter socks shall be measured by the actual linear feet installed in place.
  2. Basis of Payment:
    - a. Payment shall be compensation in full for all work and shall include all labor, equipment, and materials necessary for furnishing, placing, inspecting, monitoring, maintaining, removing, and reporting on the erosion and sedimentation controls.
    - b. No additional payment shall be made for maintenance or replacement of filter socks.
    - c. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 49A. through 49B.
- Y. PAY ITEM 50 – COIR WATTLE: Specification 31 25 00, Erosion and Sedimentation Controls
1. Method of Measurement: Coir Wattles shall be measured by the actual linear feet installed in place.
  2. Basis of Payment:
    - a. Payment shall be compensation in full for all work and shall include all labor, equipment, and materials necessary for furnishing, placing, inspecting, monitoring, maintaining, removing, and reporting on the erosion and sedimentation controls.
    - b. No additional payment shall be made for maintenance or replacement of coir wattles.
- Z. PAY ITEM 51 – STRAW WATTLE: Specification 31 25 00, Erosion and Sedimentation Controls
1. Method of Measurement: Straw Wattles shall be measured by the actual linear feet installed in place.
  2. Basis of Payment:
    - a. Payment shall be compensation in full for all work and shall include all labor, equipment, and materials necessary for furnishing, placing, inspecting, monitoring, maintaining, removing, and reporting on the erosion and sedimentation controls.
    - b. No additional payment shall be made for maintenance or replacement of straw wattles.

AA. PAY ITEM 52 – COIR LOG: Specification 31 25 00, Erosion and Sedimentation Controls

1. Method of Measurement: Coir Logs shall be measured by the actual linear feet installed in place.
2. Basis of Payment:
  - a. Payment shall be compensation in full for all work and shall include all labor, equipment, and materials necessary for furnishing, placing, inspecting, monitoring, maintaining, removing, and reporting on the erosion and sedimentation controls.
  - b. No additional payment shall be made for maintenance or replacement of coir logs.

BB. PAY ITEM 53 – CONSTRUCTION EXIT Specification 31 25 00, Erosion and Sedimentation Controls

1. Method of Measurement: Construction exits shall be measured by the actual number of entrances constructed in place.
2. Basis of Payment:
  - a. Payment shall be compensation in full for all work and shall include all labor, equipment, and materials necessary for furnishing, placing, inspecting, monitoring, maintaining, removing, and reporting on the erosion and sedimentation controls.
  - b. No additional payment shall be made for re-application or maintenance of construction exits.

CC. PAY ITEM 54 – TEMPORARY DOWNDRAIN STRUCTURE: Specification 31 25 00, Erosion and Sedimentation Controls

1. Method of Measurement: Temporary downdrain structures shall be measured by the actual linear feet of slope drain installed in place.
2. Basis of Payment:
  - a. Payment shall be compensation in full for all work and shall include all labor, equipment, materials, inlet spillways, velocity dissipators, and outlet aprons necessary for furnishing, placing, inspecting, monitoring, maintaining, removing, and reporting on the erosion and sedimentation controls.
  - b. No additional payment shall be made for re-application or maintenance of temporary downdrain structures.

DD. PAY ITEM 55 – ROCK FILTER DAM: Specification 31 25 00, Erosion and Sedimentation Controls

1. Method of Measurement: Rock filter dams shall be measured by the actual cubic yards constructed in place.
2. Basis of Payment:
  - a. Payment shall be compensation in full for all work and shall include all labor, equipment, and materials necessary for furnishing, placing, inspecting, monitoring, maintaining, removing, and reporting on the erosion and sedimentation controls.
  - b. No additional payment shall be made for maintenance or replacement of rock filter dams.

EE. PAY ITEM 56 – SILT BAG: Specification 31 25 00, Erosion and Sedimentation Controls

1. Method of Measurement: Silt bags shall be measured by the actual number of bags installed in place.
2. Basis of Payment:
  - a. Payment shall be compensation in full for all work and shall include all labor, equipment, and materials necessary for furnishing, placing, inspecting, monitoring, maintaining, removing, and reporting on the erosion and sedimentation controls.
  - b. No additional payment shall be made for re-application or maintenance of silt bags.

FF. PAY ITEM 57 – SILT FENCE (TYPE S): Specification 31 25 00, Erosion and Sedimentation Controls

1. Method of Measurement: Silt Fence Type S shall be measured by the actual linear feet of silt fence installed in place.
2. Basis of Payment:
  - a. Payment shall be compensation in full for all work and shall include all labor, equipment, and materials necessary for furnishing, placing, inspecting, monitoring, maintaining, removing, and reporting on the erosion and sedimentation controls.
  - b. No additional payment shall be made for maintenance or replacement of silt fence.

GG. PAY ITEM 58 – INLET SEDIMENT TRAP: Specification 31 25 00, Erosion and Sedimentation Controls

1. Method of Measurement: Inlet sediment traps shall be measured by the actual number of traps installed in place.
2. Basis of Payment:
  - a. Payment shall be compensation in full for all work and shall include all labor, equipment, and materials necessary for furnishing, placing, inspecting, monitoring, maintaining, removing, and reporting on the erosion and sedimentation controls.
  - b. No additional payment shall be made for maintenance or replacement of inlet sediment traps.

HH. PAY ITEM 59 – FLOATING SURFACE SKIMMER: Specification 31 25 00, Erosion and Sedimentation Controls

1. Method of Measurement: Floating surface skimmers shall be measured by the actual number of skimmers installed in place.
2. Basis of Payment:
  - a. Payment shall be compensation in full for all work and shall include all labor, equipment, and materials necessary for furnishing, placing, inspecting, monitoring, maintaining, removing, and reporting on the Inlet erosion and sedimentation controls.
  - b. No additional payment shall be made for maintenance or replacement of floating surface skimmers.

II. PAY ITEM 60 – TEMPORARY BRIDGE STREAM CROSSING: Specification 31 25 00, Erosion and Sedimentation Controls

1. Method of Measurement: Temporary bridge stream crossings shall be measured by the actual linear feet of crossing constructed in place.
2. Basis of Payment:
  - a. Payment shall be compensation in full for all work and shall include all labor, equipment, and materials necessary for furnishing, placing, inspecting, monitoring, maintaining, removing, and reporting on the erosion and sedimentation controls.
  3. Temporary culvert stream crossings shall not be measured separately but will be paid for at the Contract Unit Price(s) of the applicable material component items specified in the Contract Documents.

JJ. PAY ITEM 61 – TURBIDITY CURTAIN: Specification 31 25 00, Erosion and Sedimentation Controls

1. Method of Measurement: Turbidity curtain shall be measured by the actual linear feet installed in place.
2. Basis of Payment
  - a. Payment shall be compensation in full for all work and shall include all labor, equipment, and materials necessary for furnishing, placing, inspecting, monitoring, maintaining, removing, and reporting on the erosion and sedimentation controls.

KK. PAY ITEM 62 – CONCRETE WASHOUT STRUCTURES: Specification 31 25 00, Erosion and Sedimentation Controls

1. Method of Measurement: Concrete washout structures shall be measured by the actual number of structures installed in place.
2. Basis of Payment:
  - a. Payment shall be compensation in full for all work and shall include all labor, equipment, and materials necessary for furnishing, placing, inspecting, monitoring, maintaining, removing, and reporting on the Inlet erosion and sedimentation controls.
  - b. No additional payment shall be made for maintenance or replacement of concrete washout structures.

LL. PAY ITEM 63 – FLEXIBLE GROWTH MEDIUM (FGM): Specification 31 25 14.13, Hydraulic Erosion Control Products

1. Method of Measurement:
  - a. Flexible Growth Medium shall be measured and paid for per acre at the application rate specified in accordance with the slope in the Contract Documents or as otherwise directed by GCDWR.
  - b. Flexible Growth Medium placed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.
2. Basis of Payment:
  - a. The unit price shall be compensation in full for all tools, equipment, labor, materials, seed, soil amendments and incidentals necessary for furnishing, placing, and maintaining hydraulic erosion control products.
  - b. No additional payment shall be made for maintenance of the hydraulic erosion control products, including additional application or replacement



through completion.

- c. All grass seed, wood fiber mulch, water, soil amendments or fertilizer included in the flexible growth medium shall be considered incidental to this pay item and no additional compensation will be made.
- d. Payment shall be for actual acreage at the specified coverage rate, measured to the nearest 0.01 acre.
- e. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No.63A through No. 63E.

MM. PAY ITEM 64 – BONDED FIBER MATRIX (BFM): Specification 31 25 14.13, Hydraulic Erosion Control Products

1. Method of Measurement:

- a. Bonded Fiber Matrix shall be measured and paid for per acre at the application rate specified in accordance with the slope in the Contract Documents or as otherwise directed by GCDWR.
- b. Bonded Fiber Matrix placed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, seed, soil amendments and incidentals necessary for furnishing, placing, and maintaining hydraulic erosion control products.
- b. No additional payment shall be made for maintenance of the hydraulic erosion control products, including additional application or replacement through completion.
- c. All grass seed, wood fiber mulch, water, soil amendments or fertilizer included in the bonded fiber matrix shall be considered incidental to this pay item and no additional compensation will be made.
- d. Payment shall be for actual acreage at the specified coverage rate, measured to the nearest 0.01 acre.
- e. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 64A through No. 64E.

NN. PAY ITEM 64 – STABILIZED MULCH MATRIX (SMM): Specification 31 25 14.13, Hydraulic Erosion Control Products

1. Method of Measurement:

- a. Stabilized Mulch Matrix shall be measured and paid for per acre at the application rate specified in accordance with the slope in the Contract Documents or as otherwise directed by GCDWR.
- b. Stabilized Mulch Matrix placed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, seed, soil amendments and incidentals necessary for furnishing, placing, and maintaining hydraulic erosion control products.
- b. No additional payment shall be made for maintenance of the hydraulic erosion control products, including additional application or replacement through completion.
- c. All grass seed, wood fiber mulch, water, soil amendments or fertilizer included in the stabilized mulch matrix shall be considered incidental to this pay item and no additional compensation will be made.
- d. Payment shall be for actual acreage at the specified coverage rate, measured to the nearest 0.01 acre.
- e. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 65A through No. 65C.

OO. PAY ITEM 66 – STRAW-BASED EROSION CONTROL MATTING: Specification 31 32 01, Woven Fabric Stabilization Products

1. Method of Measurement:

- a. Straw-based erosion control fabric shall be measured per square yard complete in place.
- b. Straw-based erosion control fabric placed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.

2. Basis of Payment:

- a. The unit price shall include all labor, equipment, materials necessary for furnishing, placing, maintenance, inspection, monitoring and reporting on the erosion and sedimentation controls.

- b. No additional payment shall be made for maintenance or replacement of straw-based erosion control matting.
- c. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 66A through No. 66B.

PP. PAY ITEM 67 – WOOD FIBER (EXCELSIOR) EROSION CONTROL MATTING: Specification 31 32 01, Woven Fabric Stabilization Products

1. Method of Measurement:

- a. Wood fiber erosion control fabric shall be measured per square yard complete in place.
- b. Wood fiber erosion control fabric placed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.

2. Basis of Payment:

- a. The unit price shall include all labor, equipment, materials necessary for furnishing, placing, maintenance, inspection, monitoring and reporting on the erosion and sedimentation controls.
- b. No additional payment shall be made for maintenance or replacement of wood fiber erosion control matting.

QQ. PAY ITEM 68 – COIR FABRIC (COIR BLANKET, COIR MATTRESS): Specification 31 32 01, Woven Fabric Stabilization Products

1. Method of Measurement:

- a. Coir fabric shall be measured per square yard complete in place.
- b. Coir fabric placed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.

2. Basis of Payment:

- a. The unit price shall include all labor, equipment, materials necessary for furnishing, placing, maintenance, inspection, monitoring and reporting on the erosion and sedimentation controls.
- b. No additional payment shall be made for maintenance or replacement of coir fabric.
- c. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 68A through No. 68C.

RR. PAY ITEM 69 – GEOTEXTILE FABRIC (WOVEN TYPE 1, NON-WOVEN TYPE 2, NON-WOVEN TYPE 3): Specification 31 32 19.16, Geotextiles

1. Method of Measurement:

- a. Geotextile shall be measured for the actual square yards of land covered, measured as installed in place.
- b. Geotextile to meet installation requirements, including overlapping edges of fabric or replacement for improperly installed or damaged fabric will not be included in the measurement for payment.
- c. No separate measurement and payment shall be made for geotextiles used in the construction of in-stream or stormwater treatment structures. Costs for this work shall be included in the cost of In-Stream and Stormwater Treatment Structures, as specified in Sections 31 80 02 through 31 80 19.
- d. Geotextile fabric placed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, and incidentals necessary for furnishing, placing, staking, maintaining, and removing geotextile as shown in the Contract Documents or as directed by GCDWR.
- b. Geotextiles installed as part of other structures are excluded from this basis of payment.
- c. Payment shall be compensation for all maintenance of the geotextile, including repairs or replacement of geotextile.
- d. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 69A through No. 69C.

SS. PAY ITEM 70 – PRESSURE GROUTING SOIL STABILIZATION: Specification 31 32 23, Pressure Grouting Soil Stabilization

1. Method of Measurement: Pressure grouting soil stabilization shall be measured by the actual cubic yards of material placed as directed by GCDWR.
2. Basis of Payment: The unit price shall be compensation in full for the work and shall include furnishing and placing pressure grouting stabilization and all other labor, materials, equipment, and incidentals required to complete the Work.

TT. PAY ITEM 71 – PERMANENT TURF REINFORCEMENT MATTING: Specification 31 35 19.21, Turf Reinforcing Matting

1. Method of Measurement:

- a. Permanent turf reinforcing matting shall be measured by the square yard of land covered, measured as installed in place.
- b. Permanent turf reinforcing matting fabric placed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.

2. Basis of Payment:

- a. The unit price shall be compensation in full for furnishing and placing permanent soil reinforcing mat and all other labor, materials, and equipment, and incidentals required to complete the Work.

UU. PAY ITEM 72 – GABION STRUCTURES: Specification 31 36 00, Gabion Structures

1. Method of Measurement:

- a. Gabion structures shall be measured by the actual cubic yards installed in place as specified in the Contract Documents or as directed by GCDWR.
- b. Gabion structure(s) placed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.

2. Basis of Payment:

- a. The unit price shall be compensation in full for the work and shall include furnishing, infilling, placing, and fastening gabion structures and all other labor, materials, equipment, stone, geotextile, subgrade preparation, and incidentals required to complete the Work.

VV. PAY ITEM 73 – RIP RAP IN PLACE (TYPE 1, TYPE 3, WELL-GRADED RIP RAP): Specification 31 37 00, Rip Rap

1. Method of Measurement:

- a. Stone Rip Rap shall be measured per the actual cubic yards of material, complete in place as shown in the Contract Documents or directed by GCDWR.
- b. Rip rap placed outside the area or depth shown on the contract documents will not be included in the measurement for payment, unless directed by GCDWR.

2. Basis of Payment:

- a. The unit price shall include excavation and preparation of ground surface to the correct elevation, furnishing and placing rip rap to the specified depth and all other labor, materials, equipment, hauling, subgrade preparation, and incidentals required to complete the Work.
- b. Where an alternate gradation not meeting Type 1 or Type 3 rip rap is used as an approved substitute, Contractor measure rip rap at the Unit Price associated with Type 3 Rip Rap, where the d50 is less than or equal to 10-inches and at the Unit Price associated with Type 1 Rip Rap, where the d50 is greater than 10-inches. D50 shall be defined as the nominal rock size (diameter) of which 50% of the rocks are smaller.
- c. Stone filter blankets installed with Rip Rap shall be measured for payment as described in Section 31 05 16 – Aggregates for Earthwork.
- d. Geotextiles installed with Rip Rap shall be measured for payment as described in Section 31 32 19.16 – Geotextiles.
- e. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 73A through No. 73C.

WW. PAY ITEM 74 – STONE-GROUTED RIP RAP IN PLACE: Specification 31 37 00, Rip Rap

1. Method of Measurement: Stone-Grouted Rip Rap shall be measured per the actual cubic yards of material complete in place as shown in the Contract Documents. Grouted rip rap placed outside the area or depth shown on the Contract Documents will not be included in the measurement for payment, unless directed by GCDWR.
2. Basis of Payment:
  - a. The unit price shall include excavation and preparation of ground surface to the correct elevation, furnishing, installation of grout and placing Rip Rap to the specified depth and all other labor, materials, equipment, subgrade preparation, and incidentals required to complete the Work.
  - b. Stone filter blankets installed with Rip Rap shall be measured for payment as described in Section 31 05 16 – Aggregates for Earthwork.
  - c. Geotextiles installed with Rip Rap shall be measured for payment as described in Section 31 32 19.16 – Geotextiles.

XX. PAY ITEM 75 – STEEL SHEET PILING – PERMANENT: Specification 31 41 16.13,  
Steel Sheet Piling

1. Method of Measurement:

- a. Permanent Steel Sheet Piling shall be measured by the number of square feet of sheet piling completed and accepted, measured along the plane of surface. The limits of payment shall be computed from the actual horizontal limit of sheet piling installed and accepted, and the vertical limit as measured from the bottom of the exposed face of the sheeting to the top cutoff, as approved by GCDWR.
- b. Sheet Piling installed outside the limits shown on the Plans will not be included in the measurement for payment without prior approval by GCDWR.

2. Basis of Payment:

- a. The unit price shall include all materials, equipment, set up, labor, delivery, cutting off, painting, hauling, and other incidentals required for the construction of permanent steel sheet piling at the locations specified on the Plans or directed by GCDWR.
- b. Temporary sheet piling left in place solely at the Contractor's option, shall not be measured for additional payment under this pay item.

YY. PAY ITEM 76 – STEEL SHEET PILING – TEMPORARY: Specification 31 41 16.13,  
Steel Sheet Piling

1. Method of Measurement:

- a. Temporary Steel Sheet Piling shall be measured by the number of square feet of sheet piling completed and accepted, measured along the plane of surface for the pertinent Steel Sheet Piling item. The limits of payment shall be computed from the actual horizontal limit of sheet piling installed and accepted, and the vertical limit as measured from the bottom of the exposed face of the sheeting to the top cutoff, as approved by GCDWR.
- b. Sheet Piling installed outside the limits shown on the Plans will not be included in the measurement for payment without prior approval by GCDWR.
- c. Steel sheet piling performed on the project as part of incidental work for other items, such as protection of excavation or for the convenience of the Contractor, unless temporary steel piling is specifically called for/required by the Contract Documents, will not be included in the measurement for payment.

2. Basis of Payment:

- a. The unit price shall include all materials, equipment, set up, labor, delivery, removal, haul off and other incidentals required for the construction of temporary steel sheet piling at the locations specified on the Plans or directed by GCDWR.
- b. Temporary sheet piling ordered left in place by GCDWR shall be measured for payment under the Unit Price for Steel Sheet Piles – Permanent.

ZZ. PAY ITEM 77 – VINYL SHEET PILING: Specification 31 41 16.13, Vinyl Sheet Piling

1. Method of Measurement:

- a. Vinyl Sheet Piling shall be measured by the number of square feet of sheet piling completed and accepted, measured along the plane of surface. The limits of payment shall be computed from the actual horizontal limit of sheet piling installed and accepted, and the vertical limit as measured from the bottom of the exposed face of the sheeting to the top cutoff, as approved by GCDWR.
- b. Sheet Piling installed outside the limits shown on the Plans will not be included in the measurement for payment without prior approval by GCDWR.
- c. Vinyl sheet piling performed on the project as part of incidental work for other items, such as protection of excavation or for the convenience of the Contractor, unless temporary vinyl piling is specifically called for/required by the Contract Documents, will not be included in the measurement for payment.

2. Basis of Payment: The unit price shall include all materials, equipment, set up, labor, delivery, cutting off, painting, hauling, and other incidentals required for the construction of vinyl sheet piling at the locations specified on the Plans or directed by GCDWR.

AAA. PAY ITEM 78 – LOG – ON-SITE: Specification 31 80 02, In-Stream and Stormwater Conveyance Structure Materials

1. Method of Measurement:

- a. Log – On-Site shall be measured per each log which was acquired on site and placed as required in the Contract Documents or as otherwise directed by GCDWR.
- b. Logs On-Site acquired on site and installed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.



- c. Logs On-Site acquired and placed as part of the In-Stream and Stormwater Conveyance devices listed below shall be measured and paid for at the applicable Unit Price for that Item and no additional measurement for payment shall be made under this Section.
  - 1) Root Wad Revetment (Specification Section 31 80 04 – Root Wad Revetment)
  - 2) J-Hook Log Vane (Specification Section 31 80 08 – J-Hook Log Vane and Log Vane)
  - 3) Log Vane (Specification Section 31 80 08 – J-Hook Log Vane and Log Vane)
  - 4) Log Sill – Felled On-Site (Specification Section 31 80 10 – Log Sill)
  - 5) Toe Wood Protection (Specification Section 31 80 12 – Toe Wood Protection)

2. Basis of Payment:

- a. The unit price shall be compensation in full for all materials and transportation, handling, trim to size, labor, tools, and appliances necessary to complete the Work.
- b. Included shall be the costs of excavation beyond final dimensions to provide firm foundation and any costs of furnishing necessary work beyond the limits of measurement as defined under these specifications.

BBB. PAY ITEM 79 – LOG – IMPORTED: Specification 31 80 02, In-Stream and Stormwater Conveyance Structure Materials

1. Method of Measurement:

- a. Log – Imported shall be measured per each log imported from offsite and placed as required in the Contract Documents or as otherwise directed by GCDWR.
- b. Logs – Imported from offsite and installed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.
- c. Logs Imported from offsite and placed as part of the In-Stream and Stormwater Conveyance devices listed below shall be measured and paid for at the applicable Unit Price for that Item and no additional measurement for payment shall be made under this Section.
  - 1) Root Wad Revetment (Specification Section 31 80 04 – Root Wad Revetment)

- 2) J-Hook Log Vane (Specification Section 31 80 08 – J-Hook Log Vane and Log Vane)
- 3) Log Vane (Specification Section 31 80 08 – J-Hook Log Vane and Log Vane)
- 4) Log Sill – Imported (Specification Section 31 80 10 – Log Sill)
- 5) Toe Wood Protection (Specification Section 31 80 12 – Toe Wood Protection)

2. Basis of Payment:

- a. The unit price shall be compensation in full for all materials, transportation, handling, trim to size, labor, tools, and appliances necessary to complete the Work.
- b. Included shall be the costs of excavation beyond final dimensions to provide firm foundation and any costs of furnishing necessary work beyond the limits of measurement as defined under these specifications.
- c. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 79A through No. 79B.

CCC.PAY ITEM 80 – BOULDERS (FIELDSTONE, GRANITE QUARRY STONE):  
Specification 31 80 02, In-Stream and Stormwater Conveyance Structure Materials

1. Method of Measurement:

- a. Boulders shall be measured for pay per each stone installed and completed in place, as required in the Contract Documents or as otherwise directed by GCDWR.
- b. Boulders installed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.
- c. Boulders placed as part of the In-Stream and Stormwater Conveyance devices listed below shall be measured and paid for at the applicable Unit Price for that Item and no additional measurement for payment shall be made under this Section.
  - 1) Cross Vane (Specification Section 31 80 06 – Cross-Vane)
  - 2) J-Hook Vane (Specification Section 31 80 07 – J-Hook Vane and Boulder Vane)
  - 3) Boulder Vane (Specification Section 31 80 07 – J-Hook Vane and Boulder Vane)

- 4) J-Hook Log Vane (Specification Section 31 80 08 – J-Hook Log Vane and Log Vane)
- 5) Log Vane (Specification Section 31 80 08 – J-Hook Log Vane and Log Vane)
- 6) Step Pool Series (Specification Section 31 80 09 – Step Pool Series)
- 7) Log Sill – Felled On-Site (Specification Section 31 80 10 – Log Sill)
- 8) Log Sill – Imported (Specification Section 31 80 10 – Log Sill)
- 9) Stone Cascade (Specification Section 31 80 15 – Stone Cascade)
- 10) Stormwater Outfall Steps (Specification Section 31 80 19 – Stormwater Outfall Steps)

2. Basis of Payment:

- a. The unit price shall be compensation in full for all materials, transportation, labor, tools, and appliances necessary to complete the Work as herein specified, shown, or ordered.
- b. Removal and replacement of unstable material, beyond the depths and widths indicated in the Contract Documents, where necessary to provide firm foundations or tie-ins, and as directed and approved by GCDWR, shall be eligible for payment in accordance with Specification Section 31 23 00 – Excavation and Fill.
- c. Payment will not be approved without submission of weight delivery tickets.
- d. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 80A through No. 80H.

DDD. PAY ITEM 81 – RIVER COBBLE: Specification 31 80 02, In-Stream and Stormwater Conveyance Structure Materials

1. Method of Measurement:

- a. River cobble shall be measured for pay by volume in cubic yards of material installed and completed in place, as shown on the Contract Documents or as measured in place, if GCDWR has directed or approved changes.
- b. River Cobble installed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.

- c. River Cobble placed as part of the In-Stream and Stormwater Conveyance devices listed below shall be measured and paid for at the applicable Unit Price for that Item and no additional measurement for payment shall be made under this Section.
  - 1) Stone Toe Protection & Bendway Weir (Specification Section 31 80 03 Stone Toe Protection and Bendway Weir)
  - 2) Cross Vane (Specification Section 31 80 06 – Cross-Vane)
  - 3) J-Hook Vane (Specification Section 31 80 07 – J-Hook Vane and Boulder Vane)
  - 4) Boulder Vane (Specification Section 31 80 07 – J-Hook Vane and Boulder Vane)
  - 5) Step Pool Series (Specification Section 31 80 09 – Step Pool Series)
  - 6) Stone Cascade (Specification Section 31 80 15 – Stone Cascade)

2. Basis of Payment:

- a. The unit price shall be compensation in full for all materials, transportation, labor, tools, excavation, and appliances necessary to complete the Work as herein specified, shown, or ordered.
- b. Payment will not be approved without submission of bag labels or weight delivery tickets.

EEE. PAY ITEM 82 – RIFFLE ROCK: Specification 31 80 02, In-Stream and Stormwater Conveyance Structure Materials

1. Method of Measurement:

- a. Riffle rock shall be measured for pay by volume in cubic yards of material installed and completed in place, as shown on the Contract Documents or as measured in place, if GCDWR has directed of approved changes.
- b. Riffle Rock installed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.
- c. Riffle Rock placed as part of the In-Stream and Stormwater Conveyance devices listed below shall be measured and paid for at the applicable Unit Price for that Item and no additional measurement for payment shall be made under this Section.
  - 1) Stone Toe Protection & Bendway Weir (Specification Section 31 80 03 Stone Toe Protection and Bendway Weir)

- 2) Cross Vane (Specification Section 31 80 06 – Cross-Vane)
- 3) J-Hook Vane (Specification Section 31 80 07 – J-Hook Vane and Boulder Vane)
- 4) Boulder Vane (Specification Section 31 80 07 – J-Hook Vane and Boulder Vane)
- 5) Step Pool Series (Specification Section 31 80 09 – Step Pool Series)
- 6) Stone Cascade (Specification Section 31 80 15 – Stone Cascade)

2. Basis of Payment:

- a. The unit price shall be compensation in full for all materials, transportation, labor, tools, excavation, and appliances necessary to complete the Work as herein specified, shown, or ordered.
- b. Payment will not be approved without submission of bag labels or weighted delivery tickets.

FFF. PAY ITEM 83 – RIVER PEBBLE: Specification 31 80 02, In-Stream and Stormwater Conveyance Structure Materials

1. Method of Measurement:

- a. River pebble shall be measured for pay by volume in cubic yards of material installed and completed in place, as shown on the Contract Documents or as measured in place, if GCDWR has directed of approved changes.
- b. River pebble installed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.
- c. River pebble placed as part of the In-Stream and Stormwater Conveyance devices listed below shall be measured and paid for at the applicable Unit Price for that Item and no additional measurement for payment shall be made under this Section.

- 1) Stone Toe Protection & Bendway Weir (Specification Section 31 80 03 Stone Toe Protection and Bendway Weir)
- 2) Cross Vane (Specification Section 31 80 06 – Cross-Vane)
- 3) J-Hook Vane (Specification Section 31 80 07 – J-Hook Vane and Boulder Vane)
- 4) Boulder Vane (Specification Section 31 80 07 – J-Hook Vane and

Boulder Vane)

- 5) Step Pool Series (Specification Section 31 80 09 – Step Pool Series)
- 6) Stone Cascade (Specification Section 31 80 15 – Stone Cascade)

2. Basis of Payment:

- a. The unit price shall be compensation in full for all materials, transportation, labor, tools, excavation, and appliances necessary to complete the Work as herein specified, shown or ordered.
- b. Payment will not be approved without submission of bag labels or weight delivery tickets.

GGG.PAY ITEM 84 – STONE TOE PROTECTION AND BENDWAY WEIR: Specification 31 80 03, Stone Toe Protection and Bendway Weir

1. Method of Measurement:

- a. Stone toe protection and bendway weir shall be measured by volume of cubic yards of material installed and completed in place, as shown on the Contract Documents or as measured in place, if GCDWR has directed of approved changes.
- b. Stone toe protection and bendway weir installed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.

2. Basis of Payment:

- a. The unit price shall be compensation in full for the work and shall include the furnishing of all materials, transportation, labor, tools, and appliances necessary to complete the Work as herein specified, shown, or ordered.
- b. Included shall be the cost of excavation to final subgrade below the bedding material and along the toe of slope and over excavation for the installation of structural components.
- c. Removal and replacement of unstable or otherwise unsuitable material, beyond the depths and widths indicated in the Contract Documents, where necessary to provide firm foundations or tie-ins, if and where directed and approved by GCDWR, shall be eligible for payment in accordance with Specification Section 31 23 00 – Excavation and Fill. Excavation beyond the depths and widths needed to place structural components, as indicated in the Contract Documents, will not be eligible for additional payment, without direction or approval from GCDWR.
- d. Payment for live poles and live whips shall be covered under Section 32

97 00 - Landscaping.

HHH. PAY ITEM 85 – ROOT WAD REVETMENT: Specification 31 80 05, Root Wad Revetment

1. Method of Measurement:

- a. Root wad revetment shall be measured by the actual linear feet of root wad revetment installed in place in the longitudinal direction along the bank from the top of the root wad or as otherwise directed by GCDWR.
- b. Root wad revetment installed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all Work covered under this specification, including, but not limited to grading, installation, adjusting, excavating to subgrade, placing backfill, maintaining the feature through acceptance, and for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the Work as specified in the Contract Documents, or as directed by GCDWR.
- b. No separate measurement of materials shall be made under this item for coarse backfill, fabric, rip rap, anchors and/or other incidental items.
- c. Felled, on-site trees during site clearing activities may be used as construction material for this line item if product meets Specifications within the Contract Documents and approved by GCDWR. No additional payment shall be made under Section 31 10 00 - Site Clearing for on-site tree logs selected and accepted for installation.
- d. Removal and replacement of unstable or otherwise unsuitable material beyond the depths and widths indicated in the Contract Documents, where necessary to provide firm foundations or tie-ins, if and where directed and approved by GCDWR, shall be eligible for payment in accordance with Specification Section 31 23 00 – Excavation and Fill. Excavation beyond the depths and widths needed to place structural components, as indicated in the Contract Documents, will not be eligible for additional payment, without direction or approval from GCDWR.

III. PAY ITEM 86 – CROSS-VANE: Specification 31 80 06, Cross Vane

1. Method of Measurement:

- a. Cross-vane shall be measured by the actual linear feet of cross-vane installed and accepted into the final Work, as measured along the horizontal centerline of the following structure features: left sill, left arm, center, right arm, right sill as specified in the Contract Documents, or as

directed by GCDWR. Contractor shall notify GCDWR for measurement inspection of structure prior to backfill. Request for payment for structure submitted without measurement inspection by GCDWR will not be accepted.

- b. Cross-vane installed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all Work covered under this specification, including, but not limited to grading, installation, adjusting, excavating, placing backfill, grouting, maintaining the feature through acceptance, and for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the Work as specified in the Contract Documents, or as directed by GCDWR.
- b. Included shall be the cost of excavation to final subgrade below any bedding or rip rap material.
- c. Removal and replacement of unstable or otherwise unsuitable material, beyond the depths and widths indicated in the Contract Documents, where necessary to provide firm foundations or tie-ins, if and where directed and approved by GCDWR, shall be eligible for payment in accordance with Specification Section 31 23 00 – Excavation and Fill. Excavation beyond the depths and widths needed to place structural components, as indicated in the Contract Documents, will not be eligible for additional payment, without direction or approval from GCDWR.
- d. No separate measurement of materials shall be made under this item for coarse backfill, fabric, grouting, anchors and/or other incidental items.
- e. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 86A through No. 86D.

JJJ. PAY ITEM 87 – J-HOOK VANE: Specification 31 80 07, J-Hook Vane and Boulder Vane

1. Method of Measurement:

- a. J-hook vane shall be measured per linear foot of j-hook vane completed and accepted into the final Work, as measured along the horizontal centerline of the following structure features: outside sill, outside arm, hook, inside arm, inside sill as specified in the Contract Documents, or as directed by GCDWR. Contractor shall notify GCDWR for measurement inspection of structure prior to backfill. Request for payment for structure submitted without measurement inspection by GCDWR will not be accepted.



- b. J-hook vane installed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.

2. Basis of Payment:

- a. The unit price per linear foot of j-hook vane shall include full compensation for all Work covered under this specification, including, but not limited to grading, installation, adjusting, excavating, placing backfill, grouting, maintaining the feature through acceptance, and for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the Work as specified in the Contract Documents, or as directed by GCDWR.
- b. Included shall be the cost of excavation to final subgrade below any bedding or rip rap material.
- c. Removal and replacement of unstable or otherwise unsuitable material, beyond the depths and widths indicated in the Contract Documents, where necessary to provide firm foundations or tie-ins, if and where directed and approved by GCDWR, shall be eligible for payment in accordance with Specification Section 31 23 00 – Excavation and Fill. Excavation beyond the depths and widths needed to place structural components, as indicated in the Contract Documents, will not be eligible for additional payment, without direction or approval from GCDWR.
- d. No separate measurement of materials shall be made under this item for coarse backfill, fabric, grouting, anchors and/or other incidental items.
- e. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 87A through No. 87D.

KKK. PAY ITEM 88 – BOULDER VANE: Specification 31 80 07, J-Hook Vane and Boulder Vane

1. Method of Measurement:

- a. Boulder vane shall be measured per linear foot of boulder vane completed and accepted into the final Work, as measured along the horizontal centerline of the following structure features: outside sill, outside arm as specified in the Contract Documents, or as directed by GCDWR. Contractor shall notify GCDWR for measurement inspection of structure prior to backfill. Request for payment for structure submitted without measurement inspection by GCDWR will not be accepted.
- b. Boulder vane installed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.

2. Basis of Payment:

- a. The unit price per linear foot of boulder vane shall include full compensation for all Work covered under this specification, including, but not limited to grading, installation, adjusting, excavating, placing backfill, grouting, maintaining the feature through acceptance, and for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the Work as specified in the Contract Documents, or as directed by GCDWR.
- b. Included shall be the cost of excavation to final subgrade below any bedding or rip rap material.
- c. Removal and replacement of unstable or otherwise unsuitable material, beyond the depths and widths indicated in the Contract Documents, where necessary to provide firm foundations or tie-ins, if and where directed and approved by GCDWR, shall be eligible for payment in accordance with Specification Section 31 23 00 – Excavation and Fill. Excavation beyond the depths and widths needed to place structural components, as indicated in the Contract Documents, will not be eligible for additional payment, without direction or approval from GCDWR.
- d. No separate measurement of materials shall be made under this item for coarse backfill, fabric, grouting, anchors and/or other incidental items.
- e. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 88A through No. 88D.

LLL. PAY ITEM 89 – J-HOOK LOG VANE: Specification 31 80 08, J-Hook Log Vane and Log Vane

1. Method of Measurement:

- a. J-hook log vane shall be measured by the actual linear feet of J-hook log vane installed and accepted into the final Work, as measured along the horizontal centerline of the following structure features: outside sill, outside exposed log arm, vortex hook stones, inside exposed arm, inside sill as specified in the Contract Documents, or as directed by GCDWR. Contractor shall notify GCDWR for measurement inspection of structure prior to backfill. Request for payment for structure submitted without measurement inspection by GCDWR will not be accepted.
- b. J-hook log vane installed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.

2. Basis of Payment

- a. The unit price shall be compensation in full for all Work covered under this specification, including, but not limited to grading, installation,

adjusting, excavating, placing backfill, grouting, maintaining the feature through acceptance, and for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the Work as specified in the Contract Documents, or as directed by GCDWR.

- b. Felled, on-site trees during site clearing activities can be used as construction material for this line item if product meets specifications within the Contract Documents and approved by GCDWR. No additional payment shall be made under Section 31 10 00 - Site Clearing for on-site tree logs selected and accepted for installation.
- c. Included shall be the cost of excavation to final subgrade below any bedding or rip rap material.
- d. Removal and replacement of unstable or otherwise unsuitable material, beyond the depths and widths indicated in the Contract Documents, where necessary to provide firm foundations or tie-ins, if and where directed and approved by GCDWR, shall be eligible for payment in accordance with Specification Section 31 23 00 – Excavation and Fill. Excavation beyond the depths and widths needed to place structural components, as indicated in the Contract Documents, will not be eligible for additional payment, without direction or approval from GCDWR.
- e. No separate measurement of materials shall be made under this item for coarse backfill, fabric, anchors and/or other incidental items.
- f. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 89A through No. 89D.

MMM. PAY ITEM 90 – LOG VANE: Specification 31 80 08, J-Hook Log Vane and Log Vane

1. Method of Measurement:

- a. Log vane shall be measured by the actual linear feet of log vane installed and accepted into the final Work, as measured along the horizontal centerline of the following structure features: outside sill, outside exposed log arm as specified in the Contract Documents, or as directed by GCDWR. Contractor shall notify GCDWR for measurement inspection of structure prior to backfill. Request for payment for structure submitted without measurement inspection by GCDWR will not be accepted.
- b. Log vane installed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all Work covered under this specification, including, but not limited to grading, installation,

- adjusting, excavating, placing backfill, grouting, maintaining the feature through acceptance, and for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the Work as specified in the Contract Documents, or as directed by GCDWR.
- b. Felled, on-site trees during site clearing activities can be used as construction material for this line item if product meets specifications within the Contract Documents and approved by GCDWR. No additional payment shall be made under Section 02 41 13 – Selective Demolition for on-site tree logs selected and accepted for installation.
  - c. Included shall be the cost of excavation to final subgrade below any bedding or rip rap material.
  - d. Removal and replacement of unstable or otherwise unsuitable material, beyond the depths and widths indicated in the Contract Documents, where necessary to provide firm foundations or tie-ins, and as directed and approved by GCDWR, shall be eligible for payment in accordance with Specification Section 31 23 00 – Excavation and Fill. Excavation beyond the depths and widths needed to place structural components, as indicated in the Contract Documents, will not be eligible for additional payment, without direction or approval from GCDWR.
  - e. No separate measurement of materials shall be made under this item for coarse backfill, fabric, anchors and/or other incidental items.
  - f. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 90A through No. 90D.

NNN. PAY ITEM 91 – STEP POOL SERIES: Specification 31 80 09, Step Pool Series

1. Method of Measurement:

- a. Step pool series shall be measured by the actual linear feet of step pool series installed and accepted into the final Work, as measured along the horizontal centerline of the following structure features: left sill, left arm, center, right arm, right sill as specified in the Contract Documents, or as directed by GCDWR. Contractor shall notify GCDWR for measurement inspection of structure prior to backfill. Request for payment for structure submitted without measurement inspection by GCDWR will not be accepted.
- b. Step pool series installed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all Work covered under this specification, including, but not limited to grading, installation,

- adjusting, excavating, placing backfill, grouting, maintaining the feature through acceptance, and for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the Work as specified in the Contract Documents, or as directed by GCDWR.
- b. Included shall be the cost of excavation to final subgrade below any bedding or rip rap material.
  - c. Removal and replacement of unstable or otherwise unsuitable material, beyond the depths and widths indicated in the Contract Documents, where necessary to provide firm foundations or tie-ins, if and where directed and approved by GCDWR, shall be eligible for payment in accordance with Specification Section 31 23 00 – Excavation and Fill. Excavation beyond the depths and widths needed to place structural components, as indicated in the Contract Documents, will not be eligible for additional payment, without direction or approval from GCDWR.
  - d. Angular Fieldstone installed as glides along the downstream 1/3 of pool length shall be measured for payment as described in Section 31 80 02 – In-Stream and Stormwater Conveyance Structure Materials under the pertinent Unit Price Item.
  - e. Imported stone material used for rock-soil mix in channel beds downstream of the In-Stream Structure, shall be measured for payment as described in Section 31 05 16 – Aggregates for Earthwork, 31 37 00 – Rip Rap, and Section 31 80 02 – In-Stream and Stormwater Conveyance Structure Materials under the pertinent Unit Price Item.
  - f. On-Site stone material and soil used in rock-soil mix shall not be measured for payment but will be considered incidental to the Step Pool Series.
  - g. No separate measurement of materials shall be made under this item for coarse backfill, fabric, grouting, anchors and/or other incidental items.
  - h. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 91A through No. 91D.

000.PAY ITEM 92 – LOG SILL – FELLED ON-SITE, Specification 31 80 10, Log Sill

1. Method of Measurement:

- a. Log Sill shall be measured per linear foot of log sill completed and accepted into the final Work, as measured along the horizontal centerline of the following structure features: left sill width, left arm length, center log width, right arm length, and right sill width as specified in the Contract Documents, or as directed by GCDWR. Contractor shall notify GCDWR for measurement inspection of structure prior to backfill. Request for payment for structure submitted without measured inspection by GCDWR will not be accepted.

- b. Log Sill installed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.
2. Basis of Payment:
- a. The unit price per linear foot of log sill shall include full compensation for all Work covered under this specification, including, but not limited to grading, installation, adjusting, excavating, on-site hauling, placing backfill, grouting, maintaining the feature through acceptance, and for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the Work as specified in the Contract Documents, or as directed by GCDWR.
  - b. Felled, on-site trees during site clearing activities can be used as construction material for this line item if product meets specifications within the Contract Documents and approved by GCDWR. No additional payment shall be made under Section 02 41 13 – Selective Site Demolition for on-site tree logs selected and accepted for installation.
  - c. Included shall be the cost of excavation to final subgrade below any bedding or rip rap material.
  - d. Removal and replacement of unstable or otherwise unsuitable material, beyond the depths and widths indicated in the Contract Documents, where necessary to provide firm foundations or tie-ins, if and where directed and approved by GCDWR, shall be eligible for payment in accordance with Specification Section 31 23 00 – Excavation and Fill. Excavation beyond the depths and widths needed to place structural components, as indicated in the Contract Documents, will not be eligible for additional payment, without direction or approval from GCDWR.
  - e. No separate measurement of materials shall be made under this item for coarse backfill, fabric, anchors, grouting and/or other incidental items.
  - f. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 92A through No. 92D.

PPP. PAY ITEM 93 – LOG SILL – IMPORTED, Specification 31 80 10, Log Sill

1. Method of Measurement:
- a. Log Sill shall be measured per linear foot of log sill completed and accepted into the final Work, as measured along the horizontal centerline of the following structure features: left sill width, left arm length, center log width, right arm length, and right sill width as specified in the Contract Documents, or as directed by GCDWR. Contractor shall notify GCDWR for measurement inspection of structure prior to backfill. Request for payment for structure submitted without measured inspection by GCDWR will not be accepted.

- b. Log Sill installed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.

2. Basis of Payment:

- a. The unit price per linear foot of log sill shall include full compensation for all Work covered under this specification, including, but not limited to grading, installation, adjusting, excavating, placing backfill, grouting, maintaining the feature through acceptance, and for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the Work as specified in the Contract Documents, or as directed by GCDWR.
- b. Included shall be the cost of excavation to final subgrade below any bedding or rip rap material.
- c. Removal and replacement of unstable or otherwise unsuitable material, beyond the depths and widths indicated in the Contract Documents, where necessary to provide firm foundations or tie-ins, if and where directed and approved by GCDWR, shall be eligible for payment in accordance with Specification Section 31 23 00 – Excavation and Fill. Excavation beyond the depths and widths needed to place structural components, as indicated in the Contract Documents, will not be eligible for additional payment, without direction or approval from GCDWR.
- d. No separate measurement of materials shall be made under this item for coarse backfill, fabric, grouting, anchors and/or other incidental items.
- e. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 93A through No. 93D.

QQQ.PAY ITEM 94 – TOE WOOD PROTECTION: Specification 31 80 12, Toe Wood Protection

1. Method of Measurement:

- a. Toe wood protection shall be measured per square yard of toe wood protection, complete in place as shown in the Contract Documents or directed by GCDWR.
- b. Toe Wood protection placed outside the area shown on the Contract Documents will not be included in the measurement for payment, unless directed by GCDWR.

2. Basis of Payment:

- a. The unit price shall include full compensation for all Work covered under this specification, including, but not limited to grading, installation, adjusting, excavating, placing backfill, maintaining the feature through



acceptance, and for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the Work as specified in the Contract Documents, or as directed by GCDWR.

- b. No separate measurement of materials shall be made under this item for coarse backfill, fabric, anchors and/or other incidental items.

RRR. PAY ITEM 95 – LIVE FASCINE: Specification 31 80 14, Live Fascine

1. Method of Measurement:

- a. Live fascine shall be measured by the actual linear feet of live fascine installed in place and accepted into final work, as measured along the centerline surface of the structure as specified in the Contract Documents, or as directed by GCDWR.
- b. Live fascine installed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.

2. Basis of Payment:

- a. The unit price shall be full compensation for all Work covered under this specification, including, but not limited to grading, installation, adjusting, excavating, placing backfill, maintaining the feature through acceptance, and for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the work as specified in the Contract Documents, or as directed by GCDWR.
- b. No separate measurement of materials shall be made under this item for coarse backfill, fabric, anchors and/or other incidental items.

SSS. PAY ITEM 96 – STONE CASCADE: Specification 31 80 15, Stone Cascade

1. Method of Measurement:

- a. Stone cascade shall be measured per CY of stone completed and accepted into the final Work as specified in the Contract Documents, or as directed by GCDWR.
- b. Stone cascade installed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.
- c. Crest and Footer stones used for each Unit Price Item classification of Stone Cascade shall consist of the corresponding size boulders in accordance with the Contract Documents and Paragraph 2.1 B of Section 31 80 08 – In-Stream and Stormwater Conveyance Structure Materials.

- 1) Extra Large



- 2) Large
  - 3) Medium
  - 4) Small
2. Basis of Payment
- a. Basis of Payment
  - b. The unit price shall include full compensation for all Work covered under this specification, including, but not limited to grading, installation, grouting, adjusting, excavating, placing backfill, maintaining the feature through acceptance, and for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the work as specified in the Contract Documents, or as directed by GCDWR.
  - c. Included shall be the cost of excavation to final subgrade below any bedding or rip rap material.
  - d. Removal and replacement of unstable or otherwise unsuitable material, beyond the depths and widths indicated in the Contract Documents, where necessary to provide firm foundations or tie-ins, if and where directed and approved by GCDWR, shall be eligible for payment in accordance with Specification Section 31 23 00 – Excavation and Fill. Excavation beyond the depths and widths needed to place structural components, as indicated in the Contract Documents, will not be eligible for additional payment, without direction or approval from GCDWR.
  - e. No separate measurement of materials shall be made under this item for coarse backfill, fabric, anchors, grouting, and/or other incidental items.
  - f. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 96A through No. 96D.

TTT. PAY ITEM 97 – SOIL ENCAPSULATED LIFT (SEL) WITHOUT COIR BLOCK:  
Specification 31 80 17, Soil Encapsulated Lift

1. Method of Measurement:
- a. Soil encapsulated lifts (SEL) without coir block shall be measured by the actual linear feet of each lift installed and accepted in place as specified in the Contract Documents or as otherwise directed by GCDWR.
  - b. Soil encapsulated lifts (SEL) installed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.

2. Basis of Payment:

- a. The unit price shall be full compensation for all Work covered under this specification, including excavating, grading, installation, adjusting, placing backfill, maintaining the feature through acceptance, and for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the Work as specified in the Contract Documents, or as directed by GCDWR.
- b. Included shall be the cost of excavation to final subgrade below any bedding or rip rap material.
- c. Removal and replacement of unstable or otherwise unsuitable material, beyond the depths and widths indicated in the Contract Documents, where necessary to provide firm foundations or tie-ins, if and where directed and approved by GCDWR, shall be eligible for payment in accordance with Specification Section 31 23 00 – Excavation and Fill. Excavation beyond the depths and widths needed to place structural components, as indicated in the Contract Documents, will not be eligible for additional payment, without direction or approval from GCDWR.
- d. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 97A and 97B.

UUU. PAY ITEM 98 – SOIL ENCAPSULATED LIFTS (SEL) WITH COIR BLOCK:  
Specification 31 80 17, Soil Encapsulated Lift

1. Method of Measurement:

- a. Soil encapsulated lifts (SEL) with coir fiber block shall be measured by the actual linear feet of each lift installed and accepted as specified in the Contract Documents or as otherwise directed by GCDWR.
- b. Soil encapsulated lifts (SEL) installed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.

2. Basis of Payment:

- a. The unit price shall be full compensation for all Work covered under this specification, including, but not limited to grading, installation, adjusting, excavating, placing backfill, maintaining the feature through acceptance, and for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the Work as specified in the Contract Documents, or as directed by GCDWR.
- b. Included shall be the cost of excavation to final subgrade below any bedding or rip rap material.
- c. Removal and replacement of unstable or otherwise unsuitable material,

beyond the depths and widths indicated in the Contract Documents, where necessary to provide firm foundations or tie-ins, if and where directed and approved by GCDWR, shall be eligible for payment in accordance with Specification Section 31 23 00 – Excavation and Fill. Excavation beyond the depths and widths needed to place structural components, as indicated in the Contract Documents, will not be eligible for additional payment, without direction or approval from GCDWR.

- d. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 62.A and 62.B.

VVV. PAY ITEM 99 – STORMWATER OUTFALL STEPS: Specification 31 80 19, Stormwater Outfall Steps

1. Method of Measurement:

- a. Stormwater outfall steps shall be measured per square foot of exposed step stone surface completed and accepted into the final Work as specified in the Contract Drawings, or as directed by GCDWR.
- b. Stormwater outfall steps installed beyond the limits shown in the Contract documents will not be included in the measurement for payment unless directed or approved by GCDWR.

2. Basis of Payment:

- a. The unit price per square foot of stormwater outfall step shall include full compensation for all Work covered under this specification, including, but not limited to grading, installation, grouting, adjusting, excavating, placing backfill, maintaining the feature through acceptance, and for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the work as specified in the Contract Drawings, or as directed by GCDWR.
- b. Included shall be the cost of excavation to final subgrade below any bedding or rip rap material.
- c. Removal and replacement of unstable or otherwise unsuitable material, beyond the depths and widths indicated in the Contract Documents, where necessary to provide firm foundations or tie-ins, if and where directed and approved by GCDWR, shall be eligible for payment in accordance with Specification Section 31 23 00 – Excavation and Fill. Excavation beyond the depths and widths needed to place structural components, as indicated in the Contract Documents, will not be eligible for additional payment, without direction or approval from GCDWR.
- d. Stone material used for rock landing areas between step stones, as shown in the Contract Documents or directed by GCDWR, shall be measured for payment as described in Section 31 05 16 – Aggregates for Earthwork, 31 37 00 – Rip Rap, and Section 31 80 02 – In-Stream and

Stormwater Conveyance Structure Materials under the pertinent Unit Price Item.

- e. No separate measurement of materials shall be made under this item for coarse backfill, fabric, anchors, grouting and/or other incidental items.

## 1.12 Bid Items – Division 32: Exterior Improvements

### A. PAY ITEM 100 – LABOR RATES: Specification 32 01 30, Labor Rates

#### 1. Method of Measurement:

- a. Labor shall be measured by hour, to the nearest whole hour, worked on the Project site in the following labor categories, as approved prior to commencing Work by GCDWR. Hours shall be documented by the Contractor using daily timesheets. Time associated with transportation to and from the Project site is not eligible for payment.

1) Foreman.

2) Laborer.

3) Surveyor. For the purposes of this Pay Item, a Surveyor shall be deemed to consist of a crew of at least two persons.

4) Technical Laborer.

#### 2. Basis for Payment:

- a. The unit price shall be compensation in full for all labor, overhead, profit and benefits unless otherwise directed or approved by GCDWR.
- b. Payment will not be approved without submission of a weekly Payroll Report.
- c. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 100A through No. 100D.

### B. PAY ITEM 101 – HEAVY EQUIPMENT RATES: Specification Section 32 01 31, Construction Aids – Heavy Equipment

#### 1. Method of Measurement:

- a. Heavy equipment shall be measured by each hour of equipment used on site, up to eight (8) hours each workday, as approved or directed by GCDWR prior to commencing Work.

- b. Heavy equipment eligible for measurement under this Section shall be measured at a minimum four (4) hours on the first workday equipment is used on site in the execution of the Work.

2. Basis of Payment:
  - a. The unit price shall be compensation in full for the delivery and removal from the project site, cost of fuel, lubricants, cutting edges, maintenance, operator's wages, and all other operating costs.
  - b. Payment will not be made for equipment the Contractor leaves idle at the work site after it is no longer being used or is no longer reasonably needed in the Work.
  - c. Payment will not be approved without submission of documentation satisfactory to GCDWR, typically daily timesheets.
  - d. This pay item shall be used for all heavy equipment used on-site, not considered incidental elsewhere, and specifically requested or directed by GCDWR.
  - e. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 101A through No. 101K.
  
- C. PAY ITEM 102 – ASPHALT PAVING: Specification Section 32 12 16, Asphalt Paving
  1. Method of Measurement: The quantity to be measured in the actual number of tons of new roadway or parking area asphalt pavement installed as shown on the Contract Documents or as directed by GCDWR.
  2. Basis of Payment: The Unit Price for roadway asphalt paving shall include the furnishing of all materials, including tack coat, labor, tools, and appliances necessary to complete the Work as herein specified, shown, or ordered and maintenance charges and inspection fees required by all road departments.
  
- D. PAY ITEM 103 – CONCRETE UNIT PAVERS: Specification 32 14 13, Concrete Unit Paving
  1. Method of Measurement: The quantity to be measured in the actual number of square yards of concrete unit paving installed as shown on the Contract Documents or as directed by GCDWR.
  2. Basis of Payment:
    - a. The Unit Price for concrete unit paving shall include all materials, including pavers, bedding coarse aggregate, joint opening aggregate, labor, tools, and equipment necessary to complete the Work as herein specified, as indicated on the Drawings, or as directed by GCDWR.
    - b. Subbase Aggregate and Base Coarse Aggregate shall be measured for payment as described in Specification Section 31 05 16 – Aggregates for Earthwork.
    - c. Geotextiles shall be measured for payment as described in Specification

Section 31 32 19.16 – Geotextiles.

- d. Infill materials for Concrete Grid Unit Pavers shall be measured for payment as specified in Specification Section 31 05 16 – Aggregates for Earthwork for stone infill or as specified in Specification Section 32 91 13 – Soil Preparation for topsoil infill.
  - e. Seeding or sodding of Concrete Grid Unit Pavers shall be measured for payment as specified in Specification Section 32 92 00 – Turfs and Grasses.
  - f. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 103A through 103C.
- E. PAY ITEM 104 – PERVIOUS CONCRETE PAVING: Specification Section 32 14 43, Pervious Concrete Paving
- 1. Method of Measurement: The quantity to be measured in the actual number of cubic yards of roadway, parking area, or other areas of pervious concrete pavement installed as shown on the Contract Documents or as directed by GCDWR.
  - 2. Basis of Payment:
    - a. The Unit Price for pervious concrete paving shall include all permit fees, maintenance charges, testing and inspecting fees required by road departments and the furnishing of all materials, labor, tools, and equipment necessary to complete the Work as herein specified, as indicated on the Drawings, or as directed by GCDWR. Included in the costs for pervious concrete paving are the costs of curing materials, jointing materials, forms, test panel installation and all associated costs of work necessary for furnishing Pervious Concrete Paving.
    - b. Subbase aggregate and base coarse aggregate shall be measured for payment as described in Specification Section 31 05 16 – Aggregates for Earthwork.
    - c. Geotextiles shall be measured for payment as described in Specification Section 31 32 19.16 – Geotextiles.
- F. PAY ITEM 105 – MODULAR PREFABRICATED PERVIOUS CONCRETE PANELS: Specification Section 32 14 43, Pervious Concrete Paving
- 1. Method of Measurement: The quantity to be measured in the actual number of square yards of roadway, parking area, or other areas of modular prefabricated pervious concrete panels installed as shown on the Contract Documents or as directed by GCDWR.

2. Basis of Payment:
  - a. The Unit Price for modular prefabricated pervious concrete panels shall include all permit fees, maintenance charges, testing and inspecting fees required by road departments and the furnishing of all materials, labor, tools, and equipment necessary to complete the Work as herein specified, as indicated on the Drawings, or as directed by GCDWR. Included in the costs for modular pervious concrete panels are the costs of transportation, hauling, jointing materials, forms, field cuts, and all associated costs of work necessary for furnishing Modular Prefabricated Pervious Concrete Panels.
  - b. Subbase aggregate and base coarse aggregate shall be measured for payment as described in Specification Section 31 05 16 – Aggregates for Earthwork.
  - c. Geotextiles shall be measured for payment as described in Specification Section 31 32 19.16 – Geotextiles.
  
- G. PAY ITEM 106 – CURB AND GUTTER, HIGH BACK OR ROLL BACK: Specification 32 16 00, Curbs, Gutters, and Sidewalks
  1. Method of Measurement: Measurement shall be made using the actual linear feet of combination curb and gutter installed in accordance with these specifications as defined in the Contract Documents, or as directed by GCDWR.
  2. Basis of Payment:
    - a. The unit price shall be compensation in full for the work and shall include permit fees, maintenance charges and inspection fees required by all road departments and the furnishing of all materials, labor, tools, and appliances necessary to complete the Work as herein specified, shown, or ordered. Included shall be any costs of furnishing necessary work beyond the limits of measurement as defined under these Specifications.
    - b. Subbase aggregate under curb and gutter, where shown in the Contract Documents, shall be measured for payment as described in Specification Section 31 05 16 – Aggregates for Earthwork. Subbase aggregate installed beyond the limits shown in the Contract Documents will not be measured for payment unless directed or approved by GCDWR.
    - c. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 106A through 106C.
  
- H. PAY ITEM 107 – HEADER CURB: Specification 32 16 00, Curbs, Gutters, and Sidewalks
  1. Method of Measurement: Measurement shall be made using the actual linear feet of header curb installed in accordance with these specifications as defined in the Contract Documents or as directed by GCDWR.

2. Basis of Payment:
  - a. The unit price shall be compensation in full for the work and shall include permit fees, maintenance charges and inspection fees required by all road departments and the furnishing of all materials, labor, tools, and appliances necessary to complete the Work as herein specified, shown, or ordered. Included shall be any costs of furnishing necessary work beyond the limits of measurement as defined under these Specifications.
  - b. Subbase aggregate under curbs, where shown in the Contract Documents, shall be measured for payment as described in Specification Section 31 05 16 – Aggregates for Earthwork. Subbase aggregate installed beyond the limits shown in the Contract Documents will not be measured for payment unless directed or approved by GCDWR.
  - c. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 107A through 107B.
- I. PAY ITEM 108 – SIDEWALK: Specification 32 16 00, Curb Gutters, and Sidewalk
  1. Method of Measurement: Measurement shall be made by the actual square yards of sidewalk installed or restored in accordance with the Contract Documents, or as directed by GCDWR.
  2. Basis of Payment:
    - a. The unit price shall be compensation in full for the work and shall include any additional permit fees, maintenance charges and inspection fees required by all road departments and the furnishing of all materials, labor, tools, and appliances necessary to complete the Work as herein specified, shown, -ordered, or directed by GCDWR.
    - b. Included shall be the costs of excavation beyond trench width to provide room for forms, firm foundation, and any costs of furnishing necessary work beyond the limits of measurement as defined under these Specifications.
- J. PAY ITEM 109 – CHAIN LINK FENCE: Specification 32 31 00, Fences and Gates
  1. Method of Measurement:
    - a. Chain link fence shall be measured per linear foot along the bottom of the fence, from the outside of end posts for each continuous run of fence as defined in the Contract Documents, or as directed by GCDWR.
    - b. Three strand barbed wire shall be measured per linear foot along the bottom of the fence, from the outside of end posts for each continuous run of fence as defined in the Contract Documents, or as directed by GCDWR.



2. Basis of Payment
  - a. The unit price shall be compensation in full for all tools, equipment, labor, materials, and incidentals necessary to furnish and install posts, post assemblies, fasteners, braces, rails, chain link fabric, barbed wire brackets, and gates as directed by GCDWR.
  - b. Payment shall be compensation for all maintenance of the chain link fence, including repairs or replacement of chain link fence.
  - c. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 109A through No. 109G.
  
- K. PAY ITEM 110 – SPLIT RAIL FENCE: Specification 32 31 00, Fences and Gates
  1. Method of Measurement: Split rail fence shall be measured per linear foot along the bottom of the fence, from the outside of end posts for each continuous run of fence as defined in the Contract Documents, or as directed by GCDWR.
  2. Basis of Payment
    - a. The unit price shall be compensation in full for all tools, equipment, labor, materials, and incidentals necessary to furnish and install posts, post assemblies, fasteners, braces, rails, and gates as directed by GCDWR.
    - b. Payment shall be compensation for all maintenance of the split rail fence, including repairs or replacement of split rail fence.
    - c. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 110A through No. 110B.
  
- L. PAY ITEM 111 – WOODEN PRIVACY FENCE: Specification 32 31 00, Fences and Gates
  1. Method of Measurement: Wooden privacy fence shall be measured per linear foot along the bottom of the fence, from the outside of end posts for each continuous run of fence as defined in the Contract Documents, or as directed by GCDWR.
  2. Basis of Payment
    - a. The unit price shall be compensation in full for all tools, equipment, labor, materials, and incidentals necessary to furnish and install posts, post assemblies, fasteners, braces, rails, and gates as directed by GCDWR.
    - b. Payment shall be compensation for all maintenance of the wooden privacy fence, including repairs or replacement of wooden privacy fence.
    - c. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 111A through No. 111B.

M. PAY ITEM 112 – DECORATIVE FENCE: Specification 32 31 00, Fences and Gates

1. Method of Measurement: Decorative fence shall be measured per linear foot along the bottom of the fence, from the outside of end posts for each continuous run of fence as defined in the Contract Documents, or as directed by GCDWR.
2. Basis of Payment
  - a. The unit price shall be compensation in full for all tools, equipment, labor, materials, and incidentals necessary to furnish and install posts, post assemblies, fasteners, braces, rails, and gates as directed by GCDWR.
  - b. Payment shall be compensation for all maintenance of the decorative fence, including repairs or replacement of decorative fence.
  - c. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 112A through No. 112B.

N. PAY ITEM 113 – WELDED WIRE FENCING: Specification 32 31 00, Fences and Gates

1. Method of Measurement: Welded wire fencing shall be measured for the actual linear feet installed, measured as installed in place along the bottom of the fence from the outside of end posts for each continuous run of fence or as directed by GCDWR.
2. Basis of Payment
  - a. The unit price shall be compensation in full for all tools, equipment, labor, materials, and incidentals necessary to furnish and install posts, rails, fasteners, tie wire, wire fabric, and trench wire fabric as directed by GCDWR.
  - b. Payment shall be compensation for all maintenance of the welded wire fencing, including repairs or replacement of welded wire fencing.
  - c. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 113A through 113B.

O. PAY ITEM 114 – CHICKEN WIRE FENCING: Specification 32 31 00, Fences and Gates

1. Method of Measurement: Chicken wire fencing shall be measured for the actual linear feet installed, measured as installed in place along the bottom of the fence from the outside of end posts for each continuous run of fence or as directed by GCDWR.
2. Basis of Payment
  - a. The unit price shall be compensation in full for all tools, equipment, labor,

- materials, and incidentals necessary to furnish and install posts, fasteners, tie wire, wire fabric, and trench wire fabric as directed by GCDWR.
- b. Payment shall be compensation for all maintenance of the chicken wire fencing, including repairs or replacement of chicken wire fencing.
- P. PAY ITEM 115 – BOLLARDS: Specification 32 31 00, Fences and Gates
- 1. Method of Measurement: Bollards shall be measured for the actual number of bollards complete in place as shown in the Contract Documents or as directed by GCDWR.
  - 2. Basis of Payment
    - a. The unit price shall be compensation in full for all tools, equipment, labor, materials, and incidentals necessary to furnish and install steel bollard, baseplate, internal sleeves, primer, and fastener hardware as directed by GCDWR.
    - b. Payment shall be compensation for all maintenance of the bollards, including repairs or replacement of bollards.
- Q. PAY ITEM 116 – SEGMENTAL RETAINING WALL (PERMANENT FIELDSTONE FACE OR MODULAR BLOCK WALL FACE): Specification 32 32 23, Segmental Retaining Walls
- 1. Method of Measurement: Segmental retaining wall structures shall be measured by the actual square feet of installed vertical wall face in place as defined in the Contract Documents, or as directed by GCDWR.
  - 2. Basis of Payment
    - a. The unit price shall be compensation in full for all work and shall include full compensation for all work necessary for installation including all material, equipment, and labor required in accordance with the Contract Documents and Specifications.
    - b. Where required, all over excavation, geogrid reinforcement, backfill, foundation compaction and testing coordination, and drainpipe installation shall be included in the per square foot cost of the segmental wall.
    - c. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 116A and No. 116B.
- R. PAY ITEM 117 – ACCESS MATS: Specification 32 39 10, Temporary Construction Matting
- 1. Method of Measurement: Access mats shall be measured by the actual square

yards of mats installed in place as directed or approved by GCDWR. Measurement for payment will not include access mats used for protection of assets in the right-of-way or other surfaces requiring protection from machinery or construction traffic of any kind, whether in the right of way or not.

2. Basis of Payment

- a. Payment shall be compensation in full for all work and shall include all labor, equipment, and materials necessary for furnishing, placing, handling, on-site hauling, maintenance, and removal of the access mats. Payment includes initial installation only.
- b. No additional payment shall be made for maintenance, replacement, or relocation of access mat.
- c. Access mats used for protection of assets in the right-of-way or other surfaces requiring protection from machinery or construction traffic of any kind, whether in the right of way or not, shall be considered incidental to the Work.
- d. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 117A through 117B.

S. PAY ITEM 118 – TOPSOIL: Specification 32 91 13, Soil Preparation

1. Method of Measurement

- a. Imported topsoil shall be measured by the actual cubic yards of topsoil that is imported and installed in place as required in the Contract Documents or as otherwise directed by GCDWR.
- b. Native topsoil removed from the immediate site and reused for topsoil shall not be included in measurement under this pay item.
- c. Topsoil placement and final grading associated with performance of Temporary Seeding in accordance with Section 31 25 00 - Erosion and Sedimentation, Turfs and Grasses in accordance with Section 32 92 00 - Turf and Grasses, and Landscaping in accordance with Section 32 97 00 - Landscaping shall not be included for measurement under this pay item unless the topsoil is imported.
- d. Any additional topsoil placement and final grading that occurs outside of the defined work area, per the Contract Documents, will be considered beyond the limits of measurement and will be considered incidental to the Work, unless otherwise directed and approved by GCDWR.
- e. Soil amendments performed as part of topsoil placement and final grading activities under this pay item shall be paid per the Soil Preparation in accordance with Section 32 91 13 - Soil Preparation pay items.

2. Basis of Payment

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, and incidentals necessary to haul topsoil to the site and complete soil testing within the defined project area or as further directed by GCDWR.
- b. Payment will not be approved without submission of bag labels or weighted delivery tickets.

T. PAY ITEM 119 – SOIL AMENDMENTS: Specification 32 91 13, Soil Preparation

1. Method of Measurement

- a. Soil amendments, as listed below, shall be measured for the actual pound of material amended into the soil as required in the Contract Documents or as otherwise directed by GCDWR.
  - 1) Lime.
  - 2) Sawdust.
  - 3) Ground bark.
  - 4) Compost Mulch.
  - 5) Peat.
  - 6) Fertilizer.
  - 7) Sand.
  - 8) Perlite.
  - 9) Gypsum.
- b. Soil amendments applied during performance of Temporary Seeding in accordance with Section 31 25 00 - Erosion and Sedimentation, Turfs and Grasses in accordance with Section 32 92 00 - Turfs and Grasses, and Landscaping in accordance with Section 32 97 00 - Landscaping shall not be included for measurement under this pay item.
- c. Amendments added outside of the defined work area, per the Contract Documents, will be considered beyond the limits of measurement and will be considered incidental to the Work, unless directed and approved by GCDWR.

2. Basis of Payment

- a. The unit price shall be compensation in full for all tools, equipment, labor,

materials, and incidentals necessary to amend soil within the defined project area or as directed by GCDWR.

- b. Payment will not be approved without submission of bag labels or weighted delivery tickets.
- c. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 119A through No. 119I.

U. PAY ITEM 120 – COMPOST MULCH: Specification 32 91 13, Soil Preparation

1. Method of Measurement

- a. Compost mulch shall be measured for the actual cubic yards of material that is provided in place, according to the application method listed below, as in the Contract Documents or as otherwise directed by GCDWR:
  - 1) Blown.
  - 2) Hand placed.
- b. Any additional compost mulch added outside of the defined work area per the Contract Documents, will be considered beyond the limits of measurement and will be considered incidental to the Work, unless otherwise directed and approved by GCDWR.
- c. Compost mulch used as a soil amendment shall be measured for payment under the pertinent Soil Amendment Unit Price item.

2. Basis of Payment

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, and incidentals necessary to apply mulch within the defined project area per the Contract Documents or as otherwise directed by GCDWR.
- b. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 120A and No. 120B.

V. PAY ITEM 121 – PLANTING SOIL MIXES: Specification 32 91 13, Soil Preparation

1. Method of Measurement

- a. Planting soil mix shall be measured for the actual cubic yards of material that is installed in place as required in the Contract Documents or as otherwise directed by GCDWR.
- b. Native topsoil removed from the immediate site and reused for planting soil mix shall not be included in measurement under this pay item.

- c. Amendments shall be measured for payment under the pertinent Soil Amendment Unit Price items.
- d. Measurements for planting soil mix during performance of Landscaping in accordance with Section 32 97 00 - Landscaping shall not be included in measurement under this pay item.
- e. Any additional soil mixes added outside of the defined work area, per the Contract documents, and/or outside of area(s) directed/requested by GCDWR will be considered beyond the limits of measurement and will be considered incidental to the Work.

2. Basis of Payment

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, and incidentals necessary to furnish, install, and grade planting soil mix within the defined project area, per the Contract Documents, or as otherwise directed by GCDWR.

W. PAY ITEM 122 - TILLING: Specification 32 91 13, Soil Preparation

1. Method of Measurement

- a. Tilling of soil shall be measured for the actual square yards of land tilled as specified in the Contract Documents or as otherwise directed by GCDWR.
- b. Tilling associated with performance of Temporary Seeding in accordance with Section 31 25 00 - Erosion and Sedimentation, Turfs and Grasses in accordance with Section 32 92 00 - Turf and Grasses, and Landscaping in accordance with Section 32 97 00 – Landscaping and tilling to remedy compaction by construction equipment executing the Work shall not be included for measurement under this pay item.
- c. Any additional tilling that occurs outside of the defined work area and/or directed by GCDWR will be considered beyond the limits of measurement and will be considered incidental to the Work.

2. Basis of Payment

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, and incidentals necessary to till the soil within the defined project area or as otherwise directed by GCDWR.

X. PAY ITEM 123 – HAND GRADING: Specification 32 91 13, Soil Preparation

- 1. Method of Measurement: Hand grading shall be measured by the actual square yards of surface area where soil is placed, moved, and shaped by manual labor, where hand grading is directed by GCDWR and is not incidental to other pay items.

2. Basis of Payment

- a. The unit price shall be compensation in full for the work and shall include the furnishing of all labor, materials, and appliances necessary to complete the Work as specified.
- b. Hand grading associated with performance of Temporary Seeding in accordance with Section 31 25 00 - Erosion and Sedimentation, Turfs and Grasses in accordance with Section 32 92 00 - Turf and Grasses, Landscaping in accordance with Section 32 97 00 – Landscaping, and construction of any In-Stream Structure, Stormwater Management BMP, curb, sidewalk, pavement, or other like features covered under those specifications, shall be incidental to those items and shall not be included for measurement under this pay item.

Y. PAY ITEM 124 – SAND FILL: Specification 32 91 13, Soil Preparation

1. Method of Measurement: Sand fill, sand used to fill voids in terrain but not used as soil amendment, shall be measured by the actual cubic yards installed in place as required in the Contract Documents or as otherwise directed by GCDWR.

2. Basis of Payment

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, transportation, and incidentals necessary to excavate, furnish, place, compact and maintain sand fill as shown on in the Contract Documents, or ordered.
- b. Sand fill placed beyond the limits defined in the Contract Documents will not be included in the measure for payment, unless otherwise directed ad approved by GCDWR.
- c. Payment will not be approved without submission of bag labels or weighted delivery tickets.

Z. PAY ITEM 125 – SEEDING: Specification Section 32 92 00, Turfs and Grasses

1. Method of Measurement

- a. Seeding, in accordance with the following seed mix types, shall be measured for the actual square yards of land measured on the horizontal seeded at the coverage rate specified as shown in the Contract Documents or as otherwise directed by GCDWR.

- 1) Native upland.
- 2) Native wetland.
- 3) Ornamental.



4) Custom.

2. Basis of Payment

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, and incidentals necessary for furnishing, placing, sowing, and maintaining seeding.
- b. Payment shall be compensation in full for maintenance of the seed, including additional application or replacement during the warranty period(s).
- c. Payment shall be compensation for all soil preparation and mulching performed as part of grass seeding activity.
- d. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 125A through No. 125D.

AA. PAY ITEM 126 – TURF GRASS SEEDING: Specification Section 32 92 00, Turfs and Grasses

1. Method of Measurement

- a. Turf grass seeding, in accordance with the following seed types, shall be measured for the actual square yards of land seeded at the seeding rate specified as shown in the Contract Documents or as otherwise directed or approved by GCDWR.
  - 1) Standard Varieties
  - 2) Premium Varieties

2. Basis of Payment

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, and incidentals necessary for furnishing, placing, sowing, maintaining, and removing and/or replacing turf grass seeding during the installation and warranty period(s).
- b. No additional payment shall be made for maintenance of the seed or seeded area, including additional application or replacement.
- c. Payment shall be compensation for all soil preparation and mulching performed as part of turf grass seeding activity.
- d. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 126A through No. 126B.

BB. PAY ITEM 127 – TURFGRASS SODDING: Specification Section 32 92 00, Turfs and Grasses

1. Method of Measurement

a. Sodding, in accordance with the following sod types, shall be measured for the actual square yards that are complete in place as required in the Contract Documents or as otherwise directed by GCDWR.

- 1) Standard Varieties.
- 2) Premium Varieties.
- 3) Bermuda Grass

2. Basis of Payment

a. The unit price shall be compensation in full for all tools, equipment, labor, materials, and incidentals necessary for furnishing, placing, sowing, maintaining, and removing sodding.

b. No additional payment shall be made for maintenance of the sod, including additional installation or replacement during the warranty period(s).

c. Payment shall be compensation for all soil preparation performed as part of turf grass sodding activity.

d. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 127A through No. 127C.

CC. PAY ITEM 128: HYDROSEEDING: Specification Section 32 92 00, Turfs and Grasses

1. Method of Measurement

a. Hydroseeding, in accordance with the following seed types, shall be measured for the actual square yards at the coverage and seeding rates specified as shown in the Contract Documents or as otherwise directed by GCDWR.

- 1) Standard Turf Grass Varieties.
- 2) Premium Turf Grass Varieties.
- 3) Native Upland.
- 4) Native Wetland.
- 5) Ornamental.

6) Custom.

2. Basis of Payment

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, and incidentals necessary for furnishing, placing, sowing, maintaining, and removing hydroseed.
- b. No additional payment shall be made for maintenance of the hydroseed, including additional application or replacement.
- c. All grass seed, wood fiber mulch, water, or fertilizer included in the hydroseed mulch slurry, and straw mulch placed on hydroseeded areas shall be considered incidental to this pay item and no additional compensation will be made.
- d. Payment shall be compensation for all soil preparation performed as part of hydroseeding activity.
- e. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 128A through No. 128F.

DD. PAY ITEM 129 – LIVE STAKE: Specification Section 32 97 00, Landscaping

1. Method of Measurement: Live stakes shall be measured for the actual number of live stake cuttings complete in place as shown in the Contract Documents or as directed by GCDWR.
2. Basis of Payment:
  - a. The unit price shall be compensation in full for all tools, equipment, labor, materials, warranty, and incidentals necessary for furnishing, placing, staking, maintaining, and protecting the specific live cutting.
  - b. Replacements during the warranty period are incidental to the pay item.
  - c. Any removal of temporary vegetation, excavation, soil amendments, and mulching, within the footprint of the plant's root zone shall be considered incidental to the pay item.

EE. PAY ITEM 130 – LIVE WHIP: Specification Section 32 97 00, Landscaping

1. Method of Measurement: Live whips shall be measured for the actual number of live whip cuttings complete in place as shown in the Contract Documents or as directed by GCDWR.
2. Basis of Payment:
  - a. The unit price shall be compensation in full for all tools, equipment, labor, materials, warranty, and incidental necessary for furnishing, placing,

staking, maintaining, and protecting the specific live cutting.

- b. Replacements during the warranty period are incidental to the pay item.
- c. Any removal of temporary vegetation, excavation, soil amendments, and mulching, within the footprint of the plant's root zone shall be considered incidental to the pay item.

FF. PAY ITEM 131 – LIVE POLE: Specification Section 32 97 00, Landscaping

- 1. Method of Measurement: Live poles shall be measured for the actual number of live pole cuttings complete in place as shown in the Contract Documents or as directed by GCDWR.
- 2. Basis of Payment:
  - a. The unit price shall be compensation in full for all tools, equipment, labor, materials, warranty, and incidental necessary for furnishing, placing, staking, maintaining, and protecting the specific live cutting.
  - b. Replacements during the warranty period are incidental to the pay item.
  - c. Any removal of temporary vegetation, excavation, soil amendments, and mulching, within the footprint of the plant's root zone shall be considered incidental to the pay item.

GG. PAY ITEM 132 – LIVE PLANTINGS: Specification Section 32 97 00, Landscaping

- 1. Method of Measurement:
  - a. Live plantings, as listed below, shall be measured for the actual number of live plantings complete in place for each classification as shown in the Contract Documents or as directed by GCDWR.
    - 1) Flower Bulbs
    - 2) Plugs
    - 3) Bare Root Seedlings
- 2. Basis of Payment:
  - a. The unit price shall be compensation in full for all tools, equipment, labor, materials, warranty, and incidentals necessary for furnishing, placing, staking, maintaining, and protecting the specified live planting.
  - b. Replacements during the warranty period are incidental to the pay item.
  - c. Any removal of temporary vegetation, excavation, soil amendments, and mulching, within the footprint of the plant's root zone shall be considered

incidental to the pay item.

- d. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 132A through No. 132C.

HH. PAY ITEM 133 – CONTAINER PLANTINGS: Specification Section 32 97 00, Landscaping

- 1. Method of Measurement: Container plantings shall be measured for the actual number of specified plants complete in place for each size classification as shown in the Contract Documents or as directed by GCDWR.
- 2. Basis of Payment:
  - a. The unit price shall be compensation in full for all tools, equipment, labor, materials, warranty, and incidentals necessary for furnishing, placing, staking, maintaining, and protecting the specified container planting.
  - b. Replacements during the warranty period are incidental to the pay item.
  - c. Any removal of temporary vegetation, excavation, soil amendments, and mulching, within the footprint of the plant's root zone shall be considered incidental to the pay item.
  - d. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 133A through No. 133I.

II. PAY ITEM 134 – CALIPER TREES: Specification Section 32 97 00, Landscaping

- 1. Method of Measurement: Caliper trees shall be measured for the actual number of specified caliper trees complete in place for each size classification as shown in the Contract Documents or as directed by GCDWR.
- 2. Basis of Payment:
  - a. The unit price shall be compensation in full for all tools, equipment, labor, materials, warranty, and incidentals necessary for furnishing, placing, staking, maintaining, and protecting the specified caliper tree.
  - b. Replacements during the warranty period are incidental to the pay item.
  - c. Any removal of temporary vegetation, excavation, soil amendments, and mulching, within the footprint of the plant's root zone shall be considered incidental to the pay item.
  - d. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 134A through No. 134E.

JJ. PAY ITEM 135 – PLANT PROTECTION: Specification Section 32 97 00, Landscaping

1. Method of Measurement:

- a. Plant protection shall be measured for the actual number of plant protection devices complete in place for each classification, as approved by GCDWR prior to the Work.
- b. Plant protection devices shall not be included in the measurement for payment under this pay item for plants installed under this Contract.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, warranty, and incidentals necessary for furnishing, placing, installing, and maintaining and removing the plant protection device.

KK. PAY ITEM 136 – STRAW MULCH: Specification Section 32 97 00, Landscaping

1. Method of Measurement:

- a. Straw mulch shall be measured for the actual number of straw bales, in accordance with the type listed below, that is spread by hand and complete in place as required in the Contract Documents or as otherwise directed by GCDWR.

- 1) Wheat Straw Bales.
- 2) Pine Straw Bales.

- b. Straw mulch that is installed as part of temporary or permanent seeding shall be incidental to those items and not be eligible for measurement under this item.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, warranty, and incidentals necessary for furnishing, hauling, handling, placement, and maintaining the straw mulch.
- b. Costs associated with this activity are included in the Unit Price Schedule, Pay Items No. 136A through No. 136B.

LL. PAY ITEM 137 – WOOD MULCH: Specification Section 32 97 00, Landscaping

1. Method of Measurement:

- a. Wood mulch, in accordance with the type listed below, shall be measured for the actual cubic yards of material that is complete in place as required in the Contract Documents or as otherwise directed by GCDWR.

- 1) Hard Wood, Coarse Ground.
- 2) Hard Wood, Double Ground.
- 3) Soft Wood, Coarse Ground.
- 4) Soft Wood, Double Ground.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, warranty, and incidentals necessary for furnishing, hauling, handling, placement, and maintaining the wood mulch.
- b. Costs associated with this activity are included in the Unit Price Schedule, Pay Items No. 137A through No 137D.

MM. PAY ITEM 138 – LANDSCAPE EDGING BARRIER: Specification Section 32 97 00, Landscaping

1. Method of Measurement:

- a. Landscape edging shall be measured for the actual linear feet of landscape edging, in accordance with material listed below, complete in place as shown in the Contract Documents or as directed by GCDWR.
  - 1) Wood.
  - 2) Metal.
  - 3) Plastic.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, warranty, and incidentals necessary for furnishing and installing landscape edging barrier, including removal of any existing landscape edging barrier and trenching to install new landscape edging barrier.
- b. Maintenance of landscape edging barrier, including repairs and replacements, are incidental to the pay item.
- c. Costs associated with this activity are included in the Unit Price Schedule, Pay Items No. 138A through No. 138C.

NN. PAY ITEM 139 – TREE BAG: Specification Section 32 97 00, Landscaping

1. Method of Measurement: Tree bags shall be measured for the actual number of tree bags, measured as installed in place.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, and incidentals necessary for furnishing, placing, installing, maintaining, and removal of tree bags.
- b. Payment shall be compensation for all maintenance of the tree bags, including repairs or replacement.
- c. Initial watering and subsequent watering of tree bags during the maintenance period is incidental to this item and to the caliper tree pay item.

OO. PAY ITEM 140 – SLATE CHIPS: Specification Section 32 97 00, Landscaping

1. Method of Measurement:

- a. Slate chips shall be measured for payment for the actual cubic yards of slate chips complete and in place as shown on the Contract Documents, or as otherwise directed and approved by GCDWR.
- b. Slate chips placed beyond the limits defined in the Contract Documents will not be included in the measurement for payment, unless otherwise directed and approved by GCDWR.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, transportation, and incidentals necessary to excavate, furnish, place, compact, and maintain classified stone, as shown in Contract Documents or as otherwise directed and approved by GCDWR.
- b. Any excavation and backfill beyond the dimensions in the Contract Documents will be considered beyond the limits of measurement and will be considered incidental to the Work, unless otherwise directed and approved by GCDWR.
- c. Payment will not be approved without submission of bag labels or weighted delivery tickets.
- d. Geotextiles shall be measured for payment as described in Section 31 32 19.16 – Geotextiles.

PP. PAY ITEM 141 - FLAGSTONE: Specification Section 32 97 00, Landscaping

1. Method of Measurement:

- a. Flagstone shall be measured for payment by actual square yards of flagstone complete in place as shown on the Contract Documents or as directed by GCDWR.



- b. Flagstone placed beyond the limits defined in the Contract Documents will not be included in the measurement for payment, unless GCDWR directs or has directed placement beyond limits.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, transportation, and incidentals necessary to excavate, furnish, place, compact, and maintain classified stone, as shown in Contract Documents or otherwise directed and approved by GCDWR.
- b. Any excavation and backfill beyond the dimensions in the Contract Documents will be considered beyond the limits of measurement and will be considered incidental to the Work, unless otherwise directed and approved by GCDWR.
- c. Payment will not be approved without submission of bag labels or weighted delivery tickets.
- d. Geotextiles shall be measured for payment as described in Section 31 32 19.16 – Geotextiles.

QQ. PAY ITEM 142 – INVASIVE SPECIES PHYSICAL REMOVAL, Specification 32 97 10, Invasive Species Management

1. Method of Measurement

- a. Physical removal of invasive species shall be measured for each half day (up to four hours) or full day (more than four hours within a calendar day) for which physical removal was performed, as designated by GCDWR.
- b. Duration of physical removal work shall be measured using the designated crew's working hours, not as a sum of the individual members' hours within the crew.
- c. Work outside of the defined project area where physical removal was performed without prior approval by or direction of GCDWR shall not be included in measurement for payment.

2. Basis of Payment

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, and incidentals necessary to complete the Work. All cleared debris shall be removed, loaded, hauled away, and disposed off-site.
- b. Any removal of vegetative debris associated with this activity will be considered incidental to the cost of this activity.
- c. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 142A through No. 142B.

RR. PAY ITEM 143 – HERBICIDE APPLICATION AND PESTICIDE, LICENSED APPLICATION, Specification 32 97 10, Invasive Species Management

1. Method of Measurement
  - a. Herbicide and pesticide application shall be measured on the actual square yard basis per single occurrence as shown in the Contract Documents or otherwise directed by GCDWR.
  - b. The area of herbicide or pesticide application shall not exceed that defined in the Contract Documents or directed by GCDWR; exceedances of the defined area or as-directed area shall not be included in measurement for payment under this pay item.
2. Basis of Payment
  - a. The unit price shall be compensation in full for all tools, equipment, labor, materials, transportation, licensing, and incidentals necessary for herbicide and pesticide application.
  - b. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 143A through 143B.

1.13 Bid Items – Division 33: Utilities

A. PAY ITEMS 144 & 145 – POLYVINYL CHLORIDE (PVC) SCHEDULE 40 PIPE: Specification Section 33 42 11, Stormwater Gravity Piping

1. Method of Measurement:
  - a. Polyvinyl chloride Schedule 40 pipe shall be measured for the actual linear feet installed in place, as shown in the Contract Documents, or otherwise directed by GCDWR, either solid-walled, slotted, or perforated, measured in the horizontal plane after the pipe has been connected.
  - b. Any piping installed beyond the dimensions and location specified in the Contract Documents or as directed by GCDWR will be considered beyond the limits of measurement and will be considered incidental to the Work.
2. Basis of Payment
  - a. The unit price shall be compensation in full for all tools, equipment, labor, materials, trenching excavation and backfill including specified/classified materials, and incidentals necessary to furnish and install pipe and connections, jointing materials, mastic fillers, stoppers, concrete work, testing and inspections as specified, indicated, or directed on the Contract Documents.
  - b. Rock Excavation shall be measured for payment as described in Section 31 23 00 – Excavation and Fill.

- c. Excavation in excess of 10 feet from existing ground surface to the crown of pipe installed shall be measured for payment as described in 31 23 00 – Excavation and Fill.
  - d. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 144A through No. 145F.
- B. PAY ITEMS 146 & 147 – ALUMINUM COATED (TYPE 2) CORRUGATED STEEL PIPE: Specification Section 33 42 11, Stormwater Gravity Structures
- 1. Method of Measurement:
    - a. Aluminum Coated Corrugated Steel Pipe shall be measured for the actual linear feet installed in place, measured in the horizontal plane after the pipe has been connected.
    - b. Any piping installed beyond the dimensions and location specified in the Contract Documents or as directed by GCDWR will be considered beyond the limits of measurement and will be considered incidental to the Work.
  - 2. Basis of Payment
    - a. The unit price shall be compensation in full for all tools, equipment, labor, materials, trenching excavation and backfill including specified/classified materials, and incidentals necessary to furnish and install pipe and connections, jointing materials, mastic fillers, stoppers, concrete work, testing and inspections as specified, indicated, or directed on the Contract Documents.
    - b. Rock Excavation shall be measured for payment as described in Section 31 23 00 – Excavation and Fill.
    - c. Excavation in excess of 10 feet from existing ground surface to the crown of pipe installed shall be measured for payment as described in 31 23 00 – Excavation and Fill.
    - d. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 146A through No. 147C.
- C. PAY ITEMS 148 & 149 – CORRUGATED POLYMER PRECOAT STEEL PIPE: Specification Section 33 42 11, Stormwater Gravity Structures
- 1. Method of Measurement:
    - a. Corrugated Polymer Precoat Steel Pipe shall be measured for the actual linear feet installed in place, measured in the horizontal plane after the pipe has been connected.
    - b. Any piping installed beyond the dimensions and location specified in the Contract Documents or as directed by GCDWR will be considered beyond

the limits of measurement and will be considered incidental to the Work.

2. Basis of Payment

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, trenching excavation and backfill including specified/classified materials, and incidentals necessary to furnish and install pipe and connections, jointing materials, mastic fillers, stoppers, concrete work, testing and inspections as specified, indicated, or directed on the Contract Documents.
- b. Rock Excavation shall be measured for payment as described in Section 31 23 00 – Excavation and Fill.
- c. Excavation in excess of 10 feet from existing ground surface to the crown of pipe installed shall be measured for payment as described in 31 23 00 – Excavation and Fill.
- d. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 148A through No. 149B.

D. PAY ITEMS 150 & 151 – CORRUGATED ALUMINUM ALLOY PIPE: Specification Section 33 42 11, Stormwater Gravity Structures

1. Method of Measurement:

- a. Corrugated Aluminum Alloy Pipe shall be measured for the actual linear feet installed in place, measured in the horizontal plane after the pipe has been connected.
- b. Any piping installed beyond the dimensions and location specified in the Contract Documents or as directed by GCDWR will be considered beyond the limits of measurement and will be considered incidental to the Work.

2. Basis of Payment

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, trenching excavation and backfill including specified/classified materials, and incidentals necessary to furnish and install pipe and connections, jointing materials, mastic fillers, stoppers, concrete work, testing and inspections as specified, indicated, or directed on the Contract Documents.
- b. Rock Excavation shall be measured for payment as described in Section 31 23 00 – Excavation and Fill.
- c. Excavation in excess of 10 feet from existing ground surface to the crown of pipe installed shall be measured for payment as described in 31 23 00 – Excavation and Fill.

- d. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 150A through No. 151B.
- E. PAY ITEMS 152 & 153 – REINFORCED CONCRETE PIPE: Specification Section 33 42 11, Stormwater Gravity Structures
- 1. Method of Measurement:
    - a. Reinforced concrete pipe shall be measured for the actual linear feet installed in place, measured in the horizontal plane after the pipe has been connected.
    - b. Any piping installed beyond the dimensions and location specified in the Contract Documents or as directed by GCDWR will be considered beyond the limits of measurement and will be considered incidental to the Work.
  - 2. Basis of Payment
    - a. The unit price shall be compensation in full for all tools, equipment, labor, materials, trenching excavation and backfill including specified/classified materials, and incidentals necessary to furnish and install pipe and connections, jointing materials, mastic fillers, stoppers, concrete work, testing and inspections as specified, indicated, or directed on the Contract Documents.
    - b. Rock Excavation shall be measured for payment as described in Section 31 23 00 – Excavation and Fill.
    - c. Excavation in excess of 10 feet from existing ground surface to the crown of pipe installed shall be measured for payment as described in 31 23 00 – Excavation and Fill.
    - d. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 152A through No. 153D.
- F. PAY ITEMS 154, 155, 156 & 157 – HIGH DENSITY POLYETHYLENE PIPE: Specification Section 33 42 11, Stormwater Gravity Structures
- 1. Method of Measurement:
    - a. High density polyethylene pipe shall be measured for the actual linear feet of piping installed in place, in accordance with the type listed below and as measured in the horizontal plane after the pipe has been connected.
      - 1) HDPE Single Wall, Corrugated.
      - 2) HDPE Single Wall, Corrugated & Slotted.
      - 3) HDPE Double Wall.

- b. Any piping installed beyond the dimensions and location specified in the Contract Documents or as directed by GCDWR will be considered beyond the limits of measurement and will be considered incidental to the Work.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, trenching excavation and backfill including specified/classified materials, and incidentals necessary to furnish and install pipe and connections, jointing materials, mastic fillers, stoppers, concrete work, testing and inspections as specified, indicated, or directed on the Contract Documents.
- b. Rock Excavation shall be measured for payment as described in Section 31 23 00 – Excavation and Fill.
- c. Excavation in excess of 10 feet from existing ground surface to the crown of pipe installed shall be measured for payment as described in 31 23 00 – Excavation and Fill.
- d. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 154A through No. 157F.

G. PAY ITEMS 158 & 159 – DUCTILE IRON PIPE: Specification Section 33 42 11, Stormwater Gravity Structures

1. Method of Measurement:

- a. Ductile Iron Pipe shall be measured for the actual linear feet installed in place, measured in the horizontal plane after the pipe has been connected.
- b. Any piping installed beyond the dimensions and location specified in the Contract Documents or as directed by GCDWR will be considered beyond the limits of measurement and will be considered incidental to the Work.

2. Basis of Payment

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, trenching excavation and backfill including specified/classified materials, and incidentals necessary to furnish and install pipe and connections, jointing materials, mastic fillers, stoppers, concrete work, testing and inspections as specified, indicated, or directed on the Contract Documents.
- b. Rock Excavation shall be measured for payment as described in Section 31 23 00 – Excavation and Fill.
- c. Excavation in excess of 10 feet from existing ground surface to the crown of pipe installed shall be measured for payment as described in 31 23 00



measured by the actual vertical linear feet installed in place as measured from the invert to the rim elevation (elevation of the top of the inlet grate or manhole rim, as applicable, whichever is higher), to the nearest tenth of a foot (0.1 ft).

2. Basis of Payment:

- a. The unit price shall be compensation in full for the excavation, backfill, bedding, frames and castings, structure bases, wall sections, and top slabs, and all other labor, materials, equipment, and incidentals required to complete the Work.
- b. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 162A through No. 162F.

K. PAY ITEM 163 – REPLACEMENT TOP FOR DROP INLET, VARIOUS TYPES:  
Specification 33 42 30, Storm Drain Structures

1. Method of Measurement: Replacement Tops for Drop Inlets (GDOT Type 1019A, GDOT 9031S/9031D, and Gwinnett P&D Type 610) shall be measured by the actual number of replacement tops installed in place in accordance with inlet type.

2. Basis of Payment:

- a. The unit price shall be compensation in full for the excavation, backfill, bedding, frames and castings, precast concrete top slabs, and all other labor, materials, equipment, and incidentals required to complete the Work.
- b. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 163A through No. 163C.

L. PAY ITEM 164 – PRECAST CATCH BASIN, GROUP 1 OR 2 (GDOT 1033/1034):  
Specification 33 42 30, Storm Drain Structures

1. Method of Measurement: Complete Precast Catch Basins, Group 1 or 2, shall be measured by the actual vertical linear feet installed in place as measured from invert to rim elevation (elevation of the top of the manhole cover), to the nearest tenth of a foot (0.1 ft), in accordance with the Group Type, as shown in the Contract Documents or as directed by GCDWR.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, excavation, backfill, bedding, frames and covers, brick masonry, top and bottom slabs, and incidentals required to complete the Work.
- b. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 164A through No 164B.



- M. PAY ITEM 165 – REPLACEMENT TOP FOR 1033/1034 CATCH BASIN: Specification 33 42 30, Storm Drain Structures
1. Method of Measurement: Replacement Tops for 1033/1034 Catch Basins shall be measured by the actual number of replacement tops installed in place in accordance with each catch basin type.
  2. Basis of Payment:
    - a. The unit price shall be compensation in full for the excavation, backfill, bedding, frames and covers, precast concrete top slabs, and all other labor, materials, equipment, and incidentals required to complete the Work.
- N. PAY ITEM 166 – PVC DROP INLET: Specification 33 42 30, Storm Drain Structures
1. Method of Measurement: Complete Plastic Catch Basins, as listed below, shall be measured by the actual number of plastic inlets installed in place, in accordance with the specified type, as shown in the Contract Documents or as directed by GCDWR.
    - a. PVC Drop Inlet, Various Sizes, with Solid Lid, Flat Grate or Domed Grate (up to 6 FT in height)
    - b. PVC Drop Inlet with Stainless Steel (SS) Weir, Various Sizes, with Flat Grate or Domed Grate (up to 6 FT in height)
  2. Basis of Payment:
    - a. The unit price shall be compensation in full for all tools, equipment, labor, materials, excavation, backfill, bedding, frames and covers, top and bottom slabs, and incidentals required to complete the Work.
    - b. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 166A through No. 166G.
- O. PAY ITEM 167 – HEADWALL, VARIOUS PIPE SIZES: Specification 33 42 30, Storm Drain Structures
1. Method of Measurement: Headwalls, as listed below, shall be measured by the actual number of headwalls installed in place as shown in the Contract Documents or as directed by GCDWR.
    - a. Only pre-cast concrete, brick, and rock masonry headwalls shall be paid for under this Pay Item.
    - b. Cast-in-place concrete headwalls shall be measured and paid for under the respective Pay Item(s) for such work.

2. Basis of Payment:
    - a. The unit price shall be compensation in full for all tools, equipment, labor, materials, excavation, bedding, backfill, installation of headwall, grouting, and incidentals necessary to complete the Work.
    - b. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 167A through No. 167F.
- P. PAY ITEM 168 – BRICK MANHOLE, TYPE 1 OR 2 (GDOT 1011A): Specification 33 42 30, Storm Drain Structures
1. Method of Measurement: Brick Manholes, Type 1 or 2, shall be measured by the actual vertical linear feet installed in place as measured from invert to rim elevation (elevation of the top of the manhole cover), to the nearest tenth of a foot (0.1 ft), in accordance with the manhole type.
  2. Basis of Payment:
    - a. The unit price shall be compensation in full for the excavation, backfill, bedding, frames and covers, manhole bases, brick masonry, and top slabs, and all other labor, materials, equipment, and incidentals required to complete the Work.
    - b. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 168A through No. 168B.
- Q. PAY ITEM 169 – BRICK DROP INLET, GROUP 1 OR 2 (GDOT 1019A/9031S/9031D, AND GWINNETT P&D 610): Specification 33 42 30, Storm Drain Structures
1. Method of Measurement: Complete Brick Drop Inlets, Group 1 or 2, shall be measured by the actual vertical linear feet installed in place as measured from the invert to the rim elevation (elevation of the top of the inlet grate or manhole cover, as applicable, whichever is higher), to the nearest tenth of a foot (0.1 ft).
  2. Basis of Payment:
    - a. The unit price shall be compensation in full for the excavation, backfill, bedding, frames and castings, structure bases, brick masonry, and top slabs, and all other labor, materials, equipment, and incidentals required to complete the Work.
    - b. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 169A through No. 169F.
- R. PAY ITEM 170 – BRICK CATCH BASIN, GROUP 1 OR 2 (GDOT 1033/1034): Specification 33 42 30, Storm Drain Structures
1. Method of Measurement: Complete Brick Catch Basins, Group 1 or 2, shall be measured by the actual vertical linear feet installed in place as measured from

invert to rim elevation (elevation of the top of the manhole cover), to the nearest tenth of a foot (0.1 ft), in accordance with the Group Type, as shown in the Contract Documents or as directed by GCDWR.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, excavation, backfill, bedding, frames and covers, brick masonry, top and bottom slabs, and incidentals required to complete the Work.
- b. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 170A through No 170B.

S. PAY ITEM 171: CONCRETE FLARED END SECTIONS: Specification 33 42 30, Storm Drain Structures

1. Method of Measurement: Concrete flared end sections, standard-type and safety-type, shall be measured by the actual number installed as shown in the Contract Documents or as directed by GCDWR.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, excavation, bedding, backfill, installation of flared end sections, and incidentals necessary to complete the Work.
- b. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 171A through No. 171H.

T. PAY ITEM 172 – CONCRETE FLUME: Specification 33 42 30, Storm Drain Structures

1. Method of Measurement: Concrete Flume shall be measured by the actual cubic yards installed in place.

2. Basis of Payment:

- a. The unit price shall be compensation in full for all tools, equipment, labor, materials, excavation, bedding, backfill, concrete, reinforcing material, finishing, and incidentals necessary to furnish and install concrete flume and testing and inspections as specified, indicated, or directed on the Contract Documents.
- b. Any constructed concrete flume beyond the dimensions and location specified in the Contract Documents or as directed by GCDWR will be considered beyond the limits of measurement and will be considered incidental to the Work.

U. PAY ITEM 173 – CONCRETE FLUME WITH STONE INLAY: Specification 33 42 30, Storm Drain Structures

1. Method of Measurement: Concrete Flume with Stone Inlay shall be measured by the actual cubic yards installed in place.
2. Basis of Payment
  - a. The unit price shall be compensation in full for all tools, equipment, labor, materials, trenching excavation, bedding, backfill, concrete, reinforcing material, finishing, and incidentals necessary to furnish and install concrete flume and testing and inspections as specified, indicated, or directed on the Contract Documents.
  - b. Any installed concrete flume beyond the dimensions and location specified in the Contract Documents or as directed by GCDWR will be considered beyond the limits of measurement and will be considered incidental to the Work.

V. PAY ITEM 174 – TIE INTO EXISTING STRUCTURE: Specification 33 42 30, Storm Drain Structures

1. Method of Measurement:
  - a. Tie into Existing Structures shall be measured by the actual number of occurrences (per each) where tie-ins to existing structures, in place prior to the design and execution of the Work, are completed.
  - b. Pipe connections to new structures shall not be measured but the cost shall be incidental to the other applicable items of Work.
2. Basis of Payment
  - a. The unit price shall be compensation in full for the excavation, backfill, bedding, coring, flexible connector(s), frame(s) and casting(s), and all other labor, materials, equipment, and incidentals required to complete the Work.
  - b. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 174A through No. 174C.

## 1.14 Bid Items – Division 34: Traffic

A. PAY ITEM 175 – TEMPORARY STEEL PLATES: Specification 34 41 16.10, Traffic Control

1. Method of Measurement: Steel plates used for temporary bridging of roadway or sidewalk to accommodate vehicular and pedestrian traffic during construction shall be measured by square foot of steel plate installed.

2. Basis of Payment
    - a. The unit price shall be compensation in full for all tools, equipment, labor and materials, transportation, and incidentals necessary to excavate, furnish, place, maintain and remove temporary steel plating.
    - b. Payment will not be approved without submission of documentation satisfactory to GCDWR.
- B. PAY ITEM 176 – STREET CUT: Specification 34 71 00, Roadway and Pavement Restoration
1. Method of Measurement
    - a. Street cuts, in accordance with the detail types listed in the Unit Price Schedule, shall be measured for the actual square yards of street cut surface area as shown in the Contract Documents or as otherwise directed by GCDWR.
    - b. Any damage or replacement beyond the specified limits of these items as shown on the Contract Documents or as otherwise directed by GCDWR shall be the responsibility of the Contractor and shall not be measured for payment.
    - c. No additional measurement for payment will be made for temporary pavement, and the cost thereof shall be considered as being incidental to the Work of this Contract.
  2. Basis of Payment
    - a. The unit price shall be compensation in full for all saw cuts, subbase, base course, and surface course pavements, concrete, prime and tack coats, compaction, resetting roadway and highway signs, permit fees, maintenance charges and inspection fees required by all road departments and the furnishing of all materials, labor, tools, and appliances necessary to complete the Work as herein specified, shown, or ordered.
    - b. Included shall be the costs of excavation beyond trench width to provide firm foundation and graded aggregate base subbase for pavement materials, and any costs of furnishing necessary work beyond the limits of measurement as defined under these specifications.
    - c. The Unit Prices for all paving and curbing items shall include bituminous concrete repaving and/or relaying of roadways, parking areas, driveways, curbs, gutters, and sidewalks which settle during the warranty period.
    - d. No additional payment shall be made for excavation or disposal of excavated material above the foundation of the pavement, and the cost thereof shall be considered as being included in the Unit Prices for paving

and curbing items.

- e. Graded Aggregate Base subgrade material placed under the Street Cut subbase course shall be eligible for payment under the pertinent Contract Unit Price in accordance with Specification Section 31 05 16 – Aggregates for Earthwork.
- f. Removal, handling, hauling, and disposal of existing roadway material will be considered incidental to this pay item and no additional compensation will be made.
- g. Payment for replacing of pavements shall not be made until such evidence is presented that the Work has been completed to the satisfaction of the authority having jurisdiction.
- h. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 176A. through 176D.

C. PAY ITEM 177 – DRIVEWAY/PARKING AREA RESTORATION: Specification 34 71 00, Roadway and Pavement Restoration

1. Method of Measurement

- a. Driveway restoration, in accordance with the various thicknesses listed in the Unit Price Schedule, shall be measured for the actual square yards of driveway or parking area pavement surface area as shown in the Contract Documents; except in the instance where entire squares or slabs have been removed under direction of GCDWR.

2. Basis of Payment

- a. The unit price shall be compensation in full for all permit fees, maintenance charges and inspection fees required by all road departments and the furnishing of all materials, labor, tools, and appliances necessary to complete the Work as herein specified, shown, or ordered.
- b. Included shall be the costs of excavation beyond trench width to provide firm foundation and graded aggregate base backfill for pavement materials, and any costs of furnishing necessary work beyond the limits of measurement as defined under these specifications.
- c. The Unit Prices for all paving and curbing items, shall include bituminous concrete repaving and/or relaying of roadways, parking areas, driveways, curbs, gutters, and sidewalks which settle during the warranty period and no additional payment will be made for work to remedy damage from settlement.
- d. No additional payment shall be made for excavation or disposal of excavated material above the foundation of the pavement, and the cost

thereof shall be considered as being included in the Unit Prices for paving and curbing items.

- e. Removal, handling, hauling, and disposal of existing driveway material will be considered incidental to this pay item and no additional compensation will be made.
- f. If the Contractor chooses to use uncased bores for crossing driveways, without the prior written approval of GCDWR, compensation will be made using the unit price for Driveway Restoration based on the allowable trench width for the respective size pipe installed.
- g. Payment for replacing of pavements shall not be made until such evidence is presented that the Work has been completed to the satisfaction of the authority having jurisdiction.
- h. Costs associated with this activity are included in the Unit Price Schedule, Pay Item No. 177A and No. 177B.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Work under this Section includes all scheduling and administering of preconstruction and progress meetings as herein specified and necessary for the proper and complete performance of this Work.
- B. Scheduling and Administration by GCDWR
  - 1. Prepare Agenda
  - 2. Make physical arrangements for the meetings
  - 3. Preside at meetings
  - 4. Record minutes and include significant proceedings and decisions
  - 5. Distribute "Draft" meeting minutes for review/revision
  - 6. Incorporate revisions and distribute final copies of the minutes to participants

### 1.2 Preconstruction Meeting

- A. GCDWR will schedule the preconstruction meeting prior to the issuance of the Notice to Proceed.
- B. Representatives of the following parties are to attend the meeting:
  - 1. GCDWR; including project manager and field representative
  - 2. Designer (if deemed appropriate by GCDWR)
  - 3. Contractor's project staff, including at a minimum: the project manager, site superintendent, quality/safety control coordinator, and subcontractor coordinator
  - 4. Major subcontractors
  - 5. Representative(s) of governmental or regulatory agencies, when appropriate.
  - 6. Materials Testing Firm representative
- C. The agenda for the preconstruction meeting will consist of the following as a minimum:
  - 1. List of attendees, and introduction of each attendee and their respective project role



2. Project safety considerations
3. Housekeeping notes and procedures
4. Project Data to include total Project cost, Notice to Proceed Date, Substantial Completion Date, and Final Completion Date
5. List of project stakeholders and their contact information including email address and cell phone number
6. Communication procedures and chain of communication for specified project components
7. Distribute and discuss a list of major subcontractors and a tentative construction schedule, including Gwinnett County holidays and adverse weather days
8. Critical work sequencing
9. Pay request procedure including format, submittal, pay date, and retainage
10. Procedures for maintaining record documents
11. Distribution list for Project submittals
12. Discuss submittals to include, project schedules, requests for information, shop drawings, product data, samples, and project record drawings
13. Processing of field decisions and Change Orders
14. Work Times and Schedule
15. Inspection of Work, testing, and laboratory work
16. Safety and first aid procedures
17. Permits, easements, and their acquisition status
18. Blasting protocol
19. Traffic control

### 1.3 Project Progress Meetings

- A. GCDWR will schedule progress meetings monthly, or more frequently as directed by GCDWR.
- B. Hold called meetings as the progress of the Work dictates.
- C. The meetings shall be held at the location indicated by GCDWR.

- D. Representatives of the following parties are to be in attendance at the meetings:
1. GCDWR, to include project manager, field representative, and as conditions dictate, Operations stakeholder(s)
  2. Designer's representative as appropriate
  3. Contractor's project staff including, at a minimum, the project manager, site superintendent, quality control coordinator, and subcontractor coordinator
  4. Major subcontractors as pertinent to the agenda
  5. Representatives of governmental or other regulatory agencies, as appropriate.
  6. Materials testing firm representative as pertinent to the agenda
- E. The minimum agenda for progress meetings shall consist of the following:
1. Identification of attendees
  2. Project safety considerations
  3. Review and approval minutes of previous meeting
  4. Contractor-supplied updated Project Progress Schedule
  5. Review work progress since last meeting
  6. Review work progress planned for the next period
  7. Status of Overall Project Schedule, identify problems which impede planned progress
  8. Review Contractor's corrective measures and procedures to regain plan schedule
  9. Review submittal schedule
  10. Review budget status
  11. Review Request for Information process
  12. Review Change Management items and status of individual Change documents
  13. Review Notices, Punch lists, and project coordination issues
  14. Note field observations, problems, and decisions
  15. Review testing and quality control measures and associated issues

- F. Complete Other Current Business.

## Part 2 Products

(Not Used)

## Part 3 Execution

(Not Used)

## Part 4 Measurement and Payment

### 4.1 General

- A. No separate measurement and payment shall be made for any work performed or material used for this section. Full compensation for such work shall be considered as incidental to other items of the Work. Costs in connection therewith shall be considered a subsidiary obligation of the Contractor and shall be included in the overall cost of the Work.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes preparing, furnishing, distributing, and periodic updating of the construction schedules as specified herein.
- B. The purpose of the schedules is to demonstrate that the Contractor can complete the overall Project within the Contract Time and meet all required interim milestones.

### 1.2 Submittals

- A. Overall Project Schedule (OPS)
  - 1. Submit the schedule within 10 days after date of the Notice to Proceed.
  - 2. GCDWR will review the schedule and return it within 10 days after receipt.
  - 3. If required, resubmit within 10 days after receipt of a returned copy.
- B. Near Term Schedule (NTS)
  - 1. Submit the first Near Term Schedule within 10 days of the Notice to Proceed.
  - 2. GCDWR will review the schedule and return it within 10 days after receipt.
- C. Submit updates of the OPS and NTS with each progress payment request.
- D. Submit the number of copies required by the Contractor, plus four copies to be retained by GCDWR. Electronic submittals are acceptable.

### 1.3 Approval

- A. Approval of the Contractor's detailed construction program and revisions thereto shall in no way relieve the Contractor of any of Contractor's duties and obligations under the Contract. Approval is limited to the format of the schedule and does not in any way indicate approval of, or concurrence with, the Contractor's means, methods and ability to carry out the Work.
- B. If the Contractor's construction schedule indicates that GCDWR is to complete an activity or perform certain preceding Work by a particular date, or within a certain duration, GCDWR, or any separate contractor shall not be bound to said date or duration unless GCDWR expressly and specifically agrees to in writing to the same. The approval of the overall or near-term schedule does not constitute implied agreement of any sequence, duration, or dates for activities of GCDWR or any separate contractor, provided, however, that nothing herein shall be construed as modifying or changing, or excusing the performance of the Contractor of required portions of the Work by any specific dates set forth in the Contract Documents.

## 1.4 Overall Project Schedule (OPS)

- A. The Contractor shall submit to GCDWR for approval a detailed Overall Project Schedule of the Contractor's proposed operations for the duration of the Project. The OPS shall be in the form of a Gantt/bar chart.
- B. Unless otherwise specifically agreed to in the Contract Documents or by GCDWR in writing, the Contractor acknowledges that the Work will be performed on five (5) day, Monday to Friday, work week.
- C. Gantt/Bar Chart Schedule
  - 1. Each activity with a duration of five or more days shall be identified by a separate bar. Activities with a duration of more than 20 days shall be subdivided into separate activities.
  - 2. The schedule shall include activities for shop drawing preparation and other submittals and review, fabrication, delivery, and installation of major or critical path materials and equipment items.
  - 3. The schedule shall show the proposed start and completion date for each activity. A separate listing of activity start and stop dates and working day requirements shall be provided unless the information is shown in text form on the Gantt/bar chart.
  - 4. The schedule shall identify the Notice to Proceed date, the Contract Completion date, major milestone dates, and a critical path.
  - 5. The schedule shall be printed on a 11 x 17-inch size paper. If the OPS needs to be shown on multiple sheets, a simplified, one page, summary bar chart showing the entire Project shall be provided.
  - 6. The schedule shall have a horizontal time scale based on calendar days and shall identify the Monday of each week.
  - 7. The schedule shall show the precedence relationship for each activity.
  - 8. Any specialty equipment, labor, or other items measured and paid for at an hourly, daily, weekly, or monthly rate shall be identified along with associated activities within the Gantt Chart.

## 1.5 Near-Term Schedule (NTS)

- A. The Contractor shall develop and refine a detailed Near-Term Schedule showing the day-to-day activities with committed completion dates which must be performed during the upcoming 30-day period. The detailed schedule shall represent the Contractor's best approach to the Work which must be accomplished to maintain progress consistent with the Overall Project Schedule.

- B. The Near-Term Schedule shall be in the form of Gantt/bar chart and shall include a written narrative description of all activities to be performed and describe corrective action to be taken for items that are behind schedule.

## 1.6 Updating

- A. Show all changes occurring since previous submission of the updated schedule.
- B. Indicate progress of each activity and show actual completion dates.
- C. The Contractor shall be prepared to provide a narrative report at the Progress Meetings. The report shall include the following:
  - 1. A description of the overall Project status and comparison to the OPS.
  - 2. Identify activities which are behind schedule and describe corrective action to be taken.
  - 3. A description of changes or revisions to the Project and their effect on the OPS.
  - 4. A description of the Near-Term Schedule of the activities to be completed during the next 30 days. The report shall include a description of all activities requiring participation by GCDWR.

## Part 2 Products

(Not Used)

## Part 3 Execution

(Not Used)

## Part 4 Measurement and Payment

### 4.1 General

- A. No separate measurement and payment shall be made for any work performed or material used for this section. Full compensation for such work shall be considered as incidental to other items of the Work. Costs in connection therewith shall be considered a subsidiary obligation of the Contractor and shall be included in the overall cost of the Work.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. The Contractor shall furnish all equipment, labor, and materials required to provide GCDWR with job photographs and Preconstruction and Post-construction audio/video recordings of the Project.
- B. Photos, electronic files, and audio/video recordings shall become the property of GCDWR, and none of which shall be published without express permission of GCDWR.

### 1.2 Preconstruction and Post-Construction Audio/Video Recordings

- A. Prior to the beginning of any work, the Contractor shall make audio/video recordings of the work area to record existing conditions.
- B. Following completion of the work, another recording shall be made showing the same areas and features as in the preconstruction recording.
- C. All conditions which might later be subject to a disagreement shall be shown in sufficient detail to provide a basis for decisions.
- D. The recordings shall include the date and time markings on the video.
- E. If directed by GCDWR, videos shall be provided with an audio narration, stating a description of what is shown, structure, area, approximate station of the area shown, and street address and property owner where appropriate.
- F. Audio/video recordings quality and content shall be subject to the approval of GCDWR.

### 1.3 Construction Photographs

- A. For BMPs with subsurface components, the Contractor shall take a sufficient number of photographs to show the work in progress and any adjacent areas which were disturbed during construction. The Contractor must ensure all subsurface BMP components in each asset are photographed at least once in coordination with GCDWR. Acceptance of subsurface elements is contingent on provided photographs.

### 1.4 Disputes and Potential Claims

- A. In the event a problem arises, or dispute occurs, which may result in a potential Claim, under General Conditions Article 10.05, and the problem or dispute can be illustrated by photographs and video recordings, the Contractor shall provide such photographs and video files.

## 1.5 Submittals

### A. Formats

1. Photo files shall be provided in jpeg format. All electronic photo files shall include digital time stamps and location (EXIF) data.
2. Audio/Video Recordings shall be provided in Audio Video Interleave (AVI), Windows Media Video (WMV), Apple Quick Time (MOV) or MP4 format, as requested by GCDWR.

### B. Construction Photographs

1. Digital images of BMPs must be submitted. They must be labeled with the information below. Where requested by GCDWR, a photolog shall be submitted in addition to the digital image files to provide the following:
  - a. BMP Identifier.
  - b. Project Number.
  - c. Project Name.
  - d. Photo Number.
  - e. Date picture was taken.
  - f. View and description, indicating direction and subject of photograph, and whether the image is a pre-construction, construction progress, or post-construction photograph.
  - g. GPS coordinates.
  - h. The Contractor shall provide GCDWR with updated photographs on a monthly basis.

### C. Audio/Video Recordings

1. The preconstruction recording shall be submitted prior to the first progress payment request.
2. The post-construction recording shall be submitted with the final payment request.



## Part 2 Products

(Not Used)

## Part 3 Execution

(Not Used)

## Part 4 Measurement and Payment

### 4.1 General

- A. No separate measurement and payment shall be made for any work performed or material used for this section. Full compensation for such work shall be considered as incidental to other items of the Work. Costs in connection therewith shall be considered a subsidiary obligation of the Contractor and shall be included in the overall cost of the Work.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. All materials and/or equipment provided to GCDWR shall be subject to submittals and approval of shop drawings, prior to releasing Contractor for ordering. Any items ordered and/or delivered without approved submittals or shop drawings may be rejected by GCDWR.
- B. This section includes information and requirements for the submittal of documents during the course of work for, including but not limited to, schedules, shop drawings, product data, operation and maintenance manuals, requests for information, and record drawings as specified.
- C. Submittals shall include, but not be limited to, manufacturers' information, catalog data, shop drawings, test procedures, test results, samples, equipment performance, equipment weight, fabrication, erection, mechanical accessories, materials, reinforcing steel, piping, details, and work-related information. The Contractor shall furnish scaled drawings, or drawings of equivalent dimensions to ascertain information deemed necessary by GCDWR, descriptive data, certificates, samples, tests, and any other instructions specifically required in the Contract Documents or recommended by the manufacturers to demonstrate that the materials and equipment to be furnished and the methods of Work comply with the provisions and intent of the Contract Documents.
- D. GCDWR will identify at the Preconstruction Conference those products or procedures which will require a submittal. GCDWR reserves the right to request additional submittals during the course of the Work for products and procedures not identified at the Preconstruction Conference, in accordance provisions and intent of the Contract Documents.
- E. Submittal requirements indicated in the specifications in the Contract Documents shall generally prevail, unless otherwise directed by GCDWR.

### 1.2 Contractor's Responsibilities

- A. The Contractor shall submit to GCDWR a detailed project submittal schedule for inclusion in the Contractor's overall project schedule prior to performing the Work.
- B. The Contractor shall be responsible for the accuracy and completeness of information contained in each submittal, assuring that the Work shall be performed in accordance with the Contract Documents, unless a deviation has been approved. The Contractor shall verify that each feature of every product shall conform to the specified requirements. Submittal documents shall be clearly edited to indicate only those items being submitted in accordance with the Work. All extraneous materials shall be stricken out or removed. The Contractor shall coordinate submittals among its subcontractors and suppliers to meet the specified Work and approved progress schedules so that the Work shall not be delayed. No extension of time shall be

allowed because of failure to properly schedule submittals. The Contractor shall certify on each submittal document that it has reviewed the submittal, verified field conditions, and complied with the Contract Documents.

- C. The Contractor may authorize, in writing to GCDWR, that a material or equipment supplier may deal directly with GCDWR or its authorized representative. These dealings shall be limited to contract interpretations to clarify and expedite the Work.
- D. If the information provided in a submittal indicates any deviation from the Contract requirements, the Contractor shall by written statement accompanying the submittal, advise GCDWR of any deviation and state the reasons, therefore.
- E. The Contractor shall be required to perform a field investigation, accompanied by a representative of GCDWR, where the scope of Work shall be defined for each specific project. Upon completion of the investigation, the Contractor shall provide a formal estimate to GCDWR utilizing the Unit Price Schedule and shall detail work that may be performed under non-specific items. Upon receipt of the estimate, GCDWR will review the details, and determine if the rights of entry are required or if work may be performed on easements or ROW, and then will place the project into a pending status until approved for release to the Contractor.
- F. It shall be the Contractor's responsibility to ensure there is no conflict with other project submittals and to notify GCDWR in any case where the Contractor's submittal may concern work by another contractor, subcontractor, or GCDWR. The Contractor is solely responsible for the coordination of submittals by its subcontractors and shall verify that its subcontractors' submittals are complete in every way and meet the requirements of the Contract.

### 1.3 GCDWR Responsibilities

- A. GCDWR review and comments of project scope of work and any necessary project documents will be general and not relieve the Contractor from the responsibility for errors and omissions which may exist.
- B. Submittal reviews will be returned to the Contractor marked with one of the following, "No Exceptions Taken", "Note Markings", "Revise and Resubmit", "Rejected – See Remarks", or "Review Not Required". Returned submittals marked with "Revise and Resubmit" or "Rejected – See Remarks" shall be re-submitted until an acceptable mark of "No Exceptions Taken" or "Note Markings" is obtained. The Contractor shall pay for any submittals requiring GCDWR to review beyond the second submittal. Such payment shall be addressed as a set-aside.
- C. The approval of the Contractor's project submittals shall not relieve the Contractor of responsibility for any error, or any obligation for accuracy of dimensions and details, or for agreement with and conformity to the Contract and Contract Documents, or the responsibility to fulfill the Contract as prescribed, nor shall approval be considered approval of any deviation or conflict unless GCDWR has been expressly advised of the same or GCDWR has expressly approved such deviation or conflict.

## 1.4 Substitutions / Deviations

- A. The Contractor shall submit, in writing, its requests for permission to use “or equal” equivalents as substitutions and/or deviations to specific brand or trade name products and materials specified in the Contract Documents. Such written requests shall be clearly marked with a numeric designation and should show a corresponding, concise, and lucid justification substantiating the benefits to GCDWR. Substitution requests are subject to rejection.

## 1.5 Requests for Information / Interpretation

- A. The Contractor shall submit, in writing a Request for Information (RFI) to GCDWR concerning all construction-related questions or as required to clarify Contract Document requirements. Such written requests shall be clearly marked with a numeric designation and should provide a concise and clear designation pertaining to the subject of the request. Each properly completed and submitted RFI will receive prompt written clarification or interpretations of the Contract Documents (RFI Response), with numeric designations assigned by GCDWR corresponding to the RFI numbers.

## 1.6 Transmittals

- A. All transmittals shall be submitted by the Contractor. Transmittals submitted directly by subcontractors, fabricators, suppliers, etc. will NOT be accepted.
- B. A distribution list for all electronic transmittals will be provided during the preconstruction meeting.

## Part 2 Submittals

### 2.1 General

- A. Submittals typically fall into one of five general categories: “Schedules”, “Request for Information”, “Shop Drawings”, “Operation and Maintenance Manuals” and “Record Drawings”. Unless otherwise specified, all submittals shall be considered Shop Drawings.

### 2.2 Schedules

- A. The Contractor shall submit all requirements sufficiently in advance of construction requirements to allow ample time for the Contractor and GCDWR to complete their responsibilities, as specified herein, without claim and/or allowance by the Contractor for delays arising from its failure in this respect.
- B. Project Construction Progress Schedules shall be in accordance with Section 01 32 16 – Construction Progress Schedules.
- C. The Schedule of Values shall list the installed value of component items of the Work

to serve as a basis for computing values for progress payments during construction.

## 2.3 Request for Information

- A. The Contractor shall submit all requests sufficiently in advance of construction requirements to allow ample time for the Contractor and GCDWR to complete their responsibilities, as specified herein, without claim and/or allowance by the Contractor for delays arising from its failure in this respect.
- B. Submittals shall include GCDWR project name and number, and RFI number in numerical order, on the top portion, of the top page of the document(s).

## 2.4 Shop Drawings

- A. The Contractor shall submit all requirements sufficiently in advance of construction requirements to allow ample time for the Contractor and GCDWR to complete their responsibilities, as specified herein, without claim and or allowance by the Contractor for delays arising from its failure in this respect.
- B. All shop drawings submitted must bear the stamp of approval of and by the Contractor as evidence that the submittal has been thoroughly reviewed and coordinated.
- C. Submittals shall include GCDWR project name and number, and Shop Drawing Number in numerical order, on the top portion, of the top page of the document(s).
- D. Shop drawings which include engineering features for which Georgia laws and/or regulations require that they be prepared by a Professional Engineer, shall be signed and sealed by a Professional Engineer licensed in the State of Georgia.

## 2.5 Operation and Maintenance

- A. Operation and Maintenance Manuals submittal documents common to more than one piece of equipment shall be identified with all the appropriate equipment numbers and referenced in the other parts of the manual under that specific equipment or material. Submittals that consist of various items that together constitute a manufacturer's equipment or package, or are so functionally related, must be submitted, reviewed and approved as a whole.

## 2.6 Record Drawings

- A. Refer to Section 01 78 39 "Project Record Documents"

# Part 3 Execution

## 3.1 General

- A. As applicable, submittals shall be marked in accordance to following color schemes:

1. Manufacturer/vendor comments shall be in 'black' ink.
2. Contractor comments shall be in 'green' ink.
3. Consultant comments shall be in 'blue' ink.
4. GCDWR comments will be in 'red' ink.

### 3.2 Substitution Request Procedures

- A. If the Contractor proposes to provide material or equipment which deviates from the Contract Documents, it shall indicate so on the transmittal letter accompanying that specific submittal. Each substitution request must be clearly marked with a numeric designation having a corresponding detailed explanation to indicate the benefit to GCDWR and or the project. Explanation shall demonstrate that the substitution causes no delay and is of equal or better quality and suitability. If, at GCDWR's discretion, incomplete or irrelevant data is submitted by the Contractor to comply with this requirement, the data shall be returned to the Contractor and request for approval of the substitution shall be denied.

### 3.3 Requests for Information/Interpretation

- A. All construction related questions which may result in modifications to the Contract Documents or Contract amounts shall be submitted as an RFI.
- B. If the Contractor believes that an RFI response given by GCDWR entitles it to an increase in the Contract amount, the Contractor shall request a proposed Change Order (CO) number from the GCDWR within five (5) business days of receiving any such RFI response as a condition precedent to any such increase in Contract amount.

### 3.4 Schedules

- A. Construction Progress Schedules: Contractor shall submit to GCDWR schedules as specified in Section 01 32 16 – Construction Progress Schedules.
- B. Schedule of Submittals
  1. Contractor shall submit to GCDWR, a Schedule of Submittals within ten days after the Notice to Proceed.
  2. GCDWR will review said Schedule of Submittals and return reviewed copy to Contractor, within fourteen days.
  3. If required, Contractor shall resubmit to GCDWR, a revised Schedule of Submittals incorporating all revisions, within ten days after receipt of a returned review copy.
- C. Schedule of Values

1. Contractor shall submit to GCDWR a Schedule of Values allocated to the various portions of the Work within ten calendar days after the Notice to Proceed. The value of each activity shall be a complete and total value, including all taxes, overhead, and profit. The sum of all the values of the activities shall equal the total Price for the Project. The first progress payment will not be made until the next pay cycle following GCDWR's approval of the Contractor's Schedule of Values.
2. GCDWR will review said Schedule of Values and return reviewed copy to Contractor, within fourteen days. Upon request of GCDWR, Contractor shall support the values with data substantiating their correctness.
3. If required, Contractor shall resubmit to GCDWR, a revised Schedule of Values incorporating all revisions, within ten days after receipt of a returned review copy.
4. The Schedule of Values shall be used only as a basis of the Contractor's Application for Payment.

### 3.5 Review Procedures

- A. Submittals are specified for those features and characteristics of materials, equipment, and methods of operation, which can be selected based on the Contractor's judgment of their conformance to the specified requirements. Review will not extend to means, methods, techniques, sequences or procedures of construction, or to verifying quantities, dimensions, weights or gages, or fabrication processes (except where specifically indicated or required by the specifications) or to safety precautions or programs incident thereto.
- B. When the Contract Documents require a submittal by the Contractor, it shall be to the following minimum requirements:
  1. Shop Drawings: Unless otherwise directed by GCDWR, six copies of submitted information shall be transmitted for review and comment. After GCDWR's review and comments they will return two copies to the Contractor.
  2. Electronic submittals are acceptable. In the case of electronic submittals, one copy shall suffice.
- C. Shop Drawings
  1. GCDWR will have 14 calendar days to review and comment on a submittal after its receipt. The returned submittal will indicate one of the following actions:
    - a. If the review indicates that the submittal complies with the Contract Documents, it will be marked "No Exceptions Taken". In this event, the Contractor may begin to implement the work method or incorporate the material or equipment covered by the submittal; no re-submittal is required.

- b. If the review indicates limited corrections are required, copies will be marked “Note Markings”. The Contractor may begin implementing the work method or incorporating the material and equipment covered by the submittal in accordance with the noted corrections. No re-submittal shall be required, except where the submittal information shall be incorporated into the Project Operation and Maintenance Manuals, and then a corrected copy shall be incorporated.
  - c. If the review reveals that the submittal is insufficient and or contains incorrect data, copies will be marked “Revise and Resubmit”. Except at its own risk, the Contractor shall not undertake Work covered by this submittal until it has been revised, resubmitted, and returned with a mark of “No Exceptions Taken” or “Note Markings.”
  - d. If the review reveals that the submittal is unacceptable it will be marked “Rejected – See Remarks”. The Contractor shall not undertake Work covered by this submittal until it has been revised, resubmitted, and returned with a mark of “No Exceptions Taken” or “Note Markings.”
- D. Substitutions
- 1. GCDWR will have 21 to 30 calendar days to review and comment on a submittal for substitution after its receipt.
- E. Requests for Information/Interpretation
- 1. GCDWR will have up to 14 calendar days to review and comment on an RFI submittal after its receipt.
  - 2. Shorter review periods can be expected for simpler information requests or requests which could be time dependent.

### 3.6 Effect of Review of Contractor’s Submittals

- A. Review of the Contractor’s submittals shall not relieve the Contractor of its responsibility for errors therein and shall not be regarded as an assumption of risks or liability by GCDWR. Also, the Contractor shall have no claim on account of the failure, or partial failure, of the method of Work, material, or equipment so reviewed. A mark of “No Exceptions Taken” or “Note Markings” shall mean that GCDWR has no objection to the Contractor, upon its own responsibility, using the plan or method of Work proposed, or providing the materials or equipment proposed, with the exception of incorporating any Notes made by GCDWR.

## Part 4 Measurement and Payment

### 4.1 General

- A. No separate measurement and payment shall be made for any work performed or material used for this section. Full compensation for such work shall be considered



as incidental to other items of the Work. Costs in connection therewith shall be considered a subsidiary obligation of the Contractor and shall be included in the overall cost of the Work.

END OF SECTION

## Part 1 General

### 1.1 Scope

- A. Permits and Responsibilities: The Contractor shall, without additional expense to GCDWR, be responsible for obtaining all necessary licenses and permits, excluding those listed in Supplementary Conditions SC-6.08, and for complying with any applicable federal, state, county and municipal laws, codes, ordinances, and regulations, in connection with the prosecution of the Work. The Contractor shall be responsible for coordinating and scheduling all necessary inspections required by applicable federal, state, county, and municipal codes and regulations in relation to licenses and permits, including building permits issued for the project.
- B. The Contractor shall take proper safety and health precautions to protect the Work, the workers, the public, and the property of others.
- C. The Contractor shall be responsible for all materials delivered and work performed until completion and acceptance of the Work.
- D. The Contractor is hereby notified that a road may be under the jurisdiction of the Georgia Department of Transportation, the Gwinnett County Department of Transportation, or various cities within the County, necessitating permits and notification of these entities by the Contractor.

## Part 2 Products

(Not Used)

## Part 3 Execution

(Not Used)

## Part 4 Measurement and Payment

### 4.1 General

- A. No separate measurement and payment shall be made for any work performed or material used for this section. Full compensation for such work shall be considered as incidental to other items of the Work. Costs in connection therewith shall be considered a subsidiary obligation of the Contractor and shall be included in the overall cost of the Work.

END OF SECTION

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## Part 1 General

### 1.1 Description

- A. Whenever reference is made to conforming to the standards of any technical society, organization, body, code or standard, it shall be construed to mean the latest standard, code, specification, or tentative specification adopted and published at the time of advertisement for Request for Proposals. This shall include the furnishing of materials, testing of materials, fabrication, and installation practices. In those cases, where the Contractor's quality standards establish more stringent quality requirements, the more stringent requirement shall prevail. Such standards are made a part hereof to the extent which is indicated or intended.
- B. The inclusion of an organization under one category does not preclude that organization's standards from applying to another category.
- C. In addition, all work shall comply with the applicable requirements of local codes, utilities and other authorities having jurisdiction.
- D. All material and equipment, for which an Underwriters Laboratory (UL) Standard, an American Gas Association (AGA) or NSF International (NSF) approval, or an American Society of Mechanical Engineers (ASME) requirement is established, shall be so approved and labeled or stamped. The label or stamp shall be conspicuous and not covered, painted, or otherwise obscured from visual inspection.
- E. See Article 1.2 for potentially applicable Standards Organizations. The standards which apply to this Project are not necessarily restricted to those from organizations which are listed in Article 1.2.

### 1.2 Standards Organizations

- A. Piping and Valves
  - 1. ACPA American Concrete Pipe Association
  - 2. ANSI American National Standards Institute
  - 3. API American Petroleum Institute
  - 4. ASME American Society of Mechanical Engineers
  - 5. AWWA American Water Works Association
  - 6. CISPI Cast Iron Soil Pipe Institute
  - 7. DIPRA Ductile Iron Pipe Research Association
  - 8. FCI Fluid Controls Institute
  - 9. MSS Manufacturers Standardization Society

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10. NCPI National Clay Pipe Institute
  11. NSF NSF International
  12. PPI Plastic Pipe Institute
  13. Uni-Bell PVC Pipe Association
- B. Materials
1. AASHTO American Association of State Highway and Transportation Officials
  2. ANSI American National Standards Institute
  3. ASTM American Society for Testing and Materials
- C. Painting and Surface Preparation
1. NACE National Association of Corrosion Engineers
  2. SSPC SSPC: The Society for Professional Coatings
- D. Aluminum
1. AA Aluminum Association
  2. AAMA American Architectural Manufacturers Association
- F. Steel and Concrete
1. ACI American Concrete Institute
  2. AISC American Institute of Steel Construction, Inc.
  3. AISI American Iron and Steel Institute
  4. CRSI Concrete Reinforcing Steel Institute
  5. NRMA National Ready-Mix Association
  6. PCA Portland Cement Association
  7. PCI Pre-Stressed Concrete Institute
- G. Welding
1. ASME American Society of Mechanical Engineers
  2. AWS American Welding Society
- H. Government and Technical Organizations

1. AIA American Institute of Architects
2. APHA American Public Health Association
3. APWA American Public Works Association
4. ARC Atlanta Regional Commission
5. ASA American Standards Association
6. ASAE American Society of Agricultural Engineers
7. ASCE American Society of Civil Engineers
8. ASQC American Society of Quality Control
9. ASSE American Society of Sanitary Engineers
10. CFR Code of Federal Regulations
11. CSI Construction Specifications Institute
12. EDA Economic Development Administration
13. EPA Environmental Protection Agency
14. FCC Federal Communications Commission
15. FGDC Federal Geographic Data Committee
16. FMHA Farmers Home Administration
17. FS Federal Specifications
18. GSWCC Georgia Soil and Water Conservation Commission
19. IAI International Association of Identification
20. ISEA Industrial Safety Equipment Association
21. ISO International Organization for Standardization
22. ITE Institute of Traffic Engineers
23. MNGWPD Metropolitan North Georgia Water Planning District
24. NBFU National Board of Fire Underwriters
25. NBS National Bureau of Standards
26. NFPA National Fire Protection Association

27. (NFPA) National Fluid Power Association
28. NGICP National Green Infrastructure Certification Program
29. NISO National Information Standards Organization
30. NSA National Stone Association
31. OSHA Occupational Safety and Health Administration
32. SI Salt Institute
33. SPI The Society of the Plastics Industry, Inc.
34. USACE United States Army Corp of Engineers (USACOE)
35. USDC United States Department of Commerce
36. WEF Water Environment Federation

I. Roadways

1. AREA American Railway Engineering Association
2. DOT Department of Transportation
3. FHWA Federal Highway Administration
4. GDOT Georgia Department of Transportation
5. GDOT Standard Specifications
  - a. Standard Specifications for Construction of Transportation Systems, Georgia Department of Transportation
6. MUTCD Manual on Uniform Traffic Control Devices, Federal Highway Administration

J. Plumbing

1. AGA American Gas Association
2. NSF NSF International
3. PDI Plumbing Drainage Institute
4. SPC SBCC Standard Plumbing Code

## 1.3 Symbols

- A. Symbols and material legends shall be as scheduled on the Drawings.

## Part 2 Products

(NOT USED)

## Part 3 Execution

(NOT USED)

## Part 4 Measurement and Payment

### 4.1 General

- A. No separate measurement and payment shall be made for any work performed or material used for this section. Full compensation for such work shall be considered as incidental to other items of the Work. Costs in connection therewith shall be considered a subsidiary obligation of the Contractor and shall be included in the overall cost of the work.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. This section includes quality assurance (QA) and quality control (QC) requirements for this contract.
- B. The Contractor is responsible for controlling the quality of Work, including Work of its subcontractors and suppliers, and for assuring the quality specified in the Specifications is achieved.
- C. Refer to the General Conditions Article 6 - Contractor's Responsibilities, paragraphs 6.01, 6.02, and 6.03.
- D. Section includes administrative and procedural requirements for quality assurance and quality control.
- E. 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 Documents.
  - 1. Specific quality assurance and quality control requirements for individual construction activities are specified in the sections that specify those activities. Requirements in those sections may also cover production of standard products.
  - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality assurance and control procedures and responsibilities that facilitate compliance with the Contract Documents.
  - 3. Requirements for Contractor to provide quality assurance and control services required by, including but not limited to GCDWR, or authorities having jurisdiction, are not limited by provisions of this section.
- F. Unless explicitly stated to the contrary in the Specifications, Contractor shall arrange for and pay for all quality control testing.

### 1.2 References

- A. American Society for Testing and Materials (ASTM)
  - 1. ASTM E329-21: Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

### 1.3 Definitions

- A. Quality Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and



substantiate that proposed construction will comply with requirements.

- B. Quality Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by GCDWR.
- C. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- D. Product Testing: Tests and inspections that are performed by a Nationally Recognized Testing Laboratory (NRTL), 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.
  - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
  - 2. NVLAP: A testing agency accredited according to National Institute of Standards and Technology (NIST)'s National Voluntary Laboratory Accreditation Program.
- E. Source Quality Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- F. Field Quality Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- H. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, or subcontractor of any tier, to perform a particular construction operation, including installation, erection, application, and similar operations.
  - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- I. Experienced: For the purposes of these Contract Documents, when used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects within the past ten years similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

## 1.4 Conflicting Requirements

- A. Referenced Standards: If compliance with two or more standards is required 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 GCDWR 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 GCDWR for a decision before proceeding.

## 1.5 Submittals

- A. Contractor's Quality Assurance and Quality Control Plan: For quality assurance and quality control activities and responsibilities.
- B. Qualification Data: For Contractor's quality control personnel.
- C. Testing Agency Qualifications: For testing agencies specified in Article 1.8 of this section of the Specifications to demonstrate their capabilities and experience, including proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- D. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
  - 1. Specification section number and title
  - 2. Entity responsible for performing tests and inspections
  - 3. Description of test and inspection
  - 4. Identification of applicable standards
  - 5. Identification of test and inspection methods
  - 6. Number of tests and inspections required
  - 7. Time schedule or time span for tests and inspections
  - 8. Requirements for obtaining samples
  - 9. Unique characteristics of each quality control service

## 1.6 Contractor's Quality Control Plan

- A. Quality Control Plan, General: Submit quality control plan within thirty days of Notice to Proceed. Submit in format acceptable to GCDWR. 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.

- B. Quality Control Personnel Qualifications
  - 1. Engage qualified full-time personnel trained and experienced in managing and executing quality assurance and quality control procedures similar in nature and extent to those required for the Work.
  - 2. Project superintendent may also serve as Project quality control manager.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
  - 1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
  - 2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
  - 3. GCDWR-performed tests and inspections indicated in the Contract Documents.
- E. Continuous Inspection of Workmanship: Describe process for Contractor's 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 Documents and accepted mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports including log of accepted and rejected results. Include Work GCDWR has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming Work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

## 1.7 Reports and Documents

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other sections. Include the following:
  - 1. Date of issue
  - 2. Project title and number
  - 3. Name, address, and telephone number of testing agency
  - 4. Dates and locations of samples and tests or inspections
  - 5. Names of individuals making tests and inspections

6. Description of the Work and test and inspection method
  7. Identification of product and specification section
  8. Complete test or inspection data
  9. Test and inspection results and an interpretation of test results
  10. Record of temperature and weather conditions at time of sample taking and testing and inspecting
  11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document
  12. Name and signature of laboratory inspector, as applicable
  13. Recommendations on retesting and re-inspecting
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other sections. Include the following:
1. Name, address, and telephone number of technical representative making report
  2. Statement on condition of substrates and their acceptability for installation of product
  3. Statement that products at Project site comply with requirements
  4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken
  5. Results of operational and other tests and a statement of whether observed performance complies with requirements
  6. Statement whether conditions, products, and installation will affect warranty
  7. Other required items indicated in individual specification sections
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other sections. Include the following:
1. Name, address, and telephone number of factory-authorized service representative making report
  2. Statement that equipment complies with requirements
  3. Results of operational and other tests and a statement of whether observed

performance complies with requirements

4. Statement whether conditions, products, and installation will affect warranty
  5. Other required items indicated in individual specification sections
- D. Permits, Licenses, and Certificates: For GCDWR'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.
- E. Test and Inspection Log
1. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
    - a. Date test or inspection was conducted
    - b. Description of the Work tested or inspected
    - c. Date test or inspection results were transmitted to GCDWR
    - d. Identification of testing agency or special inspector conducting test or inspection
  2. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for GCDWR's reference during normal working hours.

## 1.8 Quality Assurance

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required. Individual specification sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling Work similar in material, design, and extent to that indicated for this Project, whose Work has resulted in construction with a record of successful in-service performance.
- E. Licensed Professional Qualifications: A person who is legally licensed to practice in

the State of Georgia, e.g., professional engineer, registered surveyor, landscape architect, and who is adequately experienced in providing the professional services of the kind indicated.

F. Specialists

1. Certain specification sections require that specific construction activities shall be performed by entities who are recognized specialists in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
2. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E329; and with additional qualifications specified in individual sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:
  - a. Provide test specimens representative of proposed products and construction.
  - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
  - c. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
  - d. When testing is complete, remove test specimens, assemblies; do not reuse products on Project.
  - e. When sampling or testing of in-situ material is required, provide safe access to sampling/testing locations and coordinate with sampling/testing

personnel.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality assurance service to GCDWR with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
- K. Codes and Standards: Refer to General Conditions Article 3 - Contract Documents: Intent, Amending, Reuse, paragraph 3.02 of the General Conditions.
- L. Copies of applicable referenced standards are not included in the Contract Documents. Where copies of standards are needed by the Contractor for superintendence and quality control of the Work, the Contractor shall obtain a copy or copies directly from the publication source and maintain at the jobsite, available to the Contractor's personnel, subcontractors, and GCDWR.
- M. Quality of Materials: Unless otherwise specified, all materials and equipment furnished for permanent installation in the Work shall conform to applicable standards and specifications and shall be new, unused, and free from defects and imperfections, when installed or otherwise incorporated in the Work. The Contractor shall not use material and equipment for any purpose other than that intended or specified unless GCDWR authorizes in writing such use.
- N. Where so specified, products or workmanship shall also conform to the additional performance requirements included within the Contract Documents to establish a higher or more stringent standard or quality than that required by the referenced standard.

## 1.9 Off-site Inspection

- A. When the specifications require inspection of materials or equipment during the production, manufacturing, or fabricating process, or before shipment, such services shall be performed by GCDWR's independent testing laboratory, or inspection organization acceptable to GCDWR in conjunction with or by GCDWR.
- B. The Contractor shall give appropriate written notice to GCDWR not less than thirty days before off-site inspection services are required, and shall provide for the producer, manufacturer, or fabricator to furnish safe access and proper facilities and to cooperate with inspecting personnel in the performance of their duties.

## 1.10 Materials and Equipment

- A. The Contractor shall maintain control over procurement sources to ensure that materials and equipment conform to specified requirements in the Contract Documents.
- B. The Contractor shall comply with manufacturer's printed instructions regarding all facets of materials and/or equipment movement, storage, installation, testing, startup,



and operation. Should circumstances occur where the Contract Documents are more stringent than the manufacturer's printed instructions, the Contractor shall comply with the specifications. In cases where the manufacturer's printed instructions are more stringent than the Contract Documents, the Contractor shall advise GCDWR of the disparity and conform to the manufacturer's printed instructions. In either case, the Contractor is to apply the more stringent specification or recommendation, unless accepted otherwise by GCDWR.

## 1.11 Quality Control

- A. GCDWR Responsibilities: Where quality control services are indicated as GCDWR's responsibility, GCDWR will engage a qualified testing agency to perform these services.
1. GCDWR will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
  2. GCDWR will determine the exact time and location of field sampling and testing and may require such additional sampling and testing to determine that materials and equipment conform with data previously furnished by Contractor and with the Contract Documents. The Contractor shall ensure a minimum 48-hr notice of readiness for testing and inspection of the Work and accepts all responsibility for any delays that result from less than 48-hr notification.
- B. Contractor Responsibilities:
1. The Contractor shall furnish a construction schedule and a minimum of 48-hour notice of readiness for testing and inspection of the Work.
  2. The Contractor shall schedule the Work to permit adequate time for testing and re-testing should test results not conform to the Contract Documents. Lack of testing or inspection which is attributable to insufficient notice by the Contractor or failure of the Contractor to cooperate, will be cause for rejection of the Work.
  3. The Contractor shall deliver materials in sufficient quantities to GCDWR's testing agency as may be required. Laboratory testing shall be performed within a reasonable time, consistent with the specified standards.
  4. The Contractor shall furnish material samples and cooperate in the field sampling and testing activities, interrupting the Work when necessary. The Contractor shall furnish personnel, facilities, and safe access to assist in the sampling and testing activities.
  5. Costs for retesting and re-inspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor.
  6. Tests and inspections not explicitly assigned to GCDWR are Contractor's responsibility. Perform quality control activities required to verify that the Work



complies with requirements, whether specified or not.

7. 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.
8. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
9. Comply with manufacturers' instructions, including each step in the sequence.
10. When manufacturers' instructions conflict with Contract Documents, request clarification from GCDWR before proceeding.
11. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
12. Perform Work by persons qualified to produce required and specified quality.
13. Verify field measurements are as indicated on plans, Shop Drawings, or as instructed by manufacturer.
14. Secure products in place with positive anchorage devices designed and sized to withstand forces, stresses, vibration, physical distortion, or disfigurement.
15. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality control services. Contractor shall not employ same entity engaged by GCDWR, unless agreed to in writing by GCDWR.
16. Notify testing agencies at least twenty-four hours or greater if required by such agency in advance of time when Work that requires testing or inspecting will be performed.
17. Where quality control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality control service. Electronic copy of report is acceptable. If electronic format is submitted, one copy will suffice.
18. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
19. Submit additional copies of each written report directly to authorities having jurisdiction when they so direct.
20. Furnish climatically-controlled curing box(es) for field storage of cast concrete cylinders or other samples. Multiple boxes shall be furnished when concrete placement activities are being performed at multiple locations across the project

site. Curing box shall be manufactured and marketed for the specific purpose described herein and shall meet standards ASTM C31, C192 and C511. Curing box shall be used to maintain temperature and humidity of the concrete cylinder specimens for 48 hours. Cure box shall feature a digital thermometer, heat/cool indicator lights; temperature set buttons and a capacity of 22 standard 6" x 12" cylinders. Use of field constructed curing boxes will not be acceptable.

C. Tolerances

1. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
2. Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with Contract Documents, request clarification from GCDWR before proceeding.
3. Adjust products to appropriate dimensions; position before securing products in place.

D. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections.

E. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in pre-installation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

F. Retesting/Re-Inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.

G. Testing Agency Responsibilities:

1. Cooperate with GCDWR and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
2. Notify GCDWR and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
3. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
4. Conduct and interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from requirements.
5. Submit a certified written report, in duplicate, of each test, inspection, and

similar quality control service through Contractor.

6. Do not release, revoke, alter, or increase the Contract Document requirements or approve, accept or reject any portion of the Work.
  7. Do not perform any duties of Contractor.
- H. Associated Services: Contractor shall 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. Safe 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.
- I. Coordination
1. Coordinate sequence of activities to accommodate required quality assurance and quality control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
  2. Schedule times for tests, inspections, obtaining samples, and similar activities.
- J. Schedule of Tests and Inspections
1. Prepare a schedule of tests, inspections, and similar quality control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
  2. Distribution: Distribute schedule to GCDWR, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

## 1.12 Special Tests and Special Inspections

- A. Special Tests and Special Inspections: GCDWR will engage a qualified agency to

conduct special tests and inspections required, as follows:

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

### 1.13 Repair and Protection

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
- B. 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.
- C. Protect construction exposed by or for quality control service activities.
- D. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality control services.

## Part 2 Products

(Not Used)

## Part 3 Execution

(Not Used)

## Part 4 Measurement and Payment

### 4.1 General

- A. No separate measurement and payment shall be made for any work performed or material used for this section. Full compensation for such work shall be considered as incidental to other items of the Work. Costs in connection therewith shall be considered a subsidiary obligation of the Contractor and shall be included in the overall cost of the Work.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Temporary facilities and controls required for this work include, but are not necessarily limited to, temporary utilities such as water and electricity, first aid facilities, sanitary facilities, potable water, temporary enclosures, and construction facilities.

### 1.2 General

- A. First aid facilities, sanitary facilities, and potable water shall be available on the Project site on the first day that any activities are conducted onsite and throughout the Project. The other facilities shall be provided as the schedule of the Project warrants.
- B. Maintenance: Use all means necessary to maintain temporary facilities in proper and safe condition throughout progress of the Work. In the event of loss or damage, immediately make all repairs and replacements necessary, at no additional cost to GCDWR.
- C. Removal: Remove all such temporary facilities and controls as rapidly as progress of the Work will permit.
- D. Mobilization shall include, but not be limited to, these principal items:
  - 1. Obtaining required permits, including any necessary land disturbing permit(s).
  - 2. Moving Contractor's equipment required for operations onto site.
  - 3. Installing temporary construction power, wiring, and lighting facilities.
  - 4. Providing on-site sanitary facilities as specified and as required by laws and regulations, and governing agencies.
  - 5. Arranging for and assembly of Contractor's work and storage yard.
  - 6. Posting OSHA required notices and establishing safety programs and procedures.
  - 7. Having Contractor's superintendent at site full time.
- E. Use area designated for Contractor's temporary facilities as shown on Contract Documents or as otherwise determined in coordination with GCDWR.

### 1.3 Submittals

- A. If requested by GCDWR, submit:
  - 1. Copies of permits and approvals for construction as required by laws and

regulations and governing agencies.

2. Shop Drawings

- a. Temporary Utility Submittals: Electric power supply and distribution plans.
- b. Temporary Construction Submittals:
  - i. Parking area plans.
  - ii. Contractor's storage yard and storage building plans, including gravel surfaced area.
  - iii. Access roads and staging area location plan.
  - iv. Utility bypass plans.

3. Qualifications of Contractor's on-site Qualified Personnel for erosion and sediment control:

- a. Qualified Personnel means a person who has successfully completed an erosion and sediment control short course eligible for continuing education units, or an equivalent course approved by Georgia EPD and the State Soil and Water Conservation Commission.
- b. Provide copy of proof of successful completion for an erosion and sediment control short course eligible for continuing education units, or an equivalent course approved by Georgia EPD and the Georgia Soil and Water Conservation Commission.
- c. Provide name and telephone number(s) for the responsible person(s) that can be reached 24 hours a day, 7 days a week for erosion and sedimentation control, and other emergencies. GCDWR will provide to Contractor the name and telephone number of GCDWR representative who can be reached 24 hours a day, 7 days a week for such emergencies.

4. Health and Safety Plan for review by GCDWR prior to commencing work on the Project.

5. The name and phone number of an individual designated as the safety officer for the Project

## 1.4 Temporary Utilities

### A. General

- 1. Provide and pay all costs for all utilities required for the performance of the Work.
- 2. Pay all costs for temporary utilities until Project completion.

3. Costs for temporary utilities shall include all utilities necessary for the performance of testing as required by the Contract Documents.

B. Temporary Water

1. Provide all necessary temporary piping, and upon completion of the Work, remove all such temporary piping. See Section 01 00 00 – General Requirements, Article 1.12.
2. Provide temporary facilities and piping required to bring water to point of use and remove when no longer needed. Install an acceptable metering device for measuring water used.
  - a. If requested, a temporary hydrant meter, for measuring water use will be provided by GCDWR. Contractor shall pay the meter use charge and any associated deposit at no additional cost to GCDWR.
3. Provide a means to prevent water used for construction and testing from flowing back into source pipeline. Device(s) shall be as approved by GCDWR for backflow prevention.

C. Temporary Electricity

1. Provide all necessary wiring for the Contractor's use.
2. Furnish, locate and install area distribution boxes such that the individual trades may use, their own construction type extension cords to obtain adequate power, and artificial lighting at all points where required for safety.
3. Provide all temporary electrical services, wire, generators, etc. required for performance of the Work inclusive of maintaining existing facilities in service during required service shutdowns.
4. Pay all fuel bills for temporary power required for the performance of the Work where required during shutdowns, bypass pumping etc.

- D. Lighting: Provide temporary lighting to meet all applicable safety requirements to allow application or installation of materials and equipment, and observation or inspection of the Work.

## 1.5 First Aid Facilities

- A. The Contractor shall provide a suitable first aid station, equipped with all facilities and medical supplies necessary to administer emergency first aid treatment. The Contractor shall have practiced and pre-planned protocols for the removal and treatment of any injured person. All first aid facilities shall be made available by the Contractor to GCDWR's personnel. In the event of a medical or health emergency, the Contractor shall facilitate access by ambulance, fire, police, and other emergency personnel or service.



## 1.6 Sanitary Facilities

- A. Prior to starting the Work, the Contractor shall furnish, for use of Contractor's personnel on the job, subcontractors, and all other on-site personnel, all necessary toilet facilities which shall be secluded from public observation, as much as practical. These facilities shall be chemical toilets. All facilities shall be kept in a clean and sanitary condition and shall comply with the requirements and regulations of the area in which the Work is performed. Adequacy of these facilities will be subject to GCDWR's review and maintenance of same must be satisfactory to GCDWR at all times.
- B. Use of GCDWR's existing sanitary facilities by construction personnel will not be allowed.

## 1.7 Potable Water

- A. The Contractor shall be responsible for furnishing a supply of potable drinking water for employees, subcontractors, inspectors, engineers, and GCDWR personnel who are associated with the Work.

## 1.8 Enclosures and Construction Facilities

- A. Furnish, install, and maintain for the duration of construction, all required scaffolds, tarpaulins, canopies, steps, bridges, platforms and other temporary construction necessary for proper completion of the Work in compliance with all pertinent safety and other regulations.

## 1.9 Parking Facilities

- A. Parking facilities for the Contractor's and Contractor's subcontractors' personnel shall be the Contractor's responsibility.
- B. Control vehicular parking to preclude interference with public traffic or parking, access by emergency vehicles, GCDWR's operations, or construction operations.

## 1.10 Protection of Work and Property

- A. General
  - 1. Perform Work within right-of-way and easements in a systematic manner that minimizes inconvenience to property owners and the public.
  - 2. No residence or business shall be cut off from vehicular traffic for a period exceeding 4 hours, unless special arrangements have been made.
  - 3. Maintain in continuous service all existing oil and gas pipelines, underground power, telephone or communication cable, water mains, irrigation lines, sewers, poles and overhead power, and all other utilities encountered along the Work, unless other arrangements satisfactory to owners of said utilities have been

made.

4. Protect, shore, brace, support, and maintain underground pipes, conduits, drains, and other underground utility construction uncovered or otherwise affected by construction operations.
5. Protect, shore, brace, support, and maintain existing soils and grade on the project site to protect and maintain existing soils and grade on adjacent properties, R.O.W.s, easements, and other lands.
6. Keep fire hydrants and water control valves free from obstruction and available for use at all times.
7. In areas where Contractor's operations are adjacent to or near a utility, such as gas, telephone, television, electric power, water, sewer, or irrigation system, and such operations may cause damage or inconvenience, suspend operations until arrangements necessary for protection or temporary or permanent relocation thereof have been made by Contractor.
8. Utility Interruptions
  - a. Notify utility owner's offices that may be affected by construction operation at least two days in advance.
  - b. Before exposing a utility, obtain utility owner's permission. Should service of utility be interrupted due to Contractor's operation, notify proper authority immediately. Cooperate with said authority in restoring service as promptly as possible and bear costs incurred.
9. Do not impair operation of existing sanitary sewer systems. Prevent construction material, pavement, concrete, earth, volatile and corrosive wastes, and other debris from entering sewers, pump stations, or other sewer structures.
10. Maintain original site drainage wherever possible.

B. Trees and Plantings

1. Protect from damage and preserve trees, shrubs, and other plants outside limits of the Work and within limits of the Work, which are designated on the Drawings to remain undisturbed.
  - a. Where practical, tunnel beneath trees when on or near line of trench.
  - b. Employ hand excavation as necessary to prevent tree injury.
  - c. Do not stockpile materials or permit traffic within drip lines of trees.
  - d. Provide and maintain temporary barricades around trees, typically no closer than the drip lines of trees or as otherwise shown or required in the

## Contract Documents.

- e. Water vegetation as necessary to maintain health.
  - f. Cover temporarily exposed roots with wet burlap and keep burlap moist until soil is replaced around roots.
  - g. No trees, except those specifically shown on Drawings to be removed, shall be removed without written approval of GCDWR.
  - h. Dispose of removed trees in accordance with Section 31 10 00 – Site Clearing.
- 2. In the event of damage to bark, trunks, limbs, or roots of plants that are not designated for removal, treat damage by corrective pruning, bark tracing, application of a heavy coating of tree paint, and other accepted horticultural and tree surgery practices.
  - 3. Unless indicated otherwise on the Drawings, replace each plant that dies as a result of construction activities.
- C. Waterways: Keep ditches, culverts, and natural drainages continuously free of construction materials and debris, unless specifically included in the Work.

## 1.11 Project Health and Safety

### A. Health and Safety Plan

- 1. If requested by GCDWR, contractor shall develop and implement a Site-Specific Health and Safety Plan (HASP) that describes the potential hazards of the work site and controls and work practices applied to minimize those hazards.
- 2. At a minimum, the HASP should include:
  - a. Safety Policy Statement
  - b. Description of site operations and list of contractor personnel
  - c. Job hazard identification for personnel
  - d. Standard Operating Procedures for equipment or processes
  - e. Equipment maintenance and housekeeping procedures
  - f. Employee safety training records
  - g. Emergency contract numbers
  - h. A detailed route map to the nearest hospital.

3. Contractor shall designate an individual to serve as the Project Safety Officer.

## 1.12 Temporary Controls

### A. Air Pollution Control

1. Minimize air pollution from construction operations. Exhaust from all machinery on the project shall meet applicable Federal, State, and local regulations.
2. Limit blowing dust caused by construction operations by applying water or employing other appropriate means or methods to maintain dust control, subject to the approval of GCDWR and in accordance with Federal, State, and local regulations.
3. Protect all existing facilities (indoors or out) from damage by dust, fumes, spray or spills (indoors or out). Protect motors, bearings, electrical gear, instrumentation and building or other surfaces from dirt, dust, welding fumes, paint spray, spills or droppings causing wear, corrosion, malfunction, failure, or defacement by enclosure, sprinkling or other dust palliatives, masking and covering, exhausting, or containment.
4. Burning of waste materials, rubbish, or other debris will not be permitted on or adjacent to site.
5. Conduct operations of dumping rock and of carrying rock away in trucks to cause a minimum of dust. Give unpaved streets, roads, detours, or haul roads used in construction area a dust-preventive treatment or periodically water to prevent dust. Strictly adhere to applicable environmental regulations for dust prevention.
6. Provide and maintain temporary dust-tight partitions, bulkheads, or other protective devices during construction to permit normal operation of existing facilities. Construct partitions of plywood, insulating board, plastic sheets, or similar material. Construct partitions in such a manner that dust and dirt from demolition and cutting will not enter other parts of existing building or facilities. Remove temporary partitions as soon as need no longer exists.

### B. Noise Control

1. Provide acoustical barriers as necessary so noise emanating from tools or equipment will not exceed legal noise levels.
2. Noise Control Ordinance: The Contractor's attention is directed to Gwinnett County Code of Ordinances, Chapter 38, Article III.

### C. Water Pollution Control

1. Divert sanitary sewage and non-storm waste flow interfering with construction and requiring diversion to sanitary sewers in accordance with Federal, State, and local regulations. Do not cause or permit action to occur which would cause

an overflow to existing waterway.

2. Prior to commencing excavation and construction, obtain GCDWR's agreement with detailed plans showing procedures intended to handle and dispose of sewage, groundwater, and stormwater flow, including dewatering pump discharges.
  3. Do not dispose of volatile wastes such as mineral spirits, oil, chemicals, or paint thinner in storm or sanitary drains. Disposal of volatile wastes into streams or waterways is prohibited. Provide acceptable containers for collection and lawful disposal of volatile waste materials, debris, and rubbish.
- D. Temporary Storage Yards: Construct temporary storage yards for storage of products that are not subject to damage by weather conditions.
- E. Temporary Storage Buildings
1. Provide environmental control systems that meet recommendations of manufacturers of equipment and materials stored.
  2. Arrange or partition to provide security of contents and ready access for inspection and inventory.
  3. Store combustible materials (paints, solvents, fuels, etc.) in a well-ventilated and remote building meeting required safety standards.

## Part 2 Product

(Not Used)

## Part 3 Execution

(Not Used)

## Part 4 Measurement and Payment

### 4.1 General

- A. Except as otherwise provided in Section 31 10 00 – Site Clearing and Section 31 41.16.13 – Steel Sheet Piling, no separate measurement and payment shall be made for any work performed or material used for this section. Full compensation for such work shall be considered as incidental to other items of the Work. Costs in connection therewith shall be considered a subsidiary obligation of the Contractor and shall be included in the overall cost of the Work.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. This section includes installing, maintaining, removing and disposing of the temporary orange barrier fencing, chain link fencing, and/or welded wire fencing as indicated in the Contract Documents or as directed by GCDWR.

### 1.2 Submittals

- A. If required by GCDWR, the Contractor shall submit for approval:
  - 1. Description and dimensions for posts to be used with temporary fencing.
  - 2. Plan detailing installation location of all temporary fencing, spacing and bury depth of posts, and openings in the temporary fencing as necessary for access.
  - 3. Description and dimensions for all necessary temporary fencing materials.

## Part 2 Products

### 2.1 Orange Barrier Fencing

- A. Must have the following characteristics:
  - 1. High-visibility, fluorescent orange color.
  - 2. Lightweight and easy to handle.
  - 3. UV stabilized fabric.
  - 4. 48-inch height, minimum.
  - 5. 100-foot or 300-foot length prefabricated rolls.
  - 6. 60-inch high, heavy duty oak stakes or metal stakes.
- B. Signage
  - 1. Orange Barrier Fencing placed as tree protection barrier shall bear necessary signage required by Gwinnett County Planning and Development.
  - 2. Laminated signs shall be securely attached to orange barrier fencing.
  - 3. Signs shall read in both English and Spanish, "TREE SAVE AREA" / "ÁREA DE ÁRBOLES PROTEGIDOS" and "STAY OUT" / "NO ENTRE".

4. Sign dimension requirement is 8.5 inches high and 11 inches wide.

## 2.2 Temporary Chain Link Fencing

- A. Temporary chain link fencing must meet the following:
  1. Fencing shall be a commercial product.
  2. Posts, tubes, rails, bracing, and fence fabric shall be galvanized steel.
  3. Height shall be, 6-feet minimum, or as otherwise specified on the Contract Documents, or directed by GCDWR.
  4. Fence fabric mesh shall have 2-inch openings.
  5. Contractor shall bury fence posts or use temporary portable bases in accordance with manufacturer's recommendations.
- B. Alternative fencing type and/or dimensions may be used as a substitute for chain link fencing to meet the temporary fencing needs, with prior approval from GCDWR.

## 2.3 Temporary Welded Wire Fencing

- A. Temporary welded wire fencing must meet the following:
  1. Welded wire fabric shall be galvanized coated one-ounce welded wire. The galvanizing shall be uniform and shall have no more than 5 percent of the joints deficient in coating as determined by ASTM A239. The welded wire fabric shall have the following specifications, unless otherwise specified in the Contract Documents.
  2. Wire Size: Steel core wire is 11 gauge.
  3. Fabric: 60-inch height with a mesh size of 2 inches by 4 inches or as otherwise specified by GCDWR or the Contract Documents.
  4. Posts: Posts for welded wire fence shall be wood or steel U-channel post of the dimensions and shapes shown on the Contract Documents. Contractor shall bury fence posts or use temporary portable bases in accordance with manufacturer's recommendations.
  5. Accessories: Accessories, including but not limited to tension wire, tie wire, fittings, staples and nails shall be galvanized in accordance with ASTM A153, except the minimum galvanizing shall be .60 ounce per square foot.
- B. Alternative fencing type and/or dimensions may be used as a replacement for welded wire fencing to meet the temporary fencing needs, with prior approval from GCDWR.

## Part 3 Execution

### 3.1 Orange Barrier Fencing

- A. Contractor shall install orange barrier fencing along surveyed easement lines, right-of-way lines, property lines, and limits of disturbance and as shown in the Contract Documents. Where necessary, the contractor shall obtain the services of a land surveyor, registered in the State of Georgia, to stake easement lines, right-of-way lines, and property lines to designate limits of construction.
- B. Maximum post spacing shall be 8-feet, or as otherwise specified in the Contract Documents or directed by GCDWR.
- C. Contractor shall install orange barrier fencing as necessary to exclude the entry of equipment into designated tree protection areas. No mobilization or other work shall be allowed on-site prior to installation of the orange barrier fencing by the Contractor and approval following site inspection by GCDWR. Contractor shall be responsible for maintaining fence for its intended purpose until directed to remove fence by GCDWR.
- D. Contractor shall install orange barrier fencing to replace sections of existing fencing removed from private property for construction period, connecting both ends of the existing fence along the existing fence alignment. Completed Work will include replacing these sections of orange barrier fencing with permanent fencing.

### 3.2 Temporary Chain Link Fencing

- A. Contractor shall install temporary chain link fencing in accordance with the Contract Documents or as directed by GCDWR. Contractor shall be responsible for maintaining fence for its intended purpose until directed to remove fence by GCDWR.

### 3.3 Temporary Welded Wire Fencing

- A. Contractor shall install temporary welded wire fencing in accordance with the Contract Documents or as directed by GCDWR. Contractor shall be responsible for maintaining fence for its intended purpose until directed to remove fence by GCDWR.

END OF SECTION



## Part 1 General

### 1.1 Summary

- A. The Contractor shall provide transportation of all equipment, materials and products furnished under these Contract Documents to the Work site. In addition, the Contractor shall provide preparation for shipment, loading, unloading, handling and preparation for installation, and all other work and incidental items necessary or convenient to the Contractor for the satisfactory prosecution and completion of the Work.
- B. All equipment, materials and products damaged during transportation or handling, or otherwise found deficient, shall be repaired or replaced by the Contractor at no additional cost to GCDWR prior to being incorporated into the Work.

### 1.2 Preparation for Shipment

- A. When practical, factory-assemble products. Match mark or tag separate parts and assemblies to facilitate field assembly. Cover machined and unpainted parts that may be damaged by the elements with a strippable protective coating.
- B. Package products to facilitate handling and protect from damage during shipping, handling, and storage. Mark or tag outside of each package or crate to indicate its purchase order number, bill of lading number, contents by name, name of Project, and Contractor, product number, and approximate weight. Include complete packing lists and bills of materials with each shipment.
- C. Protect equipment from exposure to the elements and keep dry and dust-free as far as practical. Protect painted surfaces against impact, abrasion, discoloration, or other damage.
- D. For major items, request a minimum seven-day advance notice of shipment from manufacturers. Upon receipt of manufacturer's advance notice of shipment, promptly notify GCDWR of anticipated date of equipment arrival.
- E. Factory Test Results: Reviewed and accepted by GCDWR before product shipment as required in individual Specification sections.
- F. Deliver materials to project site and place at a location determined by Contractor.
- G. Contractor shall notify GCDWR upon arrival.

### 1.3 Transportation

- A. All products shall be suitably boxed, crated, or otherwise protected during transportation.
- B. Where products will be unloaded using cranes, forklifts, or other hoisting equipment,

the Contractor shall ensure that the weights of the assembled sections do not exceed the capacity of the hoisting equipment.

- C. Small items and appurtenances such as gauges and valves, which could be damaged during shipment shall be removed from the equipment prior to shipment, packaged and shipped separately. All openings shall be plugged or sealed to prevent the entrance of water or dirt.

## 1.4 Handling

- A. Handle products in accordance with the manufacturer's written instructions, and in a manner to prevent damage. Store products, upon delivery, in accordance with manufacturer's instructions, with labels intact and legible, in approved storage yards or sheds. Provide manufacturer's recommended maintenance during storage, installation, and until products are accepted for use by GCDWR.
- B. Lifting and handling drawings and instructions furnished by the manufacturer or supplier shall be strictly followed. Eyebolts or lifting lugs furnished on the equipment or structure shall be used in handling the equipment. Spreader bars or lifting beams shall be used when the distance between lifting points exceeds that permitted by standard industry practice.
- C. Under no circumstances shall equipment or products such as pipe, structural steel, castings, reinforcement, lumber, piles, poles, etc., be thrown or rolled off of trucks onto the ground. Equipment or products so unloaded will be rejected.
- D. Slings and chains shall be padded as required to prevent damage to protective coatings and finishes and to prevent damage to edges and other vulnerable portions of structures.

## 1.5 GCDWR Furnished Equipment

- A. GCDWR furnished equipment shall mean any GCDWR-purchased equipment and such being required by these Specifications to be installed by the Contractor.
- B. The Contractor shall off load and store all GCDWR furnished equipment per this Section of these Specifications.

## Part 2 Products

(Not Used)

## Part 3 Execution

(Not Used)

## Part 4 Measurement and Payment

### 4.1 General

- A. No separate measurement and payment shall be made for any work performed or material used for this section. Full compensation for such work shall be considered as incidental to other items of the Work. Costs in connection therewith shall be considered a subsidiary obligation of the Contractor and shall be included in the overall cost of the Work.

END OF SECTION

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Product Storage and Handling Requirements

## Part 1 General

### 1.1 Summary

- A. The work under this Section includes, but not limited to, the furnishing of all labor, tools and materials necessary to properly store and protect all materials, equipment, products and the like, as necessary for the proper and complete performance of the Work.
- B. The Contractor shall be responsible for selecting and securing a storage site or sites necessary for the construction of this Project.

### 1.2 Storage and Protection

#### A. Storage

1. Maintain ample way for foot traffic at all times, except as otherwise approved by GCDWR. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration. Keep running account of products in storage to facilitate inspection and to estimate progress payments for products delivered but not installed in the Work.
2. Storage, laydown, and/or parking areas shall be as shown on the Contract Documents or otherwise as proposed by the Contractor with the approval of GCDWR. Storage areas shall be within the project Limits of Disturbance (LOD) unless otherwise arranged by the Contractor and approved by GCDWR. All storage areas shall be restored to preconstruction or better condition in accordance with other sections/provisions in the Contract Documents.
3. All property damaged by reason of storing of material shall be properly replaced/repaired to pre-construction or better condition at no additional cost to GCDWR.
4. Packaged materials shall be delivered in original unopened containers and so stored until ready for use.
5. All materials shall meet the requirements of these Specifications at the time that they are used in the Work.
6. Store products in accordance with manufacturer's instructions.

#### B. Protection

1. Use all means necessary to protect the materials, equipment and products of every section before, during and after installation and to protect the installed work and materials of all other trades.

2. All materials shall be delivered, stored, and handled to prevent the inclusion of foreign materials and damage by water, breakage, vandalism, or other causes.
- C. Replacements: In the event of damage, immediately make all repairs and replacements necessary for the approval of GCDWR and at no additional cost to GCDWR.
- D. All equipment shall be boxed, crated or otherwise completely enclosed and protected during shipment, handling, and storage. All equipment shall be stored above ground level and adequately supported on wood blocking or other approved support material. Printed storage instructions of the manufacturers shall be strictly adhered to.
- E. Painted, anodized or otherwise coated surfaces shall be protected against impact, abrasion, discoloration and other damage. All coated surfaces which are damaged prior to acceptance of equipment shall be cleaned and coated to the satisfaction of GCDWR with the same or equivalent coating used in the original application.
- F. Individually packaged, unpainted steel parts shall be protected by a wrapping of vapor phase inhibiting or oil-impregnated paper and polyethylene film prior to shipment.
- G. Ends of threaded pipe and fittings shall be sealed watertight with metal or plastic caps. Threaded openings shall be sealed watertight with metal or plastic plugs. Other openings shall be sealed with two layers of 6 mil polyethylene securely taped in place with waterproof tape.
- H. Immediately prior to installation, equipment shall be cleaned of any protective coatings used during storage and any rust, dirt, grit or other foreign material shall be removed.
- I. After storage, rubber parts such as valve seats, expansion joints, gaskets, hoses and shaft couplings shall be checked for hardening or cracking. Deteriorated parts shall be replaced prior to placing in service by the Contractor at Contractor's own expense.
- J. Unless otherwise permitted in writing by GCDWR, building products and materials such as cement, grout, plaster, particleboard, finish lumber, wiring, etc., shall be stored indoors in a dry location. Building products such as rough lumber, plywood, stone, concrete block and structural tile may be stored outdoors.
- K. Tarps and other coverings shall be supported above the stored equipment or materials on wooden strips to provide ventilation under the cover and minimize condensation. Tarps and covers shall be arranged to prevent ponding of water.

### 1.3 GCDWR Furnished Equipment

- A. The Contractor shall provide storage and protection for all GCDWR furnished equipment and materials, including extended storage as specified above.

## Part 2 Products

(Not Used)

## Part 3 Execution

(Not Used)

## Part 4 Measurement and Payment

### 4.1 General

- A. No separate measurement and payment shall be made for any work performed or material used for this section. Full compensation for such work shall be considered as incidental to other items of the Work. Costs in connection therewith shall be considered a subsidiary obligation of the Contractor and shall be included in the overall cost of the Work.
- B. At DWR's discretion, partial payment may be made for all, or part of material, product, or equipment delivered and stored at the site but not yet installed. Such payment shall be in accordance with Specification Section 01 22 00 0 – Unit Prices and Section Article 14.02.A(1) of the General Conditions, and all conditions therein. Following installation, inspection, and acceptance of the material, product, or equipment in the Work, the balance of the unit item cost extended by actual quantity of units installed may be paid under the applicable Unit Price Item, less retainage, and subject to other applicable requirements of the Contract and Specifications.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Construction surveying shall include all of the surveying work required to layout the Work and control the location of the finished Project. The Contractor shall have the full responsibility for constructing the Project to the correct horizontal and vertical alignment, as shown on the Drawings, as specified, or as directed by the Engineer or GCDWR. The Contractor shall assume all costs associated with rectifying work constructed in the wrong location and/or at the wrong elevation.

### 1.2 Definitions

- A. **Project Stakeout Survey:** A project stakeout survey is a field survey performed to provide staking and horizontal and vertical alignment controls to establish the Project limits and Project elements related to construction of the Project, including those articulated in Article 3.1 below and including but not limited to wetlands, detention basins, levees, channels, drainage swales, easements, right of way, and stormwater treatment structures. A project stakeout survey shall include the gathering of existing topographical information for projects which have unit prices for earthwork quantities.
- B. **Progress Survey:** A progress survey is a field survey performed to acquire information required to verify Work is performed in accordance with the Contract Documents and any directed field changes, including but not limited to location of channel, stormwater treatment structure dimensions, structure locations, and profile elevations and other project elements related to construction of the Project, including those articulated in Article 3.2 below. Progress surveys also includes the field acquisition of topographical and other data to establish quantities of Work performed.
- C. **Record Drawing Survey:** A record drawing survey is a field survey performed by a registered land surveyor, licensed in the State of Georgia, upon completion of the field Work by the Contractor. However, a record drawing survey may incorporate data from a progress survey as described above if subsequent construction or environmental events have not changed the constructed Work. Record drawing survey shall include the acquisition of data relative to final topographic conditions and final locations of structures and all constructed elements of the completed Work and other project elements related to construction of the Project, including those articulated in Article 3.4 below. Record drawing survey shall include the gathering of final topographical and dimensional information for projects which have unit prices for earthwork and similar quantities.
- D. **Record Documents:** A record drawing survey shall result in the following record documents: AutoCAD file containing all field data, two printed copies depicting the planimetric and topographic information, sealed and signed by a registered land surveyor licensed in the State of Georgia, a scanned pdf of same, plus an ASCII text file of X, Y, and Z values and labels of all survey data points, both raw and processed data.

- E. Construction Survey: A construction survey is additional field survey work directed to be completed by GCDWR which is not included in scope of project stakeout survey, progress survey or record drawing survey.
- F. Surveyor: Surveyor, for the purposes of this specification section, shall mean a person who is a registered land surveyor licensed in the State of Georgia or employees of a firm licensed to perform surveying in the State of Georgia, with such employees supervised by a person who is a registered land surveyor licensed in the State of Georgia.

### 1.3 Submittals

- A. At the request of GCDWR, submit field surveys as described above, with an affidavit, sealed and signed by a registered land surveyor licensed in the State of Georgia, certifying that the survey work was performed to industry and specified standards.
- B. With each monthly request for payment, submit drawings, spreadsheets and corroborating data from progress surveys that substantiate the quantities requested for payment. Failure to submit such may result in deferral by GCDWR to recommend whole or any part of Contractor's Application for Payment, either partial or final.
- C. As provided in General Conditions Article GC-14.04.A, submit record documents and/or data pursuant to the completion of record documents by others, as described above prior to request for certificate of Substantial Completion.

### 1.4 Quality Assurance

- A. The following quality assurance provisions shall apply to project stakeout surveys, progress surveys, record drawing surveys and construction surveys.
- B. Horizontal and vertical control work shall be performed using either standard Total Station surveying techniques, differential leveling or global positioning system (GPS) techniques meeting the specification requirements as outlined in the following:
  - 1. Horizontal control work generated using Total Station traverse surveys shall comply with and meet or exceed Second Order – Class II standard of accuracy for geodetic control as established by the FGDC Geospatial Positioning Accuracy Standards, Part 4: Standards for Architecture, Engineering, Construction (A/E/C), and Facility Management. For horizontal control surveys performed using GPS technology the relative horizontal accuracy shall conform to the FGDC Geospatial Positioning Accuracy Standards, Part 3: National Standard for Spatial Data Accuracy Standards.
  - 2. At a minimum, vertical control work generated using Total Station or differential level surveys shall comply with and meet or exceed Third Order, as outlined in the FGDC Geospatial Positioning Accuracy Standards, Part 4: Standards for Architecture, Engineering, Construction (A/E/C) and Facility Management. For vertical control surveys performed using GPS technology the relative vertical accuracy shall conform to the FGDC Geospatial Positioning Accuracy



Standards, Part 3: National Standard for Spatial Data Accuracy Standards.

3. At a minimum, all other surveys and the mapping produced from these surveys, including the utility location surveys and the site mapping topographic surveys for this project shall meet or exceed FGDC Part 4 Standards.
- C. The surveys shall result in coordinates of all points X, Y, and Z to the nearest 0.01 foot, except that Z coordinates for ground surface may be to the nearest 0.1 foot. Coordinates shall be provided in the Georgia West Zone 1002 State Plane Coordinate System (SPCS), and in the latest adjustment for the area. The horizontal and vertical datum(s) shall be the NAD 83 and NAVD 88 respectively. Units of measurement shall be U.S. Survey Feet. All feature location and topographic survey work and the resultant mapping, shall comply with FGDC Geospatial Positioning Accuracy Standards, Part 4: Standards for Architecture, Engineering, Construction (A/E/C), and Facility Management with accuracy tolerances of +/-0.1-foot for the horizontal, +/-0.02-foot for the vertical for all hard surfaces (pavement and invert shots etc.), and +/-0.1-foot for the vertical on soft or natural ground surfaces. Where a +/-0.1-foot vertical/elevation accuracy tolerance is required RTK GPS cannot be used, and differential level loops are required.
  - D. The surveyor shall identify the latest adjustment date/name and correct coordinate system zone for the SPCS and provide this information to GCDWR through the Contractor prior to the start of the Work. A project adjustment factor shall be provided by the surveyor for the site. All of the survey work shall be provided in ground coordinates and SPCS grid coordinates.
  - E. Information shall be recorded in field book format and any data collector information shall be provided to GCDWR through the Contractor. All level and horizontal traverse networks shall be closed to the starting point and the errors recorded. If the errors are above the standards outlined above, the survey shall re-run the horizontal and vertical traverses until the errors are eliminated within the acceptable range. Field notes shall include: the date, names of the crew, weather conditions, and a sketch outlining surroundings.
  - F. The surveyor shall provide 3D topographic and planimetric survey data in RAW ASCII comma delimited equivalent of the survey formatted as follows (Point number, N, E, Z, description) at a minimum. Seed files and complimentary files shall have an established unit of U.S. survey feet and survey tenths. The survey file shall clearly display the vertical datum on all elevation references. All entities written to Drawing files will physically be at the specified elevations, true 3D.
  - G. AutoCAD work products shall be provided in version 2013 or newer.

## Part 2 Products

(Not Used)

## Part 3 Execution

### 3.1 Project Stakeout Survey

- A. The elements and limits listed below shall be staked-out in such a manner that GCDWR can easily confirm the location and elevation of items as shown in the Contract Drawings.
1. Project limits / Limits of Disturbance
  2. Permanent benchmarks (minimum 2) as specified in Article 3.4, Paragraph D.
  3. Tree protection fencing
  4. Wetlands
  5. Erosion control practices
  6. Channel centerline
  7. In-Stream structures
  8. Bank-full and bank-full bench
  9. Limits of grading
  10. Stormwater BMPs
    - a. Pipe location, top elevation, and invert elevation
    - b. Junction box, riser, and other manhole appurtenances, location, top elevation, and invert elevation
    - c. Media and stone layer horizontal limits, thicknesses, and elevations
    - d. Embankments, centerlines, berms, and general earthwork cuts and fills with appropriate offset identified.
  11. Planting limits
  12. Underground utilities
  13. Additional items/locations at the request of GCDWR.
- B. The Contractor shall establish any survey control needed to complete the Work.

- C. Contractor shall protect existing survey control points during the progression of the Work. If survey control points are damaged, new control points shall be established, at no cost to GCDWR.
- D. The Contractor shall have on-site during all construction activities, survey equipment and sufficiently experienced personnel capable of establishing and confirming grade and elevations.

### 3.2 Progress Survey

- A. Progress survey data for channel construction shall be provided to GCDWR in Microsoft Excel format (2010 or later version) and shall include station and elevation along with an annotated description of each point for the channel profile, alignment, and cross section dimensions.
  - 1. Profile Progress Survey
    - a. Thalweg elevation at each riffle (R), run (RN), and pool (P) station as shown on longitudinal profile Drawing.
    - b. Bank full elevation at each riffle (R), run (RN), and pool (P) station.
  - 2. Alignment Progress Survey
    - a. Centerline points at 25-foot intervals along channel alignment.
    - b. Centerline points at all PCs, PTs, and PIs, and bend apex.
  - 3. Cross Section Progress Survey: Cross sections shall be taken at each riffle (R), run (RN), and pool (P). All points along the cross section where a change in bank slope occurs beginning at 10 feet beyond the limits of grading and extending through the top of bank, back of bank full bench, front of bank full bench, toe of slope, channel thalweg, and other distinct points where a change in slope occurs along the cross section.
- B. Progress Surveys for in-stream structures shall include station and elevation along with an annotated description per point for all items surveyed. Surveyor shall obtain sufficient points to locate the shape, dimension, elevations, and layout of the constructed structure including but not limited to:
  - 1. Elevation at lowest apparent point of invert on center of structure (on top of stone).
  - 2. Elevation at center of structure where arm intersects (on top of stone) for cross vanes, step vanes, and j-hook vanes.
  - 3. Elevation at midpoint of structure arm (on top of stone or log).
  - 4. Elevation at sill at front of bank-full bench intercept (on top of stone or log).

5. Elevation at sill at back of bank-full bench intercept (on top of stone or log).
- C. Progress surveys for Stormwater Management BMPs shall include station and elevations along with annotated description per point. Survey sufficient ground points to represent all features and appurtenances within and around the BMP. These features may include, but are not limited to subgrade, subbase stone and media layers, underdrain piping, inlet and outlet structures, berms, channels, landscaping, cleanouts, observation wells, outlet protection, headwalls, pipe inverts, control structures, diversion structures, or other features shown in the Contract Drawings. Survey shall obtain sufficient points to identify the shape, dimension, elevation, slopes, and layout of the BMP.
- D. Progress surveys for other structures shall include station and elevation along with an annotated description per point. These other structures may include, but not be limited to, outfall structures, control structures, diversion structures, plunge pools, pipe inverts, headwalls, layers of media and stone, or other features as shown in the Contract Drawings with specified elevations. Surveyor shall obtain sufficient points to identify the shape, dimension, elevation, and layout of the structure.
- E. Progress surveys for all other Work shall include station and elevation along with an annotated description per point. Survey sufficient ground points to represent all features within the limits of Work including fences, continuous berms and swales (greater than ten feet in length) that are generally parallel to the channel, tributaries and other storm drainage features (pipe outlets, washes, ditches, and swales).
- F. Progress surveys not approved by GCDWR will result in adjustments to the Work. Upon completing adjustments, Contractor shall resubmit progress surveys for review and approval by GCDWR.

### 3.3 Construction Survey

- A. Data from construction surveys requested by GCDWR shall be delivered in AutoCAD format and shall include point number, X, Y, and Z coordinates and annotated descriptions of each point to sufficiently describe the shape, dimension, elevation, and layout of the topographic feature.
- B. When construction surveying is required to be performed by GCDWR, Contractor shall submit same documentation as is required for Progress surveys.

### 3.4 Record Drawing Survey

- A. Survey sufficient ground points and/or channel cross sections to represent all features within the limits of the survey to produce 1-foot interval topographic contours with a map scale of 1 inch = 20 feet. The boundary of the topographic contour survey area shall extend to all disturbed areas or the project boundary, whichever is the greatest. Additionally, for constructed elements, provide the information described in Article 3.2, Paragraph B above.
- B. Identify the edge of pavement and elevations of all roads and centerline of all paths

within the project boundary at a minimum of 25-foot intervals.

- C. Survey sufficient ground points to represent all features within the limits of the survey including fences, continuous berms and swales (greater than four feet in length) that are generally parallel to the channel, tributaries and other storm drainage features (pipe outlets, washes, ditches, and swales).
- D. Upon request, place permanent benchmarks and display on deliverable Drawing. Coordinate with GCDWR to determine approximate location of the permanent benchmarks. A permanent benchmark shall consist of a brass or metal disc permanently set into concrete or other suitable surface. Permanent benchmarks shall be supplied by GCDWR.

## Part 4 Measurement and Payment

### 4.1 General

- A. No separate measurement and payment shall be made for any work performed or material used for:
  - 1. Project Stakeout.
  - 2. Progress Survey.
- B. Full compensation for such work shall be considered as incidental to other items of the Work. Costs in connection therewith shall be considered a subsidiary obligation of the Contractor and shall be included in the overall cost of the Work.
- C. Construction Survey, specifically requested by GCDWR beyond the work described in Article 4.1, Paragraph A above or requiring certification by a registered land surveyor licensed in the State of Georgia, shall be paid per the Labor Rates (32 01 30) pay items. Costs shall be per crew and include all costs for associated survey equipment, transportation, and incidentals to complete the Work.

END OF SECTION

## Part 1 General

### 1.1 Scope

- A. This Section covers the general cleaning which the Contractor shall be required to perform both during construction and before final acceptance of the Project unless otherwise shown on the Drawings or specified elsewhere in these Specifications.

### 1.2 Quality Assurance

- A. Daily, and more often, if necessary, conduct inspections verifying that requirements of cleanliness are being met.
- B. In addition to the standards described in this Section, comply with all pertinent requirements of governmental agencies having jurisdiction, including Gwinnett County Code of Ordinances, Chapter 38, Article VII, Division 2 – Illicit Discharge and Illegal Connection.

## Part 2 Products

### 2.1 Cleaning Materials and Equipment

- A. Provide all required personnel, equipment and materials needed to maintain the specified standard of cleanliness.

### 2.2 Compatibility

- A. Use only the methods and equipment which are compatible with the type of waste being removed, as recommended by the manufacturer of the material or as approved by GCDWR.
- B. Definitions of materials and procedures for waste removal are provided in 02 42 00 – Removal of Waste Material.

## Part 3 Execution

### 3.1 Progress Cleaning

- A. Do not allow the excessive accumulation of scrap, debris, waste material, and other items not required for construction of this Work.
- B. At least each week, and more often, if necessary, completely remove all scrap, debris and waste material from the job site.
- C. Provide adequate storage for all items awaiting removal from the job site, observing all requirements for fire protection and protection of the environment.
- D. Daily, and more often, if necessary, inspect the site and pick up all scrap, debris and

waste material. Remove all such items to the place designated for their storage.

- E. Daily, and more often, if necessary, inspect the road or other surface areas adjacent to the construction access(es)/exit(s) for tracked soil or sediment and clean as necessary. Clean and maintain the site as necessary to comply with the Erosion and Sediment Control Plan and applicable regulations.
- F. Restack materials stored on-site weekly.
- G. At all times maintain the site in a neat and orderly condition which meets the approval of GCDWR.

### 3.2 Final Cleaning

- A. Definitions: Unless otherwise specifically specified, "clean" for the purpose of this article shall be interpreted as removal of all tools, equipment, surplus materials, scrap, debris, trash, or other waste materials from the site and restoring the site to its pre-construction condition.
- B. General: Prior to completion of the Work, remove from the job site all tools, surplus materials, equipment, scrap, debris and waste. Conduct final progress cleaning as described in 3.1 above.
- C. Site: Unless otherwise specifically directed by GCDWR, hose down all paved areas on the site and all public sidewalks directly adjacent to the site; rake clean other surfaces of the grounds. Sweep surfaces prior to hosing down. Completely remove all resultant debris. Avoid discharging sediment-laden water to stormwater conveyances leaving the site or discharging to a stream or ditches or other conveyances that discharge to a stream. Avoid discharging heavily sediment-laden water to stormwater BMPs that could be clogged or otherwise damaged or have the vegetation therein damaged or excessively coated with sediment. All such activities must comply with the Erosion and Sediment Control Plan and applicable regulations.
- D. Structures: Remove all traces of soil, waste material, splashed material, and other foreign matter to provide a uniform degree of exterior cleanliness. Visually inspect all exterior surfaces and remove all traces of soil, waste material, and other foreign matter. Remove all traces of splashed materials from adjacent surfaces. If necessary to achieve a uniform degree of exterior cleanliness, hose down the exterior of the structure. Sweep surfaces prior to hosing down. In the event of stubborn stains not removable with water, GCDWR may require light sandblasting or other methods at no additional cost to GCDWR.
- E. Post-Construction Cleanup: All evidence of temporary construction facilities, haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, or any other evidence of construction, shall be removed as directed by GCDWR.
- F. Restoration of Landscape Damage: Any landscape feature damaged by the Contractor shall be restored as close as possible to its original condition at the Contractor's expense. Restoration shall be performed to the satisfaction of GCDWR.

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- G. Timing: Schedule final cleaning as approved by GCDWR to enable GCDWR to accept the Project.

## Part 4 Measurement and Payment

### 4.1 General

No separate measurement and payment shall be made for any work performed or material used for this section. Full compensation for such work shall be considered as incidental to other items of the Work. Costs in connection therewith shall be considered a subsidiary obligation of the Contractor and shall be included in the overall cost of the Work.

END OF SECTION



## Part 1 General

### 1.1 Summary

- A. The Work under this section includes, but is not necessarily limited to the compiling, maintaining, recording, and submitting of project record documents as herein specified.
- B. Record documents to be prepared and submitted by the Contractor include, but are not limited to Record Drawings, Specifications, Change Orders, and other modifications to the Contract, GCDWR field orders or written instructions, including Requests for Information (RFI) and Clarification Memorandums, reviewed shop drawings, product data and samples, and Test records. Final payment will not be made until all record documents are properly assembled, submitted, and approved by GCDWR.
- C. The Contractor shall maintain on the project site the latest scope of work and an updated set of Record Drawings. These drawings must be the latest revision of the Contract Drawings and match that of GCDWR.

### 1.2 Submittals

- A. The Contractor shall submit for approval by GCDWR, the following items:
  - 1. Record Drawings.
  - 2. Product Specifications
  - 3. Change orders and other contract modifications.
  - 4. GCDWR field orders.
  - 5. Requests for Information and Clarification Memorandums.
  - 6. Approved shop drawings, product data, and samples.
  - 7. Test records.
  - 8. Details not on original Construction Drawings.
  - 9. Warranties.
- B. Accompany submittal with transmittal letter containing date, project title and number, Contractor's name and address, title and number of each record document, and signature of Contractor's authorized representative.

## Part 2 Products

(Not Used)

## Part 3 Execution

### 3.1 Maintenance of Documents and Samples

- A. Store documents and samples in the Contractor's field office, or an agreed upon location when field offices are not used, apart from documents used for construction. Example acceptable locations may include lockable tool trailer at the lay down area or superintendent's work vehicle. Maintain secure storage for documents and product samples in an agreed upon location.
- B. File documents and samples in accordance with format of these specifications.
- C. Maintain documents in a neat, clean, dry, legible condition and in good order. Do not use record documents for construction purposes. Maintain at an agreed upon site for GCDWR one copy of all record documents.
- D. Keep record documents and samples available for inspection by GCDWR, at all times.
- E. Failure to maintain the record documents in a satisfactory manner maybe cause for withholding of a certificate for payment.
- F. The Contractor shall maintain on the Project site a copy of all permits issued regarding the Project.

### 3.2 Record Drawings

- A. The Contractor must maintain an up-to-date field record set of drawings by marking changes and other information directly on a clean set of full-size contract drawings. The Contractor shall submit up-to-date record drawings with monthly pay applications or have them for review at monthly progress meetings. Approval of monthly pay applications will not occur until the updated record drawings are approved. GCDWR will review the record drawings to confirm that the recorded information is current.
- B. Making Entries on Record Drawings
  - 1. Color Coding: Field Record drawing shall be marked in red.
  - 2. Date all entries.
  - 3. Date daily progress along linear stormwater systems and BMPs of any type.
  - 4. For stormwater drainage systems, legibly mark to record actual changes made during construction, including but not limited to:
    - a. Invert elevations of all pipes entering catch basins, manholes, junction

- boxes, headwalls, etc.
- b. Horizontal and vertical locations of existing and new stormwater drainage systems and appurtenances, or Work.
5. For Stormwater BMPs, legibly mark to record actual changes during construction, including but not limited to:
    - a. Measured depths of subsurface elements concealed in construction referenced to permanent surface improvements.
  6. Dimensions and details of field changes.
  7. Changes made by Addenda and Field Orders, Work Change Directive, Change Order, Written Amendment, and GCDWR's written interpretation and clarification using consistent symbols for each and showing appropriate document tracking number.

## Part 4 Measurement and Payment

### 4.1 General

- A. No separate measurement and payment shall be made for any work performed or material used for this section. Full compensation for such work shall be considered as incidental to other items of the Work. Costs in connection therewith shall be considered a subsidiary obligation of the Contractor and shall be included in the overall cost of the Work.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all material, tools, labor, and equipment necessary to properly conduct excavation at specified locations or as directed by GCDWR.

### 1.2 Submittals

- A. If requested by GCDWR, submit all working drawings and schedules of materials and methods proposed to be followed in the execution of the Work under this item.

## Part 2 Products

### 2.1 Bentonite

- A. Bentonite shall be a natural, high swelling, sodium montmorillonite bentonite.
  - 1. High swelling is defined as the ability of 2 grams of bentonite, when mechanically reduced to pass a #100 sieve, to swell when added gradually to 100 ml of distilled water to a volume of 16ml or greater.

## Part 3 Execution

### 3.1 Exploratory Excavation

- A. When directed by GCDWR, the Contractor shall perform field exploratory excavation work to determine the presence of existing underground sanitary sewer, water, and storm drainage, utility piping, and or structures. The information for each said utility found shall include, but not limited to, type of utility, material dimension, material type, and both vertical and horizontal measurements of its location.
- B. Where necessary, utilize vacuum excavation equipment to minimize the risk of damage to suspected existing utilities.
- C. Follow all federal, state, and local regulations related to excavation work.
- D. For each utility found, provide the following information:
  - 1. Type of utility
  - 2. Material type
  - 3. Material dimension
  - 4. Measurements of the vertical and horizontal location of the utility to permanent reference points

5. Any other information which may help in coordinating work around the utility
- E. When directed by GCDWR the Contractor shall exploratory excavation to evaluate subsurface conditions for features such as, but not limited to, soil stratigraphy, soil water conditions, or the presence of features such as, but not limited to, rock or other hydraulically restrictive or excavation-limiting factors or layers.
- F. Abandonment of boreholes shall be performed in accordance with all applicable federal, state, and local regulations.
- G. Submit documentation of the findings, including a detailed sketch, to GCDWR.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnish all labor, transportation, equipment, and materials necessary to perform site demolition and removal work required to accommodate new construction as specified on the Plans. Work includes but is not limited to the following:
1. Removal, haul-off and disposal of existing asphalt pavement, concrete pavement, sidewalk, paved ditches and curb or combination curb and gutter as specified in the Contract Documents or as directed by GCDWR.
  2. Removal, salvage, and disposal or abandonment of existing storm drainage pipe and structures of all types and sizes as required for the rehabilitation, replacement, and/or installation of storm drainage systems and related appurtenances, including excavation and backfill.
  3. Removal, salvage, and disposal of fencing as needed to complete the Work, or as directed by GCDWR.
  4. Tree and tree roots removal, including stump grinding.

### 1.2 Submittals

- A. If requested by GCDWR, submit:
1. To GCDWR and other authorities having jurisdiction, if required, all working drawings and schedules of materials and methods proposed to follow in the execution of the Work under this item.
  2. Photographs or videotape, sufficiently detailed, of existing conditions of project site that may be misconstrued as damage, caused by debris, or construction material removal.
  3. Details of all caps and plugs to be installed on abandoned piping to remain in the ground.
  4. Location of waste disposal facilities for all materials removed from the site.
  5. Vehicle Capacity Certifications: The Contractor shall submit to GCDWR certifications indicating the type of container or vehicle, including make and model, license plate number, equipment number, and measured maximum volume, in cubic yards, of the load bed of each piece of equipment utilized for material removal. The measured volume of each piece of equipment shall be calculated from actual internal physical measurement performed jointly by the Contractor and a GCDWR representative. Maximum volumes may be rounded to the nearest cubic yard. GCDWR reserves the right to re-measure trucks at

any time to verify reported capacity.

6. Disposal Tickets

- a. Solid waste disposal tickets shall be submitted with gross, tare, and net weights in tons of solid waste measured off-site at the solid waste disposal facility as documentation of properly disposed solid waste for each load hauled off-site.
- b. Inert waste disposal tickets shall be submitted with truckloads in cubic yards of inert waste measured off-site at the inert waste disposal facility as documentation of properly disposed inert waste for each load hauled off-site.
- c. Recycling disposal tickets shall be submitted as documentation of properly disposal of recyclable materials.
- d. Disposal tickets shall include:
  - i. Date material removed from Project site.
  - ii. Name of hauler (company and driver) transporting such material.
  - iii. General description of material transported.

## Part 2 Products

### 2.1 Pavement Removal Equipment

- A. Equipment shall be appropriate for the type, depth, and area of pavement to be removed.
- B. Milling Equipment
  1. For partial depth asphalt pavement removal, use power-driven, self-propelled milling equipment that is the size and shape that allows traffic to pass safely through areas adjacent to the work. Equipment shall be:
    - a. Designed to mill and remove specified depth of existing asphalt pavement.
    - b. Equipped with grade slope controls operating from a string line or ski and based on mechanical or sonic operation.
    - c. Capable of removing pavement to an accuracy of 1/8 inch.
    - d. Furnished with lighting system for night work, as necessary.
    - e. Provided with conveyors capable of side, rear, or front loading to transfer the milled material from the roadway or other paved area to a truck.

## Part 3 Execution

### 3.1 Saw Cuts in Existing Pavement

- A. Where pavement removal is required, the Contractor shall full depth saw cut the existing pavement, sidewalk, paved ditches, curb or combination curb and gutter along the lines specified in the Contract Documents or as directed by GCDWR.
- B. The sawcut joints shall extend for the entire length of the pavement removal area. Ragged edges shall be trimmed to provide a substantially straight-line juncture between the old and new surface.
- C. For trench excavation within a paved surface, saw cuts shall be a minimum of twelve inches (12-in) outside the maximum width of the excavated trench.
- D. Contractor shall not damage pavement sections or areas which are to be retained. Damage done by the Contractor to areas to remain in place shall be repaired or restored at the Contractor's expense.

### 3.2 Milling Operation or Pavement Removal by Other Means

- A. If removal of complete depth of pavement is specified on the Construction Documents, pavement may be excavated with hydraulic excavator, backhoe, loader, or other equipment appropriate to the type, depth, and area of pavement to be removed. Milling machinery may also be used.
- B. Partial depth pavement removal shall be completed by milling the designated areas and depths as shown on the Drawings. Ensure the following requirements are met:
  - 1. Schedule the construction operation. Use milling methods that will produce a uniform finished surface and maintain a constant cross slope between extremities in each lane.
  - 2. Provide positive drainage to prevent water accumulation on the milled pavement, as shown on the Drawings or directed by GCDWR.
  - 3. Bevel the longitudinal vertical edges greater than 2 inches that are produced by the removal process and left exposed to traffic. Bevel them at least 3 inches for each 2 inches of material removed. Use an attached mold board or other approved method.
  - 4. When removing material at ramp areas and ends of milled sections, taper the transverse edges 10 feet to avoid creating a traffic hazard and to produce a smooth surface.
  - 5. Protect with a temporary asphaltic concrete tie-in (paper joint) vertical edges at other areas such as bridge approach slabs, drainage structures, and utility appurtenances greater than ½-inch that are left open to traversing vehicles. Place the temporary tie-in at taper rate of at least 6 to 1 horizontal to vertical



distance.

6. Remove dust, residue, and loose milled material from the milled surface. Do not allow traffic on the milled surface and do not place asphaltic concrete on the milled surface until removal is complete.

### 3.3 Dust Control

- A. Dust Control: Provide power brooms, vacuum sweepers, power blowers, or other means to remove loose debris or dust. Do not allow dust to restrict visibility of passing traffic or to disrupt adjacent property owners.
- B. Dust Suppression and Protection: Provide silica particle exposure protection as required in accordance with OSHA §1926.1153 Respirable Crystalline Silica, and other dust exposure protection in accordance with OSHA and other applicable Federal, State, and local regulations.

### 3.4 Stormwater Drainage Pipe Removal

- A. The Contractor shall be responsible for removal of any existing storm drainage pipe as directed by GCDWR. Prior to removing any portion of existing pipelines, the Contractor shall obtain approval from GCDWR.
- B. The Contractor shall follow all applicable codes and regulations for removal of hazardous materials, such as asbestos cement pipe, and dispose of in a legal and proper manner.
- C. The Contractor shall load, haul away, and dispose of in a satisfactory location any debris, trash, structures, piping, and similar items removed from the worksite in accordance with all applicable codes and regulations.

### 3.5 Drainage Structure Removal and Abandonment

- A. The Contractor shall be responsible for removal of any existing storm drainage structure as directed by GCDWR.
- B. Where drainage structures are to be removed, the Contractor shall excavate the structure, remove the structure and connecting piping, as required, and backfill the void with approved material. If the drainage structure is located within a road, parking area, driveway or other maintained area, the backfill shall be compacted to 95 percent standard proctor. If the drainage structure is located in an unpaved or otherwise unimproved area, the backfill shall be compacted to 90 percent standard proctor and slightly mounded to allow for settlement.

- C. Where drainage structures are to be abandoned in place, the contractor shall grout seal the ends of all pipes entering the structure, fracture the invert of the structure to allow for drainage, cut and remove the top of structure to a minimum of three feet (3') below finished grade, fill the structure with No. 57 stone, and backfill and compact with suitable fill material as indicated in 3.2 B, unless otherwise shown or required in the Contract Documents.
- D. The Contractor shall load, haul away, and dispose of in a satisfactory location any debris, trash, structures, piping, etc. removed from the worksite in accordance with all applicable codes and regulations.

### 3.6 Pipe Abandonment in Place

- A. The Contractor shall be responsible for the abandonment of existing storm pipe. Contractor shall plug or fill and plug storm pipe as indicated in the Contract Documents or as directed by GCDWR.
- B. The Contractor shall plug abandoned pipe connections using Class A Concrete or Brick Masonry.
- C. Where directed, the Contractor shall fill abandoned pipes with flowable backfill per Section 31.23 23.33 Flowable Fill. Contractor shall place the material according to manufacturer's recommendations or as directed by GCDWR. Contractor shall cut two holes into the plug at the upstream end and pump backfill into the pipe through one of the holes until pipe is completely filled, unless otherwise shown or required in the Contract Documents.
- D. Contractor shall keep and submit detailed records of all flowable backfill placed including the date placed, location, depth and quantity used.

### 3.7 Disposal

- A. The excess asphaltic or concrete material resulting from operations described under Article 3.1 and Article 3.2 above shall be disposed of in accordance with provisions of Section 02 42 00.

### 3.8 Fence Removal

- A. The Contractor shall remove all fence components above and below ground and backfill with an acceptable fill material.
- B. Contractor shall use caution in removing and salvaging fence materials.
- C. Salvaged materials may be used to reconstruct fence as approved by GCDWR or as shown on the Contract Documents.

### 3.9 Selective Tree Removal

- A. The term selective tree removal as used herein shall include removal and disposal of

trees performed in a manner that will not jeopardize the public safety or damage structures including, but not limited to, utility lines or services, private property, or adjacent trees.

- B. Removal of trees shall follow proper safety procedures with appropriate equipment, personnel.
- C. The diameter at breast height (DBH) of a tree shall be measured at 4.5 feet above the ground.
- D. Trees identified for select removal shall be measured in accordance with the DBH. Trees with multiple trunks shall have measured the DBH of each trunk.
- E. Unless otherwise directed by DWR, grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.
- F. Fill depressions caused by tree removal operations with satisfactory soil material unless further excavation or earthwork is indicated.
- G. 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.
- H. The Contractor shall identify trees (suitable as defined in Contract Documents) that may be used for construction of in-stream structures. Trees suitable for construction of stream structures shall be approved by GCDWR. Trees used for in-stream structures may require that the root ball remain intact with the tree trunk. Stockpile trees suitable for construction of stream structures, as described in the Contract Documents.
- I. GCDWR will identify any additional trees to be saved following staking of clearing limits and installation of tree protection fencing. Contractor shall protect trees identified to be saved during all construction activities, in accordance with Section 01 56 26 Temporary Fencing
- J. Do not injure or deface vegetation that is not designated for removal.

### 3.10 Stump Grinding

- A. Grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches below exposed sub-grade.
- B. Stumps identified for grinding will be measured in diameter at the ground level.
- C. Fill depressions caused by stump grinding operations with satisfactory soil material unless further excavation or earthwork is indicated.
- D. 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.

END OF SECTION

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Removal of Surplus and Waste Material

## General

## 1.1 Summary

- A. Section includes furnishing all labor, equipment, and materials necessary to remove all surplus and waste material, as directed by GCDWR.

## 1.2 Submittals

- A. If requested by GCDWR, submit:
1. Photographs or videotape, sufficiently detailed, of existing conditions of project site that might be misconstrued as damage caused by removal operations.
  2. Vehicle Capacity Certifications: The Contractor shall submit to GCDWR certifications indicating the type of container or vehicle, including make and model, license plate number, equipment number, and measured maximum volume, in cubic yards, of the load bed of each piece of equipment utilized for material removal. The measured volume of each piece of equipment shall be calculated from actual internal physical measurement performed jointly by the Contractor and a GCDWR representative. Maximum volumes may be rounded to the nearest cubic yard. GCDWR reserves the right to re-measure trucks at any time to verify reported capacity.
  3. Disposal Tickets
    - a. Solid waste disposal tickets shall be submitted with gross, tare, and net weights in tons of solid waste measured off-site at the solid waste disposal facility as documentation of properly disposed solid waste for each load hauled off-site.
    - b. Inert waste disposal tickets shall be submitted with truckloads in cubic yards of inert waste measured off-site at the inert waste disposal facility as documentation of properly disposed inert waste for each load hauled off-site.
    - c. Recycling disposal tickets shall be submitted as documentation of proper disposal of recyclable materials.
    - d. Disposal tickets shall include:
      - i. Date material removed from Project site.
      - ii. Name of hauler (company and driver) transporting such material.
      - iii. General description of material transported.
  4. A completed and signed Gwinnett County Erosion and Sediment Control and Solid Waste Management Affidavit form, as issued by the Gwinnett County

Department of Planning and Development, verifying the associated solid waste responsibilities and requirements of the Contractor.

5. Waste Management Plan: Plan shall indicate anticipated types and quantities of demolition waste and construction waste and planned means and location of disposal of such waste.

### 1.3 Definitions

- A. The definitions contained in United States Resource Conservation and Recovery Act (RCRA) Laws and Regulations and Georgia Environmental Protection Division (EPD) Rules 391-3-4-.01 shall be applicable to this Project. The term waste shall include pre-existing materials.
- B. Construction/Demolition Waste, as defined by EPD Rule 391-3-4.01, means waste building materials and rubble resulting from construction, remodeling, repair, and demolition operations on pavements, houses, commercial buildings, and other structures. Such waste includes, but is not limited to, asbestos containing waste or asbestos containing material (ACM), wood, bricks, metal, concrete, wallboard, paper, cardboard, inert waste landfill material, and other non-putrescible wastes which have a low potential for groundwater contamination.
- C. Inert wastes, as defined by EPD Rule 391-3-4.01, means earth and earth-like products, concrete, cured asphalt, rock, bricks, yard trimmings, stumps, limbs, and leaves. This definition excludes industrial and demolition waste.
- D. Solid Waste
  1. Solid waste, as defined by EPD Rule 391-3-4.01, means any garbage or refuse; sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility; and other discarded material including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations and from community activities, but does not include recovered materials; solid or dissolved materials in domestic sewage; solid or dissolved materials in irrigation return flows or industrial discharges that are point sources subject to permit under 33 U.S.C. Section 1342; or source, special nuclear, or by-product material as defined by the federal Atomic Energy Act of 1954, as amended (68 Stat. 923).
  2. Solid waste materials as defined in GDOT Standard Specifications Section 215 shall be removed and disposed in according with the GDOT Standard Specifications Section 201 and Section 215.
- E. Surplus Material: Surplus material shall be defined as the excess and surplus materials imported to the Project site by the Contractor, including excess material not needed for the construction of the Project, or supplemental material used, including packaging materials, resulting from construction, renovation, or repair operations. Surplus material includes, but is not limited to, masonry and concrete masonry units (CMU), lumber, wood sheet materials, wood trim, metals, piping, and electrical

conduit. Surplus material is the property of and responsibility of the Contractor.

- F. Demolition Waste: Existing structure and site improvement materials resulting from demolition or selective operations. Demolition waste includes, but is not limited to, asphalt pavement, concrete, concrete reinforcing steel, brick, concrete masonry units (CMUs), structural and miscellaneous steel, piping, supports and hangers, valves, and sprinklers.
- G. Disposal: Removal and subsequent sale, recycle, reuse, or deposit in landfill or recycle center acceptable to authorities having jurisdiction.
- H. Recycled Material: Recycled material shall be material that is recovered for subsequent processing in preparation for reuse by either the Contractor or disposed of at an approved recycle center.

## Part 2 Products

(not used)

## Part 3 Execution

### 3.1 Plan Implementation

- A. Implement waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
- B. Waste Management Conference: Conduct bi-weekly conference at Project site. Review methods and procedures related to waste management including, but not limited to, the following:
  - 1. Review and discuss waste management plan.
  - 2. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
  - 3. Review procedures for periodic collection and transportation to disposal facilities.
- C. Training
  - 1. Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
  - 2. Distribute waste management plan to everyone concerned within three days of submittal return.
  - 3. Distribute waste management plan to entities when they first begin work onsite. Review plan procedures and locations established for salvage, recycling, and

disposal.

D. Site Access and Temporary Controls

1. Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
2. Designate specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and/or sold.

### 3.2 Disposal of Waste

- A. Practice efficient waste management in the use of materials in the course of the Work. Use reasonable means to divert construction and demolition waste from landfills. Facilitate recycling and salvaging of materials.
- B. Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of such in a manner acceptable to authorities having jurisdiction.
- C. Except as otherwise specified, do not allow waste materials that are to be disposed accumulate on-site.
- D. Remove and transport waste in a manner that will prevent spillage on adjacent surfaces and areas.
- E. Burning: Do not burn waste materials on-site.
- F. Waste removed from the Project site shall ultimately be disposed in sites permitted by the Georgia Environmental Protection Division for the acceptance of type of waste being disposed or at recycling centers approved for the material being recycled.
1. The acceptable types of permitted disposal facilities are as follows:
    - a. Inert Waste Landfills
    - b. Municipal Solid Waste Landfills
    - c. Municipal Solid Waste Landfills permitted to receive only construction and demolition wastes.
  2. Recycling center locations may be obtained from [www.earth911.com](http://www.earth911.com) or other legitimate sources.
- G. Exceptions to Paragraph F are as follows:
1. Hazardous waste shall be disposed of in accordance with Georgia Environmental Protection Division Rules 391-3-11.

2. Asbestos-containing waste/ACM shall also be handled and disposed of in accordance with Georgia Environmental Protection Division Rules 391-3-14.
  3. Excess earth material and excess excavated rock material may be placed on sites for which the Contractor provides to GCDWR a signed affidavit from the property owner that the placement of such material is acceptable to the property owner. The Contractor and property owner shall be responsible for all permitting of such disposal.
- H. No waste shall be placed at a transfer station facility.
- I. Construction/demolition waste and inert waste shall not be mixed when items are hauled off-site.
- J. Waste shall be loaded and hauled offsite in a manner that does not damage the existing landscape.

### 3.3 Recycling

- A. Recycle as much material as is practical, including uncontaminated packaging materials, paper, cardboard, boxes, plastic sheet and film, polystyrene packaging, wood crates, plastic pails.
- B. Prepare and maintain recyclable 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
1. Separate recyclable material from waste materials, trash, and debris. Separate recyclable material by type at Project site to the maximum extent practical according to construction waste management plan.
  2. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
  3. Inspect containers and bins for contamination and remove contaminated materials if found.
  4. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  5. Stockpile materials away from construction area. Do not store within drip line of trees to remain.
  6. Store components off the ground and protect from the weather as necessary.
  7. Remove recyclable waste and transport to recycling receiver or processor.



**D. Demolition Waste**

1. Break up and transport asphalt pavement to asphalt-recycling facility.
2. Break up and transport concrete to concrete recycling facility.
3. Concrete reinforcement and metals from concrete may be removed and sorted with other metals.
4. Metal reinforcement, anchors, and ties may be removed from masonry and sorted with other metals.
5. Clean and stack undamaged, whole masonry units on wood pallets.

**E. Surplus Material**

1. Packaging: Break down cardboard and box packaging into flat sheets. Bundle and store in a dry location. Separate and bag polystyrene packaging materials. As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood, unless otherwise directed by GCDWR. Break down crates into component wood pieces and comply with requirements for recycling wood.
2. Wood Materials: Grind or chip lumber into small pieces. Bag sawdust that does not contain painted or treated wood.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all the materials and placement of all cast-in-place concrete, including all reinforcing steel and formwork, in the structures shown on the Contract Documents, and such other concrete as may be found necessary to fully complete the Work indicated under this Contract or per GCDWR.

### 1.2 Concrete Mix Design

- A. Cast-in-place concrete mix design shall meet the following requirements which are the classifications in accordance with GDOT Standard Specification Section 500:
  - 1. Class AAA
    - a. Minimum Compressive 28 Day Strength: 5,000 psi.
    - b. Slump: 2-4 inches.
  - 2. Class AA1
    - a. Minimum Compressive 28 Day Strength: 4,500 psi.
    - b. Slump: 2-4 inches.
  - 3. Class A
    - a. Minimum Compressive 28 Day Strength: 3,000 psi.
    - b. Slump: 2-4 inches.
  - 4. Class B
    - a. Minimum Compressive 28 Day Strength: 2,200 psi.
    - b. Slump: 2-4 inches.
- B. Aggregate sizing and proportioning of cement, water, aggregates, air content, and use of admixtures shall be as required to meet the requirements of each class of concrete shown above and as needed to meet the requirements of the Work.
- C. Use of fly ash as a cement substitute is prohibited unless specifically allowed by GCDWR.
- D. Entrained Air: 4-7% Total Air Content, unless otherwise approved by GCDWR.

### 1.3 Submittals

- A. If requested by GCDWR, submit to GCDWR:
1. All working drawings and schedules of materials and methods proposed to follow in the execution of the Work under this item. Submittals shall show, in detail, the type, mix design, reinforcement layout, and location of all cast-in-place concrete and accessories to be used in construction.
  2. Certification that all materials used in cast-in-place concrete meet the material standards specified in this specification.
  3. Product data, including:
    - a. Sources of cement and aggregates.
    - b. Sieve analysis, physical properties, and deleterious substance test and evaluation reports for fine and coarse aggregates.
    - c. Chemical analysis and physical properties for each cement type used.
    - d. Material Safety Data Sheets (MSDS) for all concrete components and admixtures.
    - e. Air-entraining admixture. Product data including catalogue cut, technical data, storage requirements, product life, recommended dosage, temperature considerations and conformity to ASTM Standards.
    - f. Water-reducing admixture. Product data including catalogue cut, technical data, storage requirements, product life, recommended dosage, temperature considerations and conformity to ASTM standards.
    - g. High-range water-reducing admixture (plasticizer). Product data including catalogue cut, technical data, storage requirements, product life, recommended dosage, temperature considerations, retarding effect, slump range and conformity to ASTM standards. Identify proposed locations of use.
    - h. Sheet curing material. Product data including catalogue cut, technical data and conformity to ASTM standard.
    - i. Liquid curing compound. Product data including catalogue cut, technical data, storage requirements, product life, application rate and conformity to ASTM Standards. Identify proposed locations of use.
  4. Concrete Delivery/Batch Tickets
    - a. For each batch of concrete before unloading at the Site.
    - b. In accordance with ASTM C94/C94M, Section 14, including requirements

14.2.1 through 14.2.10.

- c. Indicate the amount of mixing water withheld, and maximum permitted amount that may be added at the Site.

## 1.4 Defective Work

- A. Any concrete work found to be defective from any cause whatsoever, at any time before the Final Acceptance of the Work, shall be either removed and replaced or repaired at the direction of GCDWR and at the expense of the Contractor.

## Part 2 Products

### 2.1 Forms

- A. All formwork shall conform to the requirements of ACI 347.
- B. The Contractor shall furnish all labor and materials for all forms required for the construction of the Work.
- C. Either metal or wood forms may be used.
- D. All forms shall be true to the required shape, clean, of sufficient strength, and well braced, so that they shall maintain their proper position during the placing and vibrating of the concrete.

### 2.2 Steel Reinforcement

- A. Steel reinforcement shall be detailed, fabricated, and placed in conformance with all applicable requirements of ACI 318, and the CRSI Manual of Standard Practice and GDOT Standard Specifications Section 853.
- B. Steel reinforcing bars shall conform to ASTM A615, Grade 60, unless otherwise specified.
- C. Welded wire fabric shall conform to ASTM A185.
- D. Steel wire shall conform to ASTM A82.
- E. All metal accessories for setting and fastening of reinforcement shall conform to CRSI Manual of Standard Practice.

### 2.3 Portland Cement

- A. In accordance with ASTM C150.
- B. Alkalis: Maximum 0.60 percent.
- C. Nonhydraulic above grade structures: Type I or Type II

- D. Hydraulic and below grade structures: Type II

## 2.4 Supplementary Cementitious Materials

- A. Slag Cement: In accordance with ASTM C989, Grades 100 of 120.
- B. Tricalcium Aluminate:
  - 1. Content of Cementitious Materials: Maximum 8 percent.

## 2.5 Aggregates

- A. Natural Aggregates
  - 1. Free from deleterious coatings and substances and conforming to the requirements of ASTM C33, unless otherwise modified herein.
  - 2. Free from materials and aggregate types causing popouts, discoloration, staining, or other defects on surface of concrete.
  - 3. Nonreactive in accordance with ASTM C33, Appendix XI, Paragraph XI.1.
  - 4. Coarse aggregate:
    - a. Natural gravels, combination of gravels and crushed gravels, crushed stone, or combination of these materials containing no more than 15 percent flat or elongated particles (long dimension more than five times the short dimension).
    - b. Materials Passing 200 Sieve: 0.5 percent maximum.
    - c. Limit deleterious substances in accordance with ASTM C33, Table 3 for exposed concrete.
  - 5. Fine aggregate:
    - a. Clean, sharp, and natural sand.
    - b. Conforming to ASTM C33.
    - c. Material Passing 200 Sieve: 4 percent maximum.
    - d. Limit deleterious substances in accordance with ASTM C33, Table 1 with material finer than 20 sieve limited to 3 percent, coal and lignite limited to 0.5 percent.

## 2.6 Admixtures

- A. Unless otherwise permitted, furnish from one manufacturer.

B. Characteristics

1. Compatible with other constituents in mix.
2. Free of chlorides and alkalis (except for those attributable to water).
3. Do not use admixtures known to be toxic after concrete has cured for 30 days.
4. Furnish type of admixtures as recommended by manufacturer for anticipated temperature ranges.
5. Proportion and mix in accordance with manufacturer's recommendations.

C. Air-Entraining Admixture: ASTM C260

D. Water-Reducing Admixture: ASTM C494/C494M, Type A or Type D.

E. Retarding Admixture: ASTM C494/C494M, Type B.

F. High Range Water Reducing Admixture (Superplasticizer): ASTM C494/C494M, Type F or G. Use only when approved by Engineer or GCDWR.

G. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II. Use only when approved by Engineer or GCDWR.

1. Use of viscosity modifier if intent is to achieve self-consolidating concrete.

H. Do not use calcium chloride as an admixture.

## 2.7 Joint Sealants

A. Water stops: Polyvinyl chloride conforming to Corp of Engineer Specification CRD-C 572, or as otherwise specified or approved by GCDWR.

B. Preformed joint filler: Sponge rubber, cork, self-expanding cork, or asphalt-impregnated fiberboard, conforming to AASHTO M 153 or AASHTO M213, or as otherwise specified or approved by GCDWR.

C. Joint sealants: Synthetic rubber that is resistant to acids and alkalis (pH range 3.5 to 8), or as otherwise specified or approved by GCDWR.

## 2.8 Water

A. Water used shall be clean, fresh, and free from oils, acids, alkalis, organics, or other deleterious substances. Potable water will fulfill this requirement.

## Part 3 Execution

### 3.1 Preparation

- A. Measurement and Mixing: Measurement and mixing of concrete shall be subject to the review of GCDWR in all respects and shall be performed in accordance with the recommendations of ACI 304, as modified herein.
1. Measuring requirements: Measure cement, fine and coarse aggregates separately by weight by equipment providing accuracy within one percent of the net load weighed. Water shall be measured by a suitable device, accurate to within one percent of the total amount required for the batch.
  2. Measuring equipment: The accuracy of the weighting equipment shall meet the requirements of the United States Bureau of Standards and standard testing weights and other necessary equipment shall be available at all times for testing the equipment.
  3. Mixing: Concrete shall be mixed in rotary, batch type mixer of adequate design to produce a thorough mix, homogenous in composition and uniform in color. Each batch of 1 cubic yard or less shall be mixed not less than 1-1/2 minutes after the last of the ingredients have been added to the mixer. The mixing time shall be increased 15 seconds for each additional cubic yard or fraction thereof.
- B. Ready-Mixed Concrete
1. Rate of delivery: The rate of delivery of the mixed concrete shall be such that the interval between placing of fresh concrete in contact with concrete already placed from previous batches shall not exceed 45 minutes. The elapsed time between the introduction of mixing water to the cement and aggregates and depositing concrete in the Work shall not exceed 60 minutes, including mixing and agitating time.
    - a. If an approved high-range water-reducer (plasticizer) is used, the elapsed time between the introduction of mixing water to the cement and aggregates and depositing concrete in the Work shall not exceed 90 minutes, including mixing and agitating time.
  2. Delivery equipment: Delivery of concrete to project site in non-agitating equipment shall not be permitted.
  3. Addition of water: No water shall be added to the concrete at the site unless allowed by GCDWR for a specific batch. Allowance of such addition to one batch shall not be construed as allowance of additions to subsequent deliveries.

### 3.2 Formwork

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be

applied, until structure can support such loads.

- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Construct forms tight enough to prevent loss of cement paste.
- D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces.
- E. Chamfer exterior corners and edges of permanently exposed concrete.
- F. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- G. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- H. Retighten forms and bracing before placing concrete, as required, to prevent mortar and cement paste leaks and maintain proper alignment.
- I. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

### 3.3 Vapor Retarders

- A. Vapor Retarders shall be minimum 6 mil polyethylene sheeting and shall be utilized under any concrete poured on earth or gravel, if concrete slab will have enclosed heated building or room above it.
- B. Lap joints 6 inches and seal with manufacturer's recommended tape.

### 3.4 Steel Reinforcement

- A. Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
- B. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- C. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- D. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
- E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.



### 3.5 Joints

- A. Joints, either vertical or horizontal, shall be made only where indicated on Construction Documents and/or as permitted by GCDWR.
- B. Construct joints shall be true to line with faces perpendicular to surface plane of concrete.
- C. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by GCDWR.
  - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated.
  - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
  - 3. Locate joints for beams, and slabs in the middle third of spans.
  - 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
  - 5. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

### 3.6 Concrete Placement

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by GCDWR.
  - 1. If water is added at Project site, it shall be added before test sampling and placing concrete, and subject to limitations of ACI 301.
  - 2. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- C. Unless permission is granted by GCDWR, concrete shall not be laid in water, nor shall water be allowed to rise on or flow over freshly placed concrete until the concrete has set for at least twenty-four hours.
- D. Concrete shall not be mixed at any time during freezing, inclement weather, or at night without explicit permission, and then only at the Contractor's risk. If permitted to build concrete structures in freezing weather, the Contractor shall provide and use proper facilities for covering and keeping warm the newly placed concrete.
- E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide

construction joints. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
  2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
  3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  2. Maintain reinforcement in position on chairs during concrete placement.
  3. Screed slab surfaces with a straightedge and strike off to correct elevations.
  4. Slope surfaces uniformly to drains where required.
  5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleed-water appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- G. Cold-Weather Placement: Comply with ACI 306.1 and as follows:
1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
  2. When average high and low temperature is expected to fall below 40 degrees F for three successive days, maintain delivered concrete mixture temperature within the temperature range specified by ACI 301.
  3. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
  4. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- H. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 degrees F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  - a. If chopped ice is used to control temperature, Contractor shall ensure that ice has melted prior to placement of concrete.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

### 3.7 Finishing Formed Surfaces

#### A. Rough-Form Finish

1. Rough-form finish is defined as as-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
2. Rough-form finish shall be provided only for concrete surfaces not exposed to view.

#### B. Smooth-Form Finish

1. Smooth form finish is defined as as-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
2. Smooth-form finish shall be provided for concrete surfaces exposed to view, from inside and out.

- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

### 3.8 Finishing Floors and Slabs

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Float Finish
  1. Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a

uniform, smooth, granular texture.

C. Trowel Finish

1. First apply float finish to surfaces to receive trowel finish.
2. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighnten until surface is free of trowel marks and uniform in texture and appearance.
3. Apply a trowel finish to ground floor slab.
4. Finish and measure surface so gap at any point between concrete surface and an unlevelled, freestanding, 10-foot-long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch.

D. Trowel and fine-broom finish shall be applied to all pedestrian traffic surfaces other than ground floor slab. Apply a first trowel finish and construction joints and edge fillets, then while concrete is still plastic, slightly scarify surface with a fine broom.

E. Apply non-slip coating to walking surfaces where called for on the Contract Documents.

### 3.9 Miscellaneous Concrete Items

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

### 3.10 Concrete Protecting and Curing

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb./sq. ft./hour before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before

float finishing.

- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
  - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    - a. Water,
    - b. Continuous water-fog spray, and
    - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
  - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
    - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
    - b. Moisture cure any or all concrete surfaces at Contractor's option.
  - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

### 3.11 Removing and Reusing Forms

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that do not support weight of concrete may be removed after cumulatively curing at not less than 50 degrees F for 24 hours after placing concrete, if concrete is cured enough to not be damaged by form-removal operations and curing and protection operations are maintained.
  - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least

75 percent of its 28-day design compressive strength. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.

2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
  - C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by GCDWR.

### 3.12 Concrete Surface Repairs

- A. Defective Concrete: Repair and patch defective areas when approved by GCDWR. Remove and replace concrete that cannot be repaired and patched to GCDWR's satisfaction.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one-part Portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
  1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
  2. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
  1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01-inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
  2. After concrete, has cured at least 14 days, correct high areas by grinding.

3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
  4. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
  5. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
  6. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to GCDWR's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to GCDWR's approval.

### 3.13 Field Quality Control

- A. Testing and Inspecting: If directed by GCDWR, Contractor shall engage a third-party independent testing and inspection agency to perform field tests and inspections and prepare test reports.
- B. No concrete shall be placed until all steel reinforcement to be covered has been inspected in place and approved by GCDWR.
- C. GCDWR reserves the right to conduct additional concrete field testing through the County's materials testing annual services contract.
- D. Inspections: Contractor shall perform the following inspections:
1. Steel reinforcement placement, prior to placing concrete.
  2. Verification of use of required design mixture.



3. Concrete placement, including conveying and depositing.
  4. Curing procedures and maintenance of curing temperature.
  5. Review concrete delivery tickets at time of delivery to assure conformance to ACI 318.
  6. Verification of concrete strength before removal of shores and forms from beams and slabs.
- E. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C172 shall be performed according to the following requirements:
1. Testing Frequency
    - a. Obtain at least one composite sample for each 100 cubic yards or fraction thereof of each concrete mixture placed each day.
    - b. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
  2. Slump shall be tested in accordance with ASTM C143, with one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
  3. Air Content shall be tested in accordance with ASTM C231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  4. Concrete Temperature shall be tested in accordance with ASTM C1064, with one test hourly when air temperature is 40 degrees F and below and when 80 degrees F and above, and one test for each composite sample.
  5. Unit Weight: Perform one test for each composite sample in accordance with ASTM C138.
  6. Compression Test Specimens shall be collected in accordance with ASTM C31. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
  7. Compressive-Strength Tests shall be performed in accordance with ASTM C39, with test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
    - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.



- b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
  8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
  9. Strength of each concrete mixture will be satisfactory if every average of any three-consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
  10. Test results shall be reported in writing to GCDWR, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
  11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by GCDWR but will not be used as sole basis for approval or rejection of concrete.
  12. Additional Tests: Testing and inspecting agency shall make additional tests of concrete, as directed by GCDWR, when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by GCDWR.
  13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
  14. Correct deficiencies in the Work that test reports and inspections indicate does not comply with the Contract Documents.
- F. Notify GCDWR at appropriate times for the performance of special inspections as required by Contract Documents.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all materials and all labor to perform the non-shrink grouting work shown on the drawings or required by GCDWR.

### 1.2 Submittals

- A. If requested by GCDWR, submit
  - 1. Product data of grouts.
  - 2. Proposed method for keeping existing concrete surfaces wet prior to placing grout.
  - 3. Forming method for fluid grout placements.
  - 4. Curing method for grout.
  - 5. Manufacturer's written instructions for:
    - a. Adding fiber reinforcing to batching.
    - b. Cement-water ratio of grout topping.
    - c. Mixing of grout.
  - 6. Manufacturer's proposed training schedule for grout work.
  - 7. Manufacturer's Certificate of Compliance for:
    - a. Grout being free from chlorides and other corrosion-causing chemicals.
    - b. Non-shrink grout properties of Category II and Category III, verifying expansion at 3 days or 14 days will not exceed the 28-day expansion and non-shrink properties are not based on gas or gypsum expansion.
  - 8. Manufacturer's Certificate of Proper Installation.
  - 9. Statements of Qualification: Non-shrink grout manufacturer's representative.
  - 10. Test Reports
    - a. Test report for 24-hour evaluation of non-shrink grout.
    - b. Test results and service report from demonstration and training session.

- c. Field test reports and laboratory test results for field-drawn Samples.

### 1.3 Qualifications

- A. Non-Shrink Grout Manufacturer's Representative: Authorized and trained representative of grout manufacturer.

### 1.4 Warranty

- A. Manufacturer warrants participation with Contractor in replacing or repairing grout found defective as a result of faulty materials, as determined by industry standard test methods.

### 1.5 Manufacturer's Services

- A. General

1. Contractor shall coordinate demonstrations, training sessions, and applicable Site visits with grout manufacturer's representative.
2. Provide and conduct onsite, demonstration and training sessions for bleed tests, mixing, flow cone measurement, cube testing, application, and curing for each category and type of non-shrink grout.
3. Necessary equipment and materials shall be available for demonstration.

- B. Training

1. Training of Contractor's employees is required for all grout installations.
2. Grout manufacturer's representative shall train Contractor to perform grout work.
3. Establish location at Site and schedule time for grout manufacturer's demonstration and training session of proposed non-shrink grouts. Mix non-shrink grouts to required consistency, test, place, and cure on actual Project, such as, baseplates and tie holes to provide actual on-the-job training.
4. Mix grout to fluid consistency and conduct flow cone and two bleed tests, make a minimum of six cubes for testing of two cubes at 1 day, 3 days, and 28 days. Use remaining grout for final Work.
5. Training shall include methods for curing grout.
6. Mix and demonstrate patching through-bolt holes and block outs for gate guides, and similar items.

- C. Transport test cubes to independent test laboratory and obtain test reports.

## Part 2 Products

### 2.1 Materials

- A. Grout and mortar for pipe opening and other uses shall meet the requirements of GDOT Standard Specification Section 834.2.03.

## Part 3 Execution

### 3.1 Non-Shrink Grout

- A. General: Mix, place, and cure non-shrink grout in accordance with grout manufacturer's representative's training instructions and manufacturer's written guidance and instructions.
- B. Form Tie or Through-Bolt Holes: Provide non-shrink grout, Category I and Category II, fill space with dry pack dense grout hammered in with steel tool and hammer. Through-bolt holes; coordinate dry pack dense grout application with vinyl plug and bonding agent as specified in Section 03 30 00 - Cast-in-Place Concrete.
- C. Grouting Machinery Foundations
  1. Block out original concrete or finish off at distance shown below bottom of machinery base with grout. Prepare concrete surface by sandblasting, chipping, or by mechanical means to remove any soft material.
  2. Set machinery in position and wedge to elevation with steel wedges or use cast-in leveling bolts.
  3. Form with watertight forms at least 2 inches higher than bottom of plate.
  4. Fill space between bottom of machinery base and original concrete in accordance with manufacturer's representative's training instructions.

### 3.2 Field Quality Control

- A. Evaluation and Acceptance of Non-Shrink Grout
  1. Provide a flow cone and cube molds with restraining plates onsite. Continue tests during Project as demonstrated by grout manufacturer's representative.
  2. Perform flow cone and bleed tests and make three 2-inch by 2-inch cubes for each 25 cubic feet of each type of non-shrink grout used. Use restraining caps for cube molds in accordance with ASTM C1107.
  3. For large grout applications make three additional cubes and one more flow cone test. Include bleed test for each additional 25 cubic feet of non-shrink grout placed.

4. Consistency shall be in accordance with manufacturer's recommendations. Grout with consistencies outside range requirements shall be rejected.
5. Segregation shall be in accordance with manufacturer's recommendations. Grout, when aggregate separates, shall be rejected.
6. Non-shrink grout cubes shall test equal to or greater than minimum strength specified.
7. Strength Test Failures: Non-shrink grout work failing strength tests shall be removed and replaced.
8. Perform bleeding test to demonstrate grout will not bleed.
9. Store cubes at 70 degrees F.
10. Independent testing laboratory shall prepare, store, cure, and test cubes in accordance with ASTM C 1107.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes constructing rubble masonry from classes such as coursed, random, and random range work, from roughly squared and dressed stone laid with or without mortar as specified on the Plans.

### 1.2 Submittals

- A. If requested by GCDWR, submit for approval to GCDWR and other authorities having jurisdiction, all working drawings and schedules of materials and methods proposed to follow in the execution of the Work under this item.
- B. Submittals shall show in detail the type, size, and location of all rubble masonry and accessories to be used in construction. Submittals shall include material properties data and mortar mix design.

## Part 2 Products

### 2.1 Rubble Masonry

- A. Stone for masonry shall meet the requirements of GDOT Standard Specification 834.

### 2.2 Mortar

- A. Portland Cement: ASTM C150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Hydrated Lime: ASTM C207, Type 'S.'
- C. Aggregate for Mortar: ASTM C144, except for joints less than ¼ inch thick, use aggregate graded with 100 percent passing the No.16 sieve.
- D. White-Mortar Aggregates: Natural white sand or ground white stone.

## Part 3 Execution

### 3.1 Shaping the Stone

- A. Roughly square the stones on joints, beds, and faces. At angles and ends of walls, use selected stone roughly squared and pitched to line. If specified, finish the corners or angles in exterior surfaces with a chisel draft.

## 3.2 Laying

- A. Decrease the stone thickness from the bottom to the top of wall.
- B. Ensure that the headers in the heart of the wall are the same size as shown in the face and extend at least 12 inches into the core or backing.
- C. Ensure that headers in walls 2 feet or less in thickness extend entirely through the wall. The headers shall occupy at least 20 percent of the face of the wall.
- D. Lay the masonry to line and in roughly leveled courses. Ensure that the bottom of the foundation is large, selected stones.
- E. Lay the courses with leaning beds parallel to the natural bed of the material.
- F. Regularly diminish the thicknesses of the courses, if varied, from the bottom to the top of the wall. Keep a surplus supply of stones at the site to select from.
- G. When mortar masonry is specified:
  - 1. Clean each stone and saturate it with water before setting it. Clean and moisten the bed that will receive it.
  - 2. Bed the stones in freshly made mortar with full joints. Carefully settle the stones in place before the mortar sets.
  - 3. Do not permit spalls in the beds. Ensure that the joints and beds have an average thickness of not more than 1 inch.
  - 4. Ensure that the vertical joints in each course break with the adjoining courses at least 6 inches.
  - 5. Do not place vertical joints directly above or below a header joint. If a stone is moved or if the joint is broken after the mortar has set, take the stone up and thoroughly clean the mortar from the bed and joints. Reset the stone in fresh mortar. Do not lay the masonry in freezing weather or when the stone contains frost, except by permission and subject to required conditions. Do not lay the masonry in freezing weather or when the stone contains frost, except with permission.
  - 6. Whenever possible, properly point the face joints before the mortar sets. If joints cannot be pointed, rake them out to a depth of 1 inch before the mortar sets. Do not smear the stone face surfaces with the mortar forced out of the joints or the mortar used in pointing.
  - 7. Thoroughly wet the joints pointed after the stone is laid with clean water and fill with mortar.
  - 8. Drive the mortar into the joints and finish with an approved pointing tool.

9. Keep the wall wet while pointing. In hot or dry weather, protect the pointed masonry from the sun and keep it wet for at least three days after the pointing is finished.
  10. Do not perform pointing in freezing weather or when the stone contains frost.
  11. After the pointing is completed and the mortar is set, thoroughly clean the walls and leave them in a neat condition.
- H. When laying dry rubble masonry:
1. Take care that each stone takes a firm bearing no less than in three separate points upon the underlying course.
  2. Ensure that face joints are no greater than 1 inch wide.
  3. Chink the open front and rear joints with spalls fitted to take firm bearing upon the top and bottom surfaces throughout the length of the stone.
  4. Fill the interstices in the heart of the wall with spalls. When specified, thoroughly slush the open joint on the rear surfaces with mortar to prevent water from seeping through the joints.
- I. Weep Holes: Provide adequate drainage for retaining walls with weep holes as shown on the Plans or required by GCDWR. When backfilling at weep holes, build chimneys and French drains extending through the parts of the fill to be drained.
- J. Copings: Use copings, bridge seats, and back walls made from the materials shown on the Plans. If not otherwise specified, they shall be Class A concrete. Make concrete copings in sections at least 12 inches thick and from 5 feet to 10 feet long, extending the full width of the wall. Cast the sections in place or precast and set them in place in free mortar beds.

### 3.3 Mortar

- A. Rubble Masonry shall be laid in mortar consisting of one part by volume of Portland Cement and two parts of volume of clean, coarse, screened sand, thoroughly mixed dry, with sufficient water afterwards added slowly to give proper consistency. Twenty pounds of lime per sack of cement may be added.

## Part 4 Measurement and Payment

### 4.1 General

- A. The cost of rubble stones, mortar, chimneys, weep holes, and French drains used in the construction of masonry storm drain structures shall be included in the Unit Price paid in accordance with Section 33 42 30 - Storm Drainage Structure pay items.
- B. The cost of rubble stones, mortar, chimneys weep holes, and French drains used in



the construction of masonry walls shall be included in the Unit Price paid in accordance with Section 32 32 23 – Segmented Retaining Walls pay items.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section Includes furnish all tools, labor, equipment, and materials necessary for furnishing and installing steel hand railings on steps, platforms, headwalls or at other locations and to the limits indicated on the Contract Documents or as directed by GCDWR.

### 1.2 Submittals

- A. If requested by GCDWR, submit:
  - 1. Shop drawings based on field measurements for review prior to fabrication.
  - 2. Paint and stain samples.
  - 3. Material list including the brand and quality of each different material to be used for fabricating the Work.

## Part 2 Products

### 2.1 Steel Railings and Steel Sleeves

- A. Pipe shall be standard weigh pipe conforming to ASTM A53. Steel tubing shall conform to ASTM A501 or as designated in the Contract Documents.
- B. Galvanized pipe and tubing shall be required when designated on the Contract Documents or as directed by GCDWR. Galvanized pipe shall comply with the requirements of ASTM A123
- C. Sleeves shall be galvanized on all surfaces.

### 2.2 Fasteners:

- A. Acceptable expansion bolts are as follows:
  - 1. Hilti Corp; Kwik Bolt
  - 2. Wej-it Corp; Standard Wej-its
  - 3. USE; Taper-Bolt
  - 4. Olin Corp; Trubolt
  - 5. Phillips; Red Head Wedge Anchors

- B. Other brands of expansion bolts will be considered upon submission to GCDWR of data sheets describing capacities and installation procedures of bolts.
- C. The bolts, nuts, and fasteners shall be galvanized in accordance with ASTM A153.
- D. Gates shall be replaced to match existing or match new railing if new.

## 2.3 Fabrication

- A. General: Field measure the location where the railing is to be installed, compare to the Contract Documents, and review with GCDWR prior to fabrication.
- B. Workmanship: Fabricate structural steel in accordance with American Institute of Steel Construction (AISC) Specifications and additional requirements specified hereafter; perform fabrication and assembly in the shop to the greatest extent possible; form materials well, with sharp angles or lines, free from bends, twists, or open joints; shear and punch clean, true lines and surfaces; thickness of metal and details of assembly and supports shall provide ample strength and rigidity.
- C. Welding: Contractor shall perform welding in the shop with welders qualified under the AWS D1.1/D1.1M welding code for class of work employed; protect adjacent construction and materials against damage; neatly and symmetrically make all welds; fill or grind to a uniform, smooth shape; where required to present uniform appearance, fill space between welds and weld irregularities with suitable metal putty or compound made for this purpose.
- D. Fastenings: Contractor shall provide concealed fastenings wherever possible; do not use screws or bolts where they can be avoided; where used, heads shall be countersunk, screwed up tight and threads nicked to prevent loosening; and make threaded connections tight so that threads shall be entirely concealed by fittings.
- E. Paint: All products not specified by name shall be “best grade” or “first line” products available by the manufacturer. Shop clean primer on hollow metal WORK immediately before painting to remove grease and dirt film from surfaces.
- F. Railings which are not designated to be painted shall be galvanized steel in accordance with ASTM A123.

## Part 3 Execution

### 3.1 General

- A. Contractor shall erect structural steel in accordance with the AISC Specifications with modifications and additional requirements specified hereafter.
- B. Erect all Work true to lines and planes, with vertical lines plumb and horizontal lines level.
- C. Weld or bolt all permanent connections.

- D. Anchorage of rail posts in or on Concrete shall be as specified in the Contract Documents.

### 3.2 Miscellaneous angles, lintels, plates, and embedded items

- A. All welding procedures shall conform to AWS D1.1/D1.1M. All welds shall develop capacity of members being joined, unless specific length or extent is noted on the Contract Documents.
- B. Finish all cut ends neatly without irregular torch marks or sharp fins. Grind all cut surfaces to a smooth surface. Clean of all loose mill scale, rust, and foreign matter.
- C. Any shop paint on surfaces adjacent to joints to be field welded shall be wire brushed to reduce the paint film to a minimum. Grind down burrs and sharp ridges at all exposed corners and surfaces of welds prior to field painting. After field welding, welded joints to be field primed.
- D. Expansion bolts shall be installed per manufacturer's recommendations.

### 3.3 Painting

- A. Inspection: Examine surfaces scheduled to receive paint and finishes for conditions that may adversely affect execution, permanence, or quality of Work and which cannot be put into an acceptable condition through preparatory Work as included under Paragraph 3.3B – Preparation.
- B. Preparation:
  - 1. Sanding: Sand metal surfaces between coats to ensure smoothness and adhesion of subsequent coats. Use extra fine sandpaper to avoid cutting the edges when sanding. Apply putty or spackling compound after surfaces are primed and primer is dry. Bring material flush with adjoining surfaces.
  - 2. Surface Filling: Surfaces shall be perfectly dry, clean, and smooth before starting Work. Fill cracks, holes, or scratches full and make smooth before finish is applied to surfaces.
  - 3. Galvanized Surfaces: Wash with mineral spirits and prime as specified.
  - 4. Protection: Furnish and lay drop cloths or mask off areas where finishing is being done to protect surfaces and other work from damage during the execution of Work. Contractor shall be responsible for repairing any surfaces or materials damaged during installation, preparation, and painting at no additional cost to GCDWR.
- C. Workmanship:
  - 1. Existing Surfaces: If the surfaces are not in proper shape for painting, repair, rebuild, or refinish before proceeding with the Work. Contractor shall be

responsible for any poor Work caused by improper surfaces. The application of the first coat does not relieve Contractor of the responsibility for failure of the base coat. Do not apply any coats on either damp or wet surfaces and in no case until the preceding coat is dry and hard.

2. General: Apply materials evenly without runs or sagging of materials and according to the manufacturer's requirements. Sand Work between coats.

D. Touch-up Painting:

1. Contractor shall, after erection of steel, apply touch-up paint to field bolt heads and nuts, field welds, and abrasions. When zinc coating has been scratched or removed from surfaces, three (3) coats of zinc rich paint shall be applied over the areas where the coating has been disturbed.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes all work necessary to furnish and install including but not limited to, the purchase, delivery to the work site, onsite storage, delivery to the work areas, and construction of the signs as described below.

### 1.2 Submittals

- A. If requested by GCDWR, submit:
  - 1. Sign proofs for review by GCDWR, including:
    - a. Temporary Project Sign.
    - b. Interpretive Sign.
    - c. Mitigation Bank Boundary Sign.
  - 2. Manufacturer's product information for interpretive sign and mounting frames.

## Part 2 Products

### 2.1 Temporary Project Sign

- A. Large Sign: Provide and maintain 8 feet wide by 4 feet tall sign constructed of 3/4-inch exterior high-density overlaid plywood or 4-millimeter corrugated plastic with plywood or weather-proof oriented strand board (OSB) backing. Sign shall be mounted on metal or treated wood posts that will last the entire duration of the project with no loss of aesthetics. Message graphic and text will be provided by GCDWR. Graphic details including text fonts and sizes, and colors will be submitted to GCDWR for review prior to installation by the Contractor.
- B. Medium Sign: Provide and maintain 4 feet wide by 2 feet tall sign constructed of 3/4-inch exterior high-density overlaid plywood. Sign shall be mounted on metal or treated wood posts that will last the entire duration of the project with no loss of aesthetics. Message graphic and text will be provided by GCDWR. Graphic details including text fonts and sizes, and colors will be submitted to GCDWR for review prior to installation by the Contractor.
- C. Small Sign: Provide and maintain 18 inch by 27-inch sign constructed of 4-millimeter-thick exterior corrugated plastic with metal stand. Message graphic and text will be provided by GCDWR. Graphic details including text fonts and sizes, and colors shall be submitted to GCDWR for review prior to installation by the Contractor.

## 2.2 Interpretive Sign

- A. Signs shall be approximately 24 inches by 36 inches and shall be provided by GCDWR.

## 2.3 Mitigation Bank Boundary Sign

- A. Signs shall be approximately 12 inches by 12 inches and shall be provided by GCDWR.

## 2.4 Prefabricated Signage

- A. Prefabricated aluminum sheet signage up to 36 inches in longest dimension shall be furnished and installed as indicated in the Contract Documents.
- B. Sign hardware shall be galvanized in accordance with ASTM A153 and shall comply with the following standards:
  - 1. Bolts, ASTM A307.
  - 2. Washers, ASTM F436.
  - 3. Nuts, ASTM A563, Grade A.

## Part 3 Execution

### 3.1 Temporary Project Sign

- A. Large or Medium Sign: Sign shall be mounted on metal or treated wood posts that will last the entire length of the project.
- B. Small Sign: Sign shall be installed per the direction of GCDWR. Accompanying metal stand shall be in good working order with the ability to uphold the sign for the length of the project.

### 3.2 Interpretive Sign

- A. Sign frame shall be installed according to manufactures specifications.

### 3.3 Mitigation Bank Boundary Sign

- A. Sign shall be permanently installed per the direction of GCDWR. Sign shall be installed according to manufactures specifications.

### 3.4 Prefabricated Signage

- A. Prefabricated Signage shall be permanently installed and mounted as indicated in the Contract Documents or as directed by GCDWR. Sign shall be installed according to

manufactures specifications.

END OF SECTION



## General

### 1.1 Summary

- A. Section includes furnishing all labor, equipment, fish, and materials necessary for and to properly complete Fish Stocking and Fish Removal to the satisfaction of GCDWR and according to the Contract Documents.

### 1.2 Definitions

- A. Largemouth Bass (*Micropterus salmoides*): A freshwater gamefish in the sunfish family, a species of black bass native to Georgia.
- B. Bluegill (*Lepomis macrochirus*): A species of freshwater fish native to Georgia in the sunfish family sometimes referred to as bream or coppernose.
- C. Redear Sunfish (*Lepomis microlophus*): A species of freshwater fish native to Georgia in the sunfish family sometimes referred to as shellcracker or bream.
- D. Channel Catfish (*Ictalurus punctatus*): A species of freshwater fish native to Georgia in the bullhead catfish family sometimes referred to as channel cat.
- E. Triploid Sterile Grass Carp (*Ctenopharyngodon idella*): A freshwater fish in the minnow family native to China sometimes referred to as white amur that feeds on aquatic vegetation. Triploid Grass Carp are commercially produced fish with abnormal chromosome numbers that result in sterility. Georgia laws and regulations require each grass carp be verified and documented triploid.
- F. Threadfin Shad (*Dorosoma petenense*): A freshwater fish in the shad family native to Georgia. Threadfin Shad are not target angling species; however, they are excellent bait for a wide variety of sportfish species.
- G. Stocking includes all materials, labor, transportation, and temporary storage associated with placement fish in water body.
- H. Electrofishing: A process in which a controlled electric field is generated in a waterbody to temporarily stun fish in close proximity for the purpose of sampling, removal, or relocation.

### 1.3 Submittals

- A. If requested by GCDWR, submit:
  - 1. Description and location of proposed sources of fish.
  - 2. Documentation from State of Georgia Registered Fish Dealer as to all Fish Species described in Definitions above, including quantity and size.
  - 3. Documentation from GADNR must be provided to demonstrate that Triploid

Sterile Grass Carp are purchased from properly licensed grass carp dealers and that each grass carp is verified and documented triploid.

4. Delivery tickets showing source, type, and quantity of each load of fish delivered to Site.
  5. The size and type of equipment to be used to stock the fish.
  6. Fish removal plan. Plan shall indicate means and methods of removal, anticipated removal rate, electrofishing equipment type and size, health and safety plan, relocation, and re-stocking methods.
  7. The size and type of equipment to be used to remove the fish.
- B. Upon completion of fish stocking activities, Contractor shall provide GCDWR with documentation that describes the hatchery name and contact details; final quantity, by species, of fish stocked, lot or batch number, and estimated date of hatching.

## 1.4 Quality Assurance

- A. Contractor shall be familiar with the current edition of the following referenced documents and keep a hardcopy at the construction site at all times. These documents must be complied with, as applicable.
1. Georgia Department of Natural Resources (GADNR), Wildlife Resources Division (WRD):
    - a. List of registered fish dealers.
    - b. Fish from DNR hatcheries.
    - c. Licensed triploid sterile grass carp suppliers.
  2. Georgia Museum of Natural History: Fish descriptions and nomenclature are based on written materials produced by Georgia Museum of Natural History, Fishes of Georgia, 2009.
- B. Fish Source: Hatchery that has produced fish species described above and has performed satisfactorily on other projects for at least five years.
- C. Fish for use in Fish Stocking must be approved on-site by GCDWR prior to placement and/or acceptance of the Work.
- D. Fish shall be conditioned for 48 hours before collection from Fish Dealer. Fish shall be seined, sorted, graded, counted, and then held in holding facilities with sufficient water quality and aeration for at least two days but for not more than three days without feed prior to collection for transport.
- E. Fish removed from waterbody shall be loaded into oxygenated tanks and relocated to an alternate location selected by GCDWR.

## Part 2 Products

### 2.1 Fish - Physical Characteristics

- A. Fingerlings shall be of uniform color and size.
- B. Fingerlings in transportation unit shall be swimming and active. Fingerlings that remain up-right, that are sluggish and do not respond to stimuli or prefer to be isolated from the group are not acceptable.
- C. Fingerlings will be rejected if several fish have patches over their body, no tail or missing fins, show signs of physical injury or bleeding, are deformed, or do not meet required size (See table Required Fish Sizes).

REQUIRED FISH SIZES - INCHES		
	Minimum	Maximum
Largemouth Bass	1.5	4
Bluegill	1.5	4
Redear Sunfish	1	3.5
Channel Catfish	3	5
Triploid Sterile Grass Carp	8	10
Threadfin Shad	1	2

### 2.2 Removal Materials and Equipment

- A. Contractor shall furnish all materials, tools, equipment, facilities, and services as required for performing fish removal.

## Part 3 Execution

### 3.1 Fish Stocking

- A. Notify GCDWR at least one week prior to stocking fish. GCDWR must be present on site before Contractor may proceed with fish stocking.
- B. Fish shall be stocked at the specified rate per surface area of the pond as measured in the drawings (see table Fish Stocking Rates).
- C. Stocking for Bluegill, Redear Sunfish, and Threadfin Shad shall be performed between October and March. Stocking for Bass and Triploid Sterile Grass Carp shall be performed between May and June. Catfish may be stocked throughout the year.
- D. Ponds smaller than one acre shall be stocked with Channel Catfish only.
- E. Contractor shall not stock species other than those specified without written authorization by GCDWR.
- F. Contractor shall transport fish directly from dealer to the pond and packed for live

transportation in tanks with aeration. The survival of the fish enroute from the fish dealer to the pond is the Contractor's responsibility.

- G. Stocking shall be performed in a manner that minimizes stress to the fish. Prior to introducing fish into the pond from hauling containers, Contractor shall acclimatize the fish by adding water from the pond to water in the hauling containers over a period of 30 minutes until the water temperatures are equal. Contractor shall not add more than one-third of the volume of the container at a time.
- H. Stocking shall be performed with a bucket to transport fish from hauling container to pond. Contractor shall gently lower bucket in water and let fish swim into pond on their own.
- I. Aeration shall be maintained in hauling container through stocking process until all fish have been stocked.

<b>FISH STOCKING RATES</b>		
<b>Fish Species</b>	<b>Stocking Rate, Ponds with Surface Area greater than 1 Acre (Fish per Acre)</b>	<b>Stocking Rate, Ponds with Surface area Less than 1 Acre (Fish per Acre)</b>
Largemouth Bass	50	--
Bluegill	400	--
Redear Sunfish	100	--
Channel Catfish	50	500
Triploid Sterile Grass Carp	5	--
Threadfin Shad	3 pounds	3 pounds

### 3.2 Fish Removal

- A. Notify GCDWR at least one week prior to removing fish. GCDWR must be present on-site before Contractor may proceed with fish removal.
- B. Contractor shall transport fish directly from waterbody to a GCDWR-selected alternate location and packed for live transportation in tanks with aeration. The survival of the fish enroute from the waterbody to the alternate location is the Contractor's responsibility.
- C. Removal shall be performed in a manner that minimizes stress to the fish.
- D. Removal shall be performed using electrofishing and seining until catch rates are at approximately 0%.
- E. Aeration shall be maintained in hauling container through removal process until all fish have been removed.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, equipment, and materials necessary for hauling and properly placing classified stone at the locations and to the limits indicated on the Contract Documents or as directed by GCDWR.

### 1.2 Submittals

- A. Certified Test Results: If requested by GCDWR, submit the following for all Classified Stones and Rock Types described in Part 2: gradation, abrasion resistance and bulk density.

### 1.3 Quality Assurance

- A. Source: Quarry shall have produced Classified Stones and Rocks and has performed satisfactorily on other projects for at least 5 years. Native, on-site Classified Stones may be used pending written approval from GCDWR.
- B. Classified Stone shall be free of unspecified sand and soil, roots and other organic or deleterious matter.

## Part 2 Products

### 2.1 Aggregate Stone

- A. No. 3, No. 4, No. 5, No. 57, No. 8 and No. 89 Stones shall be in accordance with GDOT Standard Specification Section 800 – Coarse Aggregate.
- B. Graded Aggregate Base shall be in accordance with GDOT Standard Specification Section 815 – Graded Aggregate.
- C. Pea gravel shall be smooth round stones 1/2-inch to 3/8-inch, varying in color.

### 2.2 Geotextiles

- A. Woven and non-woven geotextiles shall be as specified in Section 31 32 19.16 - Geotextiles.

## Part 3 Execution

### 3.1 Construction

- A. Prepare the ground surface where the classified stone will be placed to conform with the correct grades before beginning the placement. Ground surface shall be smooth

and free of obstructions, depressions, or debris. Ground surface shall be prepared in accordance with Drawings and Specifications.

- B. Place woven geotextile on the prepared ground surface under all classified stone unless otherwise specified on the Construction Drawings or otherwise directed by GCDWR.
- C. Place classified stone to a uniform thickness as specified in the Contract Documents.

END OF SECTION

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## Geogrids and Geocells for Earthwork

### Part 1 General

#### 1.1 Summary

- A. Section includes installation and placement of geogrid and geocell confinement systems during construction activities.

#### 1.2 Submittals

- A. If required by GCDWR, submit:
  - 1. Manufacturer's data sheets on each product to be used.
  - 2. Certification from the manufacturer showing the physical properties of the material.
  - 3. Storage and handling requirements.
  - 4. Installation methods.
  - 5. Evidence from the manufacturer that geogrid and geocell material has been used successfully in installations with similar environmental and project conditions.
  - 6. Shop drawings, including but limited to details of materials, construction dimensions, section layout, system components and relationship with adjacent construction.
  - 7. Verification samples: Two representative units of each type.
  - 8. Calculations for recommended anchor system, tendon system or anchor trenches.

#### 1.3 Quality Assurance

- A. During shipment and storage, protect the grid from damage, mud, dirt, dust, debris and exposure to ultraviolet light, including sunlight.

### Part 2 Products

#### 2.1 Geogrid

- A. Geogrid shall be as specified in the Construction Documents or approved equal.
- B. Geogrid and shall comply with GDOT Standard Specification 809, as applicable.

## 2.2 Geocell Confinement System

- A. Geocell confinement system is a lightweight, flexible mat that consists of HDPE strips.
- B. The mat shall be perforated and the strips shall be ultrasonically welded together to form a strong configuration. Cell seam strength shall be uniform over full depth.
- C. Geocell shall be as specified in the Construction Documents or approved equal and shall meet the following, unless otherwise approved by GCDWR:

Property	Standard / Test Method	Value
Sheet Thickness	ASTM D 5199	50 – 60 mils
Carbon Black, min. by weight	ASTM D 5199	1.5%
Environmental Stress Crack Reduction, min.	ASTM D 1693	3500 hours
Short-Term Seam Peel Strength for 4 in. depth	ASTM D 6392	320 lb/ft
Percent Open Area, max	USACE CW02215	20%
Nominal Expanded Cell Size	Calipered	11.3 in x 12.6 in

## Part 3 Execution

### 3.1 Geogrid

- A. Geogrid shall be installed in accordance with the manufacturer's specifications and the Contract Documents.
- B. Ensure that the stabilizing geogrid at any and every layer is held taut, by mechanical means, free of wrinkles, bends or undulations until the special backfill material has been placed and compacted above the restrained layer to the level of the next layer of stabilizing geogrid.
- C. Release the uppermost layer of stabilizing geogrid after the final layer of backfill is placed and compacted.
- D. Geogrid damaged during installation shall be promptly removed and replaced with new geogrid material.

### 3.2 Geocell Confinement System

- A. Geocell shall be installed in accordance with the manufacturer's specifications and the Contract Documents.
- B. Examine and prepare areas to receive geocells using the methods recommended by the manufacturer for achieving desired project conditions.
  - 1. Prepare site by removing vegetative cover, debris, and unacceptable soil from area where geocells will be installed.
  - 2. Replace removed soils with acceptable materials in accordance with Contract Documents or as directed by GCDWR.



- C. Do not proceed with preparation or installation until unacceptable conditions have been corrected using methods recommended by the manufacturer and deviations from manufacturer's recommended tolerances are corrected.
- D. Cell Infill materials shall be as indicated in construction documents.
  - 1. Infill material shall be free of any foreign material.
  - 2. Clays, silts and organic materials are not acceptable infill material.
  - 3. Infill material shall be free-flowing and not frozen when placed in geocell sections.
- E. Install geocells in accordance with manufacturer's instructions, approved submittals, and in proper relation with adjacent construction at locations indicated in the Contract Documents.
- F. Anchor geocell sections as necessary to resist sliding due to gravitational forces, sheet flow, and other anticipated forces. Anchoring components shall be installed in accordance with the Contract Documents and manufacturer instructions.
- G. Ensure top edges of adjoining cell walls are flush with each other and in proper alignment.
- H. Deliver infill materials to geocells working from upslope to downslope. Limit the drop height of infill material to a maximum of 3 feet to prevent damage to geocells.
- I. Overfill expanded geocell sections by 1 to 2 inches to allow for setting and compaction, when using granular infill materials.
- J. Compact granular infill materials to top of geocells to a minimum of 95 percent Standard Proctor or as specified in the Contract Documents or otherwise directed by GCDWR.
- K. Clean and protect products in accordance with manufacturer's recommendations.
- L. Geocells damaged during installation shall be promptly removed and repaired or replaced with new geocell material at the Contractor's expense, prior to the work being covered.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section Includes furnishing all labor, equipment, and materials necessary to perform site clearing activities.

### 1.2 Submittals

- A. Submit, in accordance with Section 01 32 33 – Photographic Documentation, photographs and/or videotape sufficiently detailed of existing conditions within the limits of construction and of trees and plantings, construction, and site improvements of the adjoining area that might be misconstrued as damage caused by site clearing.
- B. The Contractor shall submit to GCDWR an estimation of the amount of time needed/schedule to complete brush cutting, shrub trimming, selective tree pruning, and selective tree removal in a designated area.
- C. The Contractor shall provide GCDWR with a completed and signed Gwinnett County Erosion and Sediment Control and Solid Waste Management Affidavit form, verifying the associated solid waste responsibilities and requirements of the Contractor.

### 1.3 Scheduling and Sequencing

- A. The submittals required in Article 1.2, above must be approved by GCDWR before commencing work.
- B. Obtain GCDWR approval of staked site clearing limits prior to commencing clearing, grubbing, and stripping.
- C. Prepare site only after National Pollutant Discharge Elimination System (NPDES) permit for Construction Activities has been obtained and adequate erosion and sediment controls are in-place. See Contract Documents and Construction Phasing and Erosion Control Notes.

## Part 2 Products

(not used)

## Part 3 Execution

### 3.1 General

- A. Contractor shall identify trees (suitable as defined in Contract Documents) that may be used for construction of in-stream structures. Trees suitable for construction of stream structures shall be approved by GCDWR. Trees used for in-stream structures may require that the root ball remain intact with the tree trunk. Stockpile trees suitable for construction of stream structures, as described in the Contract Documents.
- B. The diameter at breast height (DBH) of a tree shall be measured at 4.5 feet above the ground.
- C. Selective tree removal of trees measuring 12-inches or greater in DBH, where removal and disposal of trees must be performed in a manner that will not jeopardize the public safety or damage structures including, but not limited to, utility lines or services, private property, or adjacent trees, shall be covered under Section 02 41 13.
- D. GCDWR will identify any additional trees to be saved following staking of clearing limits and installation of tree protection fencing. Contractor shall protect trees identified to be saved during all construction activities, in accordance with Section 01 56 26.
- E. Do not injure or deface vegetation that is not designated for removal.
- F. All vegetative material from clearing and grubbing, selective tree pruning, brush cutting, and shrub trimming activities shall be disposed off-site unless otherwise described below, identified in the Contract Documents or directed by GCDWR. Material removed from the site becomes property of the Contractor.
- G. Removal of pre-existing non-vegetative debris shall be covered under Section 02 42 00.
- H. The Contractor shall not burn any material generated from clearing and grubbing operations without written approval from GCDWR.
  - 1. The Georgia Environmental Protection Division has issued a burning ban for thirteen Metro Atlanta Counties, including Gwinnett. The ban is in effect each year from May 1 through September 30. This ban shall be considered for projects that require clearing and debris removal. It is the Contractor's responsibility to remove all construction debris from the jobsite.
  - 2. Any costs incurred due to non-compliance with the burning ban are the sole responsibility of the Contractor.

### 3.2 Limits

- A. Site clearing activities shall be confined to limits shown on the Contract Documents and as shown on the approved submittal described above.

1. Contractor shall survey and identify with field stakes and/or orange barrier fence (OBF), the limits of clearing and grubbing and brush cutting prior to site clearing activities. Contractor shall protect all stakes during construction and replace any damaged or removed stakes within one working day.
2. All trees, limbs, and shrubs to be cut shall be marked by the Contractor before the service is performed. The trees, limbs, and shrubs shall be marked using high visibility flagging tape.
3. Contractor shall review limits of site clearing activities with GCDWR prior to beginning work.

### 3.3 Clearing and Grubbing – Mulch On-Site

- A. The term clearing and grubbing – mulch on-site, as used herein, shall include mulching of all trees, brush, stumps, logs, grass, weeds, roots, decayed vegetable matter, shrubs, and other vegetation within the limits shown on the Contract Documents, except that privet and other invasive species shall be separated, shall not be mulched, and shall be hauled off-site.
- B. Clear and grub as authorized by GCDWR.
  1. Grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.
  2. Use only hand methods for grubbing within tree protection zone.
- C. Mulch shall be spread on-site as shown on the Contract Documents or as directed by GCDWR.
- D. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, similar to the adjacent soil, unless further excavation or earthwork is indicated.
- E. 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.

### 3.4 Clearing and Grubbing – Haul Off-site

- A. The term clearing and grubbing – haul off-site as used herein shall include clearing and removal of all trees, brush, stumps, logs, grass, weeds, roots, decayed vegetable matter, shrubs, and other vegetation within the limits shown on the Contract Documents.
- B. Clear and grub as authorized by GCDWR.
  1. Grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.
  2. Use only hand methods for grubbing within tree protection zone.

- C. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
- D. 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.

### 3.5 Selective Tree Pruning

- A. The term selective tree pruning as used herein shall include trimming, pruning, cutting, removal and disposal performed in a manner that will not jeopardize the public safety or damage structures including, but not limited to, utility lines or services, private property, or adjacent trees.
- B. Contractor shall utilize ropes, aerial lifts, or other suitable methods when trimming, pruning, or removing limbs and shall not use climbing spikes unless otherwise directed by GCDWR.
- C. Limbs shall be cut off smooth, without splitting or shattering. Scars greater than one inch in diameter shall be sealed with an approved sealer asphalted tree paint. The trunks of the trees shall be carefully protected from damage, and if unavoidable damage occurs, the injured portions shall be neatly trimmed and covered with an application of tree paint.
- D. Material generated from selective tree pruning may be mulched and used on site in accordance with the requirements of Section 3.3, as directed by GCDWR, unless otherwise directed in the Contract Documents.
- E. Tree pruning performed during selective tree removal, clearing and grubbing and all other work shall be considered incidental.

### 3.6 Brush Cutting

- A. The term brush cutting used herein shall include the cutting of trees (up to 4-inch DBH), brush and grasses left on-site using heavy commercial grade, self-propelled or powered rotary blade mowing equipment (Bush Hog or GCDWR-approved equivalent) for reoccurring clearing of right of ways and easements.
- B. Remove trees (up to 4-inch DBH), brush and grasses as authorized by GCDWR.
- C. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated. When it is necessary to cut tree roots on the surface of the ground, the ends shall be cut off smooth, without splitting or shattering. Scars greater than 1 inch in diameter shall be sealed with an approved sealer asphalted tree paint. The trunks of the trees shall be carefully protected from damage, and if unavoidable damage occurs, the injured portions shall be neatly trimmed and covered with an application of tree paint.
- D. Fill depressions caused by brush cutting operations with satisfactory soil material, similar to the adjacent soil, unless further excavation or earthwork is indicated.

- E. 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.

### 3.7 Shrub Trimming

- A. The term shrub trimming used herein shall include the selective trimming of shrubs as directed by GCDWR.
- B. Shrubs will be trimmed, shaped, and sheared in accordance with the guidelines provided by the National Arborist Association for Class II, Standard Pruning to develop the natural form of the plant, and create the effect desired by GCDWR.
- C. Shrubs will be pruned as necessary to remove dead branches and other branches as needed, in a manner that will not jeopardize the public safety or damage structures including, but not limited to, utility lines or services, private property, or adjacent vegetation.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes making all excavations and fills required for the Work, to the lines and grades as indicated on the Contract Documents, or as directed, and removal of all excess excavated materials as otherwise specified herein.
- B. The Contractor shall make all excavation and fills required to meet the lines, grades and cross-sections as indicated on the Contract Documents, or as directed, and shall remove all excess excavated materials as specified herein.
- C. The Contractor shall furnish, haul, and place all imported fill material as required for proper backfilling of excavations when, in the opinion of GCDWR or their representative, the original material is unsuitable for use as backfill because it fails to meet the requirements set forth in this section for Backfilling. This item shall also include fill material required for embankments and elsewhere when suitable material excavated under this Contract is not available in sufficient quantity or fails to meet the requirements of this section.
- D. Contract Documents indicate elevations of the existing ground and the approximate elevations of the finished grades of the backfills around structures prior to construction of the various portions of the Work. The elevations of the existing ground are believed to be reasonably correct, but are not purported to be absolutely so, and, together with any schedule of quantities, are presented only as an approximation. The Contractor shall satisfy itself, however, by actual examination of the site of the Work, as to the existing elevations and the amount of work required under these items.
- E. The Contractor shall furnish all the materials for and shall properly place bedding material, which may be deemed necessary by GCDWR, and which may be required for proper completion of the Work included under this Contract.
- F. Perform earthwork operations in a safe and proper manner with appropriate precautions being taken against all hazards.
- G. Maintain all excavated and backfilled areas for structures, trenches, backfills, topsoil areas, embankments, and channels in good condition at all times until final acceptance by GCDWR. Repair all damage caused by erosion or other construction operations using material of the same type as the damaged material.
- H. Perform earthwork within the rights-of-way of the State Department of Transportation, the County Department of Transportation, and the respective cities in accordance with requirements and provisions of the regulations of and permits issued by those agencies for the construction within their respective rights-of-way. Such requirements and provisions, where applicable, and if more stringent, shall take precedence and supersede the provisions of these Specifications.
- I. Control grading in a manner to prevent water running into excavations. Avoid

obstruction of surface drainage and provide means whereby stormwater can be uninterrupted in existing gutters, other surface drains, or temporary drains. Provide free access to all fire hydrants, water valves, and meters.

- J. It is understood and agreed that the Contractor has made a thorough investigation of the surface and subsurface conditions of the site and any special construction problems which might arise as a result of nearby watercourses and floodplains, particularly in areas where construction activities may encounter water-bearing sands and gravels or limestone solution channels. Provide all services, labor, equipment, and materials necessary or convenient to complete the work within the time specified in these Contract Documents.

## 1.2 Definitions

- A. The term "excavation" as used herein shall mean mechanical or hand removal of materials including earth, hardpan, masonry, plain concrete, reinforced concrete, pavement, pavement foundation, ashes, rubbish, muck, rock of any competence, or structure, and other material. No classification of excavated materials will be made, except for rock and unsuitable material to be removed from trench bottom as described herein. Excavation work includes the removal and subsequent handling of all materials excavated or otherwise removed in performance of the contract work, regardless of the type, character, composition, or condition thereof.
- B. Excavation shall include the removal of materials from their original location and on-site handling within a contiguous project site of any and all materials encountered in performing the Work. Excavation shall include all groundwater and surface water control (pumping, bailing, draining, or other methods selected by the Contractor), protection of excavation and adjacent utilities and structures (by sheeting, shoring, or other method selected by the Contractor); the support of sewers, conduits, any and all utilities, roadways, foundations, and other piping, facilities, and features within the limits of the excavation work or adjacent thereto; prevention of damage to structures; and all incidental Work. Moreover, the Contractor shall assume all responsibility for any obstacles or conditions, foreseen or unforeseen, encountered, or manifest during the performance of the Work.
- C. The term "fill" as used herein shall mean placement of materials including select compactable material (soil or well graded crushed stone) free from all perishable and objectionable materials; no stones larger than four inches in the longest dimension, unless otherwise authorized by GCDWR. Backfill is generally considered the placement of fill material back into an excavation that has been excavated for a pipe, similar facility, or other structure, and shall be considered a type of fill operation. All backfill operations and materials shall meet the requirements of fill materials.
- D. Fill shall include on-site handling within a contiguous project site; initial and final filling; grading of grounds; and restoration of sub-surface materials disturbed. Fill shall include all groundwater and surface water control (diverting, pumping, bailing, and draining, etc.), protection of fill area and adjacent utilities and structures (sheeting, and shoring, etc.); the support of sewers, conduits, roadways, foundations, and other piping within the limits of the fill work or adjacent thereto; prevention of damage to



structures; and all incidental Work. Moreover, the Contractor shall assume all responsibility for any obstacles or conditions, foreseen or unforeseen, encountered, or manifest during the performance of the Work.

- E. **Unclassified Excavation and Fill:** Excavation and Fill consisting of all earthwork operations, involving grading and construction, except for excavation and backfill for trenching, channel and stream change excavation, excavation of unsuitable materials, excavation and backfill for minor structures, pond sediment removal – wet sediment, and any other earthwork operations separately designated. Classification includes excavation for placement of subsurface media for stormwater infiltration BMPs and excavation of drainage ditches.
- F. **Trench Excavation:** Excavation and backfill for storm sewer, sanitary sewer lines, water distribution lines, and all related appurtenances.
- G. **Channel Excavation:** All excavation and backfill associated with stream bank and channel changes.
- H. **Unsuitable Material Excavation:** All additional excavation of unsuitable material below the lowest excavation limits established.
- I. **Excavation and Backfill for Minor Structures:** Includes excavation and backfill, required to install headwalls, weirs, outlet control structures, and end sections according to the Contract Documents.
- J. **Pond Sediment Removal:** Includes excavation and removal of sediment deposited in stormwater BMPs, to re-establish storage and function of the facility. Pond sediment removal shall be classified as “dry” or “wet” in accordance with the material properties specified herein.
- K. **Centerline of Channel:** Location in the channel that is horizontally equidistant from both the left and right top of banks at a given station.
- L. **Bankfull:** Defined as the elevation on the bank where flows exceed the principal channel and flooding begins (incipient point of flooding).
- M. **Bankfull Bench:** A channel feature consisting of a break or change in the channel bank slope occurring at the bankfull elevation. The cross slope of this bank feature is typically flat or flatter than 12 to 1 draining toward the channel.
- N. **Thalweg:** Defined as the "flowline" or the line connecting the lowest points of successive cross-sections along the channel.
- O. **Top of Bank:** The point at which the existing or proposed channel cross section intercepts the existing adjacent ground.
- P. **Right Bank:** Facing downstream, the streambank on the right.
- Q. **Left Bank:** Facing downstream, the streambank on the left.

## 1.3 Submittals

- A. If required by GCDWR, submit:
  - 1. Submittals as described below.
  - 2. Channel Construction Plan which shall detail the execution of channel construction. The Channel Construction Plan shall include, but is not limited to:
    - a. Methods and sequencing of excavation.
    - b. Proposed locations and extents of on-site stockpiled excavated material.
    - c. Quantity, types, and sizes of equipment proposed to perform the Work.
  - 3. Progress as-built survey of constructed channel, in accordance with Specification Section 01 71 23.16 – Construction Surveying.
  - 4. Blasting Plans and Surveys as described in Sections 3.12.B, 3.12.C, and 3.12.I, herein.

## Part 2 Products

### 2.1 Pipe Bedding

- A. Bedding material, when required under this contract, shall be placed in the bottom of the trench after the same has been excavated.
- B. Where an incompressible foundation exists below the bedding zone for Stormwater Gravity Piping, excavate an additional six inches to establish suitable foundation for pipe embedment. Where unstable foundation material is encountered below the bedding zone for Stormwater Gravity Piping, excavate to an additional depth as shown on plans or directed by GCDWR. Foundation backfill material used to replace unsuitable materials shall be as defined in Specification 33 42 11 – Stormwater Gravity Piping.
- C. Bedding material type and depth shall be as defined as detailed in Specification Section 33 42 11 – Stormwater Gravity Piping, on the Contract Documents, or as directed by GCDWR. The surface of the bedding material shall be spread to form a uniform support for the pipe and appurtenances. There shall be no separate payment for minimum required bedding.
- D. For installations under pavements, foundations, or other similar applications as indicated in the Contract Documents or by GCDWR, bedding materials and depths for Stormwater Gravity Piping shall comply with the requirements of Specification Section 34 71 00 – Roadway Construction.

## 2.2 Pipe Backfill

- A. Backfill material type and depth shall be defined as detailed in Specification Section 33 42 11 – Stormwater Gravity Piping on the Contract Documents, or as directed by GCDWR.
- B. For installations under pavements, foundations, or other similar applications as indicated in the Contract Documents or by GCDWR, initial and final backfill materials and depths for Stormwater Gravity Piping shall comply with the requirements of Specification Section 34 71 00 – Roadway Construction.

## 2.3 Classified Stone

- A. Graded aggregate base (GAB) material used for filling shall meet the requirements of the GDOT Standard Specifications, Section 815.
- B. Coarse aggregate material shall meet the requirements of Specification Section 31 05 16 – Aggregates for Earthwork and the requirements of the GDOT Standard Specifications, Section 800.

## 2.4 Select Structural Fill

- A. Select structural fill soils may be used as fill, provided they have been tested by GCDWR's testing contractor/agent representative and assessed by the Engineer of Record to be of composition and moisture content compatible with achieving the specified degree of compaction and meet all other requirements specific to the proposed use.
- B. Unless otherwise specified in the Contract Documents or direct by GCDWR, Select Structural Fill soils shall meet the material requirements of Class I soils, in accordance with GDOT Standard Specification 810.

# Part 3 Execution

## 3.1 General

- A. Perform all earthwork operations in compliance with the requirements of OSHA Construction Standards, Part 1926, Subpart P, Excavations, Trenching, and Shoring; Subpart O, Motor Vehicles, Mechanized Equipment, and Marine Operations; and any and all other applicable Federal, State, and local regulations.

## 3.2 Protection of Trees and Shrubbery

- A. The Contractor shall be responsible for the protection of tops, trunks, and roots of existing trees that are to remain on the project site. Existing trees, which may be subject to construction damage, shall be protected in accordance with requirements in Section 31 10 00 - Site Clearing. Heavy equipment or stockpiles will not be permitted within critical root zone. Interfering branches shall be removed in

accordance with requirements in Section 31 10 00 - Site Clearing.

- B. In areas beyond limits of construction, no vegetation shall be removed without the written consent of the property owner and approval of GCDWR.
- C. In open or improved lawn areas, excavation shall be performed with extreme care to avoid any damage to adjoining lawn areas. In areas not readily accessible by machinery and where excavation is required near existing trees and shrubberies, which may be damaged by excavation equipment, the area shall be excavated with hand tools except as provided is in this section.

### 3.3 Clearing and Care of Surface Materials

- A. Topsoil shall be removed to its entire depth from all areas to be excavated or graded. The topsoil shall be stockpiled in designated or approved locations where it will not interfere with construction operations. Topsoil as stored, shall be reasonably free of subsoil, debris, and stones larger than two inches in diameter. The stored topsoil shall be used for finished grading.
- B. Any other existing surface materials not to be removed, such as but not limited pavement, concrete, pavers, etc., in the vicinity of excavation shall be protected from damage by excavating equipment and other construction activities. Surfaces damaged by excavating and other equipment and other construction activities shall be restored to the satisfaction of DWR at the Contractor's expense unless otherwise stated in the Contract Documents

### 3.4 Sheeting and Shoring

- A. The Contractor shall be responsible for supporting and maintaining excavations required hereunder, even to the extent of sheeting or shoring the sides and ends of excavations with timber or other supports. If the sheeting, braces, shores, stringers, or wailing timbers, or other supports are not properly placed or are insufficient, the Contractor shall provide additional or stronger supports as may be required or directed. The requirement of sheeting, shoring, or of the addition of supports shall not relieve the Contractor of its responsibility for their sufficiency.
- B. Trench sheeting shall be left in place until the backfilling has been completed to elevation not less than twelve inches above the top of the pipe or until backfill has been completed to a depth that removal of sheeting would not risk failure of the excavation walls, slopes, or side slopes.
- C. Where in the opinion of GCDWR the removal of sheeting would endanger the Work built under this Contract or any adjoining improvements, such sheeting will be ordered to be left in place and the tops cut off as directed. In removing sheeting, the Work shall be performed in such a manner as to prevent injurious or damaging caving of the sides. All voids left by sheeting along trenches shall be carefully backfilled and compacted with suitable tools. Any timber directed to be left in place will not be paid for as supplemental price. No additional payment will be made for sheeting when directed to be left in place.

- D. In quicksand or soft ground, or areas where quick conditions exist or could be caused or exacerbated by excavation, sheeting shall be driven to such depth below bottom of the trench to prevent upheaval or quick conditions, or as directed. Surface water and groundwater control may be used in combination with sheeting to prevent causing or exacerbating quick conditions or soft ground.
- E. Failure or refusal of GCDWR to order sheeting, or timbering to be left in place shall in no way relieve the Contractor of responsibility placed upon him under any provisions of the Specifications or other Contract Documents or applicable Federal, State, or local regulations.
- F. The need and adequacy of sheeting, shoring, bracing, or other provisions to protect personnel and equipment in a trench or other excavation, and to meet local and OSHA safety requirements, shall be the sole and exclusive responsibility of the Contractor. Where required by Federal, State, or local regulations, trench protection shall be designed by a Professional Engineer and the costs for such design shall be considered incidental to the Work and borne by the Contractor.

### 3.5 Unauthorized Excavation

- A. All excavations carried outside of the lines and grades given or specified, without direction of GCDWR, together with the removal of such material and all excavations, and other work resulting from slides, cave-ins, swellings, or upheavals shall be at the Contractor's own cost and expense.
- B. All spaces beneath foundations resulting from unauthorized excavations, slides, or cave-ins shall be repaired at the Contractor's expense, with bedding materials or concrete, or other appropriate materials and means as directed.
- C. All excavations carried outside the lines and grades given or specified, without direction of GCDWR, shall be restored to original or better condition at the Contractor's expense. This is to include all landscaping outside of the lines and grades given or specified.

### 3.6 Removal of Water

- A. The Contractor shall pump out, or otherwise remove and dispose of, any water (including stormwater), or any other liquids which may be found or may accumulate as fast as they may collect in the excavations, regardless of source or whether it be from its own or adjacent contracts. Disposal of water must meet the requirements in Section 31 25 00 - Erosion and Sedimentation Controls, Section 31 23 19 – Dewatering, and applicable Federal, State, and local regulations.
- B. All necessary precautions shall be taken to prevent disturbance to and to properly protect and drain the areas upon which concrete is to be poured, pipe is to be laid, and other structures set or constructed.
- C. The flow in sewers, drains, gutters, or water courses encountered in the Work shall be adequately accounted for by the Contractor at its own expense to ensure these

flows do not interfere with performance of any and all of the Work and shall be maintained in such a manner as to ensure continuity of flow at all times.

- D. Unless otherwise permitted, groundwater encountered within the limits of excavation shall be lowered to an elevation not less than two feet below the bottom of such excavation before pipe laying or concreting is started and shall be maintained at such elevation until concrete and joint materials have attained initial set.
- E. If necessary, means, including maintenance of dewatered conditions, to prevent flotation or displacement of pipe and structures shall be implemented, during installation and backfill and until final conditions are established.

### 3.7 Excavation Methods

- A. All excavation shall be in open cut unless otherwise indicated on the Contract Documents or approved by GCDWR and shall be in accordance with the GDOT Standard Specifications Sections 204, 205, 206, 207 and 208. In general, topsoil may be removed by machine methods. Excavation below topsoil may also be performed by machine but shall be supplemented by such hand dressing or leveling as may be required to conform to lines and grades as given by GCDWR. Material so removed shall be used in fill, making embankments, filling low areas, or as otherwise directed, unless determined unsuitable for such use by GCDWR.
- B. Hand tool excavation shall be used where necessary to protect existing utilities and structures.
- C. All excavated and filled areas shall be carefully cut or graded by hand to leave smooth (residential lawns shall be free from irregular surface change greater than  $\pm 0.10$  foot), firm, even surfaces, free of rock on the surface, and properly graded as detailed on the Contract Documents, and/or required by GCDWR, and shall be tamped or otherwise compacted to maintain the material in position. All excavated areas shall be maintained in this condition until final completion and acceptance of the Work.
- D. It is the Contractor's responsibility to have all excavation conform to local and OSHA safety requirements.
- E. Unless otherwise shown on the Contract Documents, the minimum trench widths shall be sufficiently wide to allow achieving the specified compaction beside the pipe and beneath the pipe's haunches.

### 3.8 Trench Excavation

- A. For storm drainage and utility pipelines, the maximum width of trench from an elevation twelve inches above the top of the pipe to the bottom of the trench shall be that indicated on the Contract Documents.
- B. Excavation of pipe trenches with side sloping to the bottom will not be permitted.
- C. Should trenches be excavated with more than the specified maximum widths,

GCDWR may require the Contractor to furnish additional bedding, concrete cradle, or concrete encasement, as applicable, for the pipe at the Contractor's own expense.

### 3.9 Trench Length

- A. The length of trench to be excavated or the areas of the surface to be disturbed without stabilizing at any one time shall be limited by GCDWR with regard both to expeditious construction and to the convenience and safety of citizens directly and indirectly affected by the Work.
- B. The Contractor shall not have more than 300 feet of trench excavated without stabilizing at one time. New trenching will not be permitted to be excavated, if there are previously excavated trenches that require backfilling or surface areas that require restoration. Clean up, grassing, or other surfacing as specified in the Contract Documents shall follow a maximum of 300 feet behind pipe installation.
- C. In any event, no additional Work of any kind will be permitted if there are existing streets, roadways, or other areas that require attention to return them to a safe and proper condition. In general, no trench shall be excavated more than 150 feet ahead of pipe laying.
- D. For safety, no trenches will be allowed to be left open or without otherwise stabilizing at night or on weekends unless approved by GCDWR. All required permits shall be obtained before trenching begins.

### 3.10 Ditch Excavation

- A. This work includes excavating, shaping, compacting, handling, hauling, and properly disposing of material encountered when excavating, changing, cleaning, relocating, or widening ditches as indicated on the Contract Documents and/or directed by GCDWR.
- B. All ditch excavation shall conform to the specifications and requirements in Section 3.19, Channel Construction, unless otherwise directed by GCDWR.

### 3.11 Rock Excavation

- A. Rock is defined as stone in original ledge or mass and boulders over one-half cubic yard in volume which cannot be excavated with a backhoe having a bucket curling force rated at not less than 26,000 pounds. Material which can be loosened with a pick, frozen materials, or partially weathered rock, which for convenience or economy is loosened by drilling and blasting or by drilling coupled with wedging, and material which is exterior to the limits of measurement allowed shall not be measured or classified as rock excavation.
- B. Rock excavation by blasting shall be performed in advance of pipe laying or instream structure installation. Rock shall be removed to a depth of at least 6 inches below the bottom of the pipe or instream structure and this area shall be backfilled with crushed stone and lightly consolidated before installing the pipe or instream structure.



- C. In removing, special care shall be taken to excavate it as closely as possible to the required shape and with no projection into the trench.
- D. All rock excavated shall be disposed of off-site, in accordance with Specification Section 02 42 00 – Removal of Waste Material, unless otherwise identified in the Contract Documents or as directed by GCDWR. Excavated rock removed from the site becomes the property of the Contractor.

### 3.12 Blasting

#### A. Requirements

1. Furnish all labor, equipment and materials required to drill, blast, loosen, excavate, and dispose material to complete the Work shown on the Contract Documents and specified herein.
2. The Work shall include, but not be limited to:
  - a. Blast round design.
  - b. Planning and execution of appropriate site-specific safety measures to be employed during all blasting operations, and the safe handling and storage of high explosives and blasting agents.
  - c. Drilling blast holes, loading blast holes with explosives, wiring, placing detonation cord, means of ignition, and safe detonation of blast rounds.
  - d. Removal from the site of all excess excavated soil, debris, and rock.
  - e. Dewatering and maintenance of groundwater and surface water in all excavations.
  - f. Performance of all surveys necessary to establish and verify the lines and grades and to determine the amount of material removed.
  - g. Implementation of monitoring program to monitor condition of existing structures and utilities in vicinity of proposed blasting operations, to ensure existing features remain undamaged by blasting procedures.
3. All excavations shall be in conformity with the lines, grades, and cross sections on the Contract Documents or established by GCDWR. Where rock exists at planned invert elevation, blasting shall ensure removal of 6 inches of rock below the bottom of pipe. All over-blast shall be removed and the resulting over-excavation filled with compacted structural fill soil or compacted crushed stone.
4. All blasting operations, including transporting and storing of explosives shall comply with the Georgia State Fire Commissioner's Rules and Regulations for Explosives and Blasting Agents, and all applicable Federal, State, and local codes and regulations.



B. Submittals

1. In accordance with the procedures and requirements set forth in Section 01 33 00 - Submittal Procedures, the Contractor shall submit the following at least 30 working days prior to beginning any blasting operations:
  - a. Names, addresses, telephone numbers, and qualifications of the blasting subcontractor(s) and explosives supplier(s) that will be used, include the designated Blaster-In-Charge.
  - b. Copies of Training Certificates for the designated Blaster-In-Charge, blasting foreman, and any other key personnel that will be responsible for the work, showing that they have received specialized training in the proper handling of explosives.
  - c. A Blasting Plan, indicating the methods, materials, and equipment to be used. The Blasting Plan shall indicate the types of explosives to be used, drilling patterns, and a general layout and schedule for executing the work in accordance with state regulations.
  - d. A ground vibration and air blast monitoring plan, indicating structures that will be monitored, monitoring equipment that will be used, and personnel that will perform the monitoring.
2. At least 24 hours before each blast round, Contractor shall submit a detailed blast round design plan to GCDWR's on-site representative. The blasting plan submitted is for record keeping purposes only. Review by GCDWR shall not relieve the Contractor of its responsibilities as provided herein. The blast round design submittals shall include:
  - a. Location (state grid coordinates) and limits of the shot.
  - b. Number, diameter, and depth of blast holes to be detonated in the round, and a plan showing the drill hole pattern, spacing and distance to the free face.
  - c. Depth of overburden.
  - d. Total weight of explosives in the round and the types of explosives to be used.
  - e. Loading diagram showing the location of explosives, primers, and initiators; and location, depth, and type of stemming to be used in each hole.
  - f. Initiation sequence, including delay timer and delay system, total weight of explosive to be detonated on each delay, and a list of the timing of the delays.
  - g. Manufacturer's data sheet for all explosives, primers, and initiators to be

- used.
- h. Planned seismic monitoring positions, distances from the blast round, and seismograph types to be used to monitor vibrations and air blast overpressures.
  - i. Type and amount of blasting mats and/or depth of soil cover to be used over the top surface of the shot.
  - j. Any other information required by applicable state and federal regulations.
3. Within 24 hours after each blast round, Contractor shall submit a blasting report to GCDWR. The blasting report shall include:
- a. Date and time of shot.
  - b. Foreman's name.
  - c. Number and depth of holes detonated.
  - d. Weather conditions at the time of detonation.
  - e. Type of explosives and detonators used.
  - f. Peak particle velocity of ground motion and primary frequency for all ground vibration monitoring stations.
  - g. Peak air blast overpressure measured.
  - h. Distance from the blast round to each monitoring station for vibrations and air blast.
  - i. Amount of explosive used in each hole, and maximum weight of explosive detonated on any single delay in the blast round.

C. Pre-Blast Survey

- 1. The pre-blast survey shall be conducted by the approved vibration consultant, and accompanied by a GCDWR representative, on the residences and facilities adjacent to the proposed rock blasting in accordance with the submitted survey and monitoring plan. The survey shall include, but not be limited to the following:
  - a. A site plan or drawing of the structure to be examined showing the structure in relationship to the proposed rock blasting area and a full description of the structure including type of materials and construction.
  - b. Structure (interior and exterior surfaces) shall be examined by experienced and qualified personnel noting any visible structural and

- aesthetic flaws of structure. Existing cracks and flaws shall be noted, significant cracks measured, and all cracks and flaws photographed.
- c. Upon completion of the examination, the structure's owner shall be asked to review the report, note any corrections or omissions, and sign a statement that to the best of its knowledge, the examination report reflects the conditions of the structure prior to any rock blasting. If the structure's owner refuses to sign said report, it shall be noted in the report by the examiner.
  - d. Nothing contained herein shall relieve the Contractor of responsibility for claims arising from its construction operations. Failure to inspect any structure, whether or not required by these Contract Documents or inadequacy of the inspections shall not relieve the Contractor of its responsibility.
  - e. In the event that any property owner denies access for the survey of structures and facilities, the Contractor shall, after requesting and receiving authorization from GCDWR, notify such property owner, by certified mail, stating that this is final notification. Submit to GCDWR, copies of all correspondence between the Contractor and the property owner(s). GCDWR, upon review of the submitted correspondence may waive requirements set forth above. However, the Contractor is fully responsible for claims and damage arising from its construction operations regardless of property location.
  - f. Two electronic copies of the examination reports shall be submitted to GCDWR for their records.

D. Use of Explosives

1. When the use of explosives is necessary for the prosecution of the work, the Contractor shall exercise the utmost care not to endanger life or property. The Contractor shall be responsible for any and all damage or injury to persons or property resulting from the use of explosives.
2. All explosives shall be stored in a secure manner, in compliance with all laws, and all such storage places shall be marked clearly "DANGEROUS EXPLOSIVES" and with any and all markings required by Federal, State, and local regulations, and shall be in the care of competent watchpersons at all times.
3. The Contractor shall notify any public utility company having facilities in close proximity to the site of the work of its intention to use explosives. This notice shall be given sufficiently in advance and in accordance with all applicable regulations to enable the utility companies to take whatever steps they may consider necessary to protect their property from injury. The Contractor shall also give GCDWR, all occupants of adjacent property, and all other Contractors working in or near the Project, notice of its intention to use explosives.

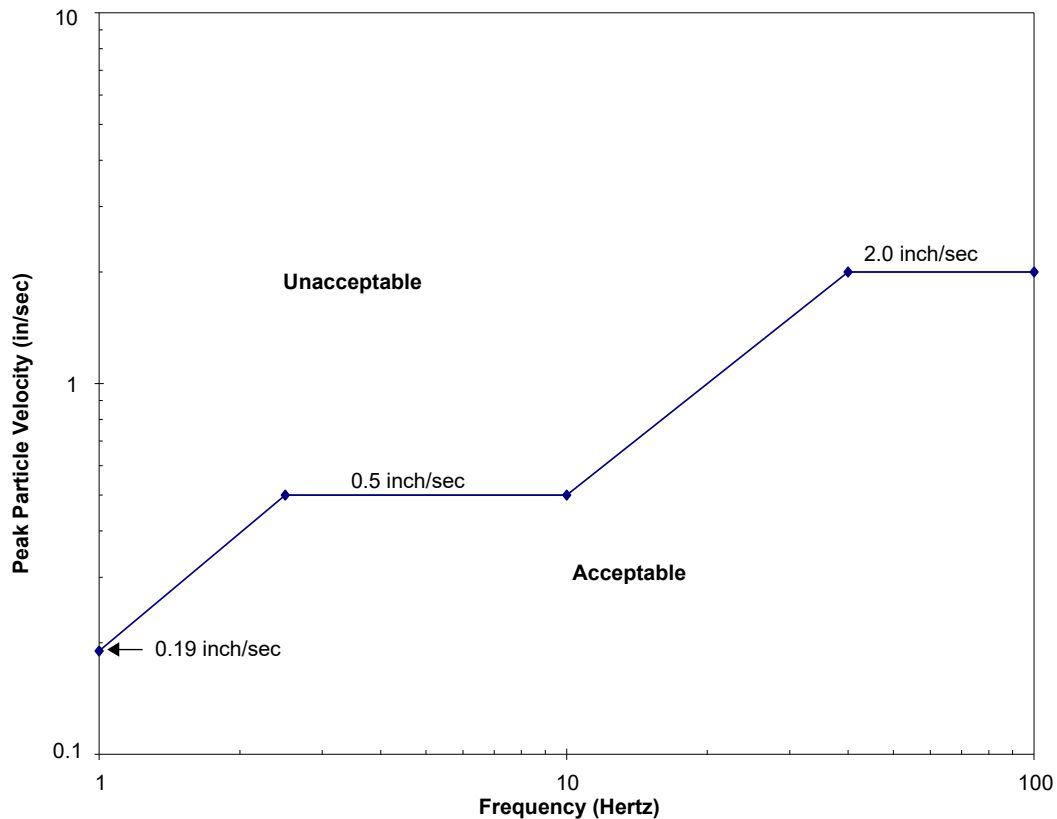
4. Only non-electric type initiators may be used.

E. Blasting Operations

1. Explosives shall be of such quantity and power and shall be used in such locations as will neither open seams nor otherwise disturb the material outside the prescribed limits of excavation. As the excavation approaches its final limits, the depth of holes for blasting and the amount of explosives used for each hole shall be reduced so that the underlying or adjacent rock will not be disturbed or shattered.
2. Blasting shall not be performed within 100 feet of newly placed concrete that has cured less than 7 days. No blasting shall be permitted within 50 feet of any existing structure or any new structure in progress.

F. Blast Monitoring

1. The Contractor shall exercise the utmost care not to damage property on-site and off-site. The Contractor shall, after requesting and receiving authorization from GCDWR, notify each adjoining property owner within 1500 feet of the site of the anticipated ground vibrations and noise which will occur due to its blasting operations. This notice shall be given 7 days in advance to enable the adjacent property owners to take whatever precautions they may consider necessary. The Contractor shall limit its operations to minimize any disturbance to the adjacent property owners. Motorists on adjacent roadways shall be notified in accordance with state regulations. The Contractor shall be responsible for any damage to any structure or utility line, pipes, etc., on-site and off-site as a result of its operations.
2. For each blast round, Contractor shall monitor and record noise and air blast overpressures at the site perimeter nearest the blast location and at the on-site or off-site structure located nearest to the round. Peak air blast overpressure shall not exceed 140 dbl, measured at the site perimeter. The velocity/shock wave shall not exceed 2-inch PPV at 40 Hz or greater. At lower frequencies use the established limits in the vibration criteria as presented in the U.S. Bureau of Mines RI 8507.
3. The site of every blast round shall be sufficiently covered with blasting mats or other devices to prevent any flying debris. The number and type of blasting mats must be satisfactory to GCDWR. The Contractor shall be fully responsible for any damage caused by flying debris, both to on-site and off-site properties.
4. Whenever blasting is to be performed within 750 feet of any structure, the Contractor shall use a seismograph to measure the peak particle velocities of ground vibration resulting from each blast at the closest structure. Vibrations shall be monitored utilizing a seismograph capable of providing a record of particle velocity and frequency along three mutually perpendicular axes utilizing internal calibration. Measured peak particle velocity of ground motion at the monitored structure shall not exceed the values shown in the following graph:



- G. Notification: Give twenty-four hours' notice to GCDWR and adjacent residences and/or businesses prior to each blast.
- H. Complaints: Submit notice of blasting complaints to GCDWR in writing within twenty-four hours of receipt thereof. The notice shall identify the origin of complaint and shall contain a brief description of alleged damages or other circumstances upon which the complaint is predicated. Contractor shall assign a number to each complaint consecutively in the order of receipt. Each complaint shall be assigned a separate number and show in each letter complaint all previous complaint numbers registered by the same complainant. In addition, Contractor shall make a summary report each month to GCDWR. The summary report shall indicate date, time, and name of person investigating the complaint and amount of damages (or an estimate thereof), if any.
- I. Post-Blast Survey
  - 1. The post-blast survey shall be conducted by the same vibration consultant, after requesting and receiving authorization from GCDWR, who performed the pre-blast survey. The consultant shall examine all structures from which a complaint has originated after the blast. The survey shall include, but not be limited to the following:
    - a. A full description of the alleged damage caused by the blast. Where appropriate, a sketch shall be included to more fully describe the location

and type of damage. Cracks shall be measured and compared to any original measurements which may have been taken in the Pre-Blast Survey.

- b. Colored photographs shall be taken of any alleged damage.
- c. Two copies of the Post Blast Survey report shall be submitted to GCDWR. The report shall include the consultant's assessment of the alleged damage and an opinion as to its likely cause. In the case of submittal of electronic copies, one copy will suffice.

### 3.13 Spoil Removal

- A. The Contractor shall remove from the site of the Work, all earth more than that required to fill the excavation and to make the necessary fills. This shall be done immediately after the fills are completed to the satisfaction of GCDWR.
- B. Fill materials GCDWR may deem unfit for use on-site may be removed from the site by the Contractor.
- C. All spoils removed shall be disposed of off-site unless otherwise identified in the Contract Documents or as directed by GCDWR. Material removed from the site becomes the property of the Contractor.
- D. Any material, which may spill or drip from vehicles while being transported on public streets, drives, other paved surfaces, or any other surface where the spillage or dropped material may be deleterious to, shall be immediately removed and cleaned by the Contractor, to the satisfaction of GCDWR, or the proper officials of the municipality in which the hauling or work is being done.
- E. The surface of all graded and spoil areas shall be left in a smooth and level or evenly sloped condition, free from stones, rubbish, or other debris.
- F. Disturbed areas shall be left in a neat and finished appearance and either temporarily stabilized or permanently stabilized, in accordance with the requirements in Specification Section 31 25 00 - Erosion and Sedimentation Controls.

### 3.14 Storage of Materials

- A. All salvageable materials, which may be removed from the site, together with all materials taken from the site, shall be stored in an approved, suitable place or as directed by GCDWR. The Contractor shall be responsible for any loss of or damage to salvageable materials through careless removal, neglectful or wasteful storage, or use of such material.
- B. In the storing of excavated material, which is to be used as a fill, the Contractor shall exercise care so as to avoid inconveniencing the public. If, in the opinion of GCDWR,

it is necessary to remove this excavated material from the streets or lots, the Contractor shall do so at no cost to GCDWR.

- C. Stored materials shall be left in a neat, drainable condition and, if left for more than seven days or in an anticipated rainfall event, the areas shall be temporarily stabilized with mulch only or with temporary grassing and mulch and must meet the requirements in the section titled Erosion and Sedimentation Controls.

### 3.15 Additional Excavation

- A. It is expected that satisfactory foundations will be found at the elevations indicated on the Contract Documents. However, should GCDWR determine it necessary to go to additional depth, the excavation shall be carried to an additional depth by the removal of unsuitable material as authorized and directed by GCDWR. Material used for replacement of unsuitable material shall be with classified stone as directed by GCDWR to the foundation elevations indicated on the Contract Documents.

### 3.16 Trench Backfilling

- A. Bedding and backfilling of trenches shall be as indicated in the Contract Documents and be performed in accordance with Specification Section 33 42 30 – Storm Drain Structures and Specification Section 34 71 00 – Roadway and Pavement Restoration, as applicable.
- B. Bottom of trenches in earth must be shaped or molded and compacted to the contour of the outside of the pipe, using bedding materials when required, as indicated on the Contract Documents, to give a full support to the lower segment of the pipe and so that the pipe is firmly supported in the excavation throughout its entire length, in such manner as to prevent any subsequent settlement of the pipe. Boulders or loose rocks, which might bear against the pipe, will not be permitted in the trench bottom or in the backfill to a depth of eighteen inches above the pipe. Bottoms of excavations which are of loose granular soils or fine-grained material that is or has become unconsolidated shall be compacted prior to placing bedding or pipe.
- C. Except as otherwise specified or directed, all forms, bracing, and lumber shall be removed before backfilling.
- D. Initial backfill in trenches where pipe has been laid shall be placed very carefully in layers not exceeding six inches in thickness and carefully and thoroughly consolidated by tamping simultaneously under the haunches and on both sides of the pipe to a height of twelve inches above the top of the pipe. Initial backfill material shall be free of rocks larger than four inches in the largest dimension. Initial backfilling must be performed properly and before any backfill is deposited in large quantities from a machine bucket or other vehicle. During initial backfill, dumping from a bucket must not be allowed to fall from a height of more than one foot upon a pipe, and in all cases the bucket must be lowered so that the shock of the falling earth will not damage the pipe or structure. Only after the initial backfill has been placed to a point twelve inches above the top of the pipe may Work proceed in placing the remaining backfill, which must be carefully placed and compacted by tamping. In streets, other surfaced



areas, or where directed, this backfill shall be placed in layers not to exceed eight inches in thickness. All precautions must be taken to avoid future settlement in these areas. Tamping shall be done by approved mechanical tampers.

- E. Material under roadways and other paved areas shall be placed and compacted to a density of not less than 95 percent as determined by a standard Proctor test ASTM DD1557. Areas outside of roadways or paved areas (non-structural) shall be compacted as directed by GCDWR to meet existing or proposed uses of the area. GCDWR may, at its option, direct tests to be made to determine the density of the compacted material. The location and number of tests shall be designated by GCDWR as work progresses but shall not be less than one test per 100 to 150 linear feet of backfill placement for each 2 vertical feet of backfill placed.
- F. Materials used for backfilling shall be free from all perishable and objectionable materials; no stones larger than four inches in the longest dimension shall be placed directly above the pipe.
- G. Select, compactable material (soil or well-graded crushed stone) shall be used in pipe trenches under roadways and other paved areas. When required on the plans, or required or directed by GCDWR, graded aggregate base backfill shall be used in pipe trenches under roadways.
- H. Backfilling shall not be performed in freezing weather (below 32 degrees F) except by permission of GCDWR and shall not be performed with frozen material or upon frozen materials.
- I. All backfilled areas shall be carefully graded by hand to leave smooth (lawns shall be free from irregular surface change greater than  $\pm 0.10$  foot), firm, even surfaces, free of rock on the surface and properly graded as detailed on the Contract Documents, and/or required by GCDWR, and shall be tamped or otherwise compacted to maintain the material in position. All backfilled areas shall be maintained in this condition until final completion and acceptance of the Work.
- J. Where directed by GCDWR, the backfill shall be mounded slightly above the adjacent ground to allow for settlement. In case of settlement after backfill, the Contractor shall correct the cause of the settlement and supply sufficient material satisfactory to GCDWR to make up for the deficiency. Contractor must provide to GCDWR, when asked, any independent material testing reports performed on behalf of the contractor.

### 3.17 Embankment Over Pipes

- A. Where the crown of a pipe comes within two feet of, or extends above, the surface of the ground, it shall be covered and protected by an embankment. Unless otherwise ordered or indicated on the Contract Documents, this embankment shall be at least two feet deep over the top of the pipe, at least four feet wide at the top, and with stable side slopes of not less than two horizontal to one vertical extending to the surface of the ground. Provision shall be made for surface drainage.



- B. The materials of which the embankments are to be constructed shall be the same as those permitted for backfill and shall be free from objectionable materials as defined in the section Backfilling.
- C. The earth shall be placed in layers not exceeding eight inches in thickness, which shall be compacted by hand tamping or by other methods approved or directed by GCDWR. The embankments shall not be built during freezing weather or with frozen materials. The surface shall be brought to the true lines and grades as specified or indicated on the Contract Documents and shall be raked smooth and left free from rubbish, stones, or gravel. Placing of backfill or embankment over and around structures shall be done evenly on all sides to avoid unbalanced loading or overturning action.
- D. Protect pipes from damage due to construction activities. Do not drive equipment within 4 ft when measured horizontally from the pipe nor drive equipment over the pipe until at least 24 in. of compacted fill is over the pipe. Greater cover may be needed for thermoplastic pipes or other pipes depending on the weight and characteristics of the construction equipment. Any pipe damaged by construction equipment shall be replaced or repaired to the satisfaction of GCDWR at the Contractor's expense.

### 3.18 Access by GCDWR's Material Testing Firm

- A. Contractor shall allow and accommodate both scheduled and unscheduled sampling or testing of excavation materials and backfill which may include, but is not limited to excavating and setting aside directed materials for sampling, providing description, properties, moisture content, dry density, sieve analysis, Atterberg limits, compaction testing, permeability, etc.
- B. The Contractor shall give GCDWR's material testing firm a minimum of 24-hour notice when scheduling testing and/or evaluations.

### 3.19 Channel Construction

- A. Contractor shall perform all earthwork and related operations, including, but not limited to, channel excavation, grading, compaction, and as-built verification of the constructed channel.
- B. The Contractor shall be responsible for providing centerline construction staking (and necessary off-set staking) to facilitate construction in accordance with the requirements of Section 01 71 23.16 – Construction Surveying.
- C. The Contractor shall obtain GCDWR approval of the staked channel alignment prior to commencing channel excavation.
- D. The Contractor shall not have more than 100 feet of channel excavated without stabilizing at one time unless otherwise directed or approved by GCDWR. Clean up and vegetative stabilization shall follow a maximum of 100 feet behind channel construction. New channel will not be permitted to be excavated, if there are

previously excavated channel reaches that require filling or surface areas that require restoration. In any event, no additional Work of any kind will be permitted if there are existing streets, roadways, or other areas that require attention to return them to a safe and proper condition.

- E. The Contractor shall provide progress surveys of the constructed channel, verifying the field location of stations, points and elevations shown on the Contract Documents.
- F. Construction of In-Stream Structures
  - 1. In-Stream Structures shall be constructed in accordance with the Contract Documents and in accordance with Sections 31 80 02 through 31 80 19.
  - 2. Excavation for In-Stream Structures shall be limited to the extents shown on the Contract Documents.
  - 3. GCDWR must review the limits of over excavation for In-stream structures prior to performing the excavation. Over excavation shall not proceed without approval of GCDWR. Over excavation completed outside the lines of the Contract Documents without GCDWR approval will not be included in the measurement and payment, unless completed at the direction of GCDWR.

### 3.20 Pond Sediment Removal

- A. Where pond sediment is ordered to be excavated and removed, GCDWR will determine the extent of removal required.
- B. There shall be two classes of pond sediment removal:
  - 1. Dry sediment removal, where soil moisture content is less than or equal to 50%.
  - 2. Wet sediment removal, for saturated soils or soil moisture content greater than 50%.
- C. Contractor shall notify GCDWR at least 48 hours prior to the removal of pond sediments, to allow collection of moisture content samples by a GCDWR's material testing firm for sediment removal classification.
- D. Dry sediment removal shall be measured and paid for as Unclassified Excavation and Fill.
- E. For Wet sediment removal, the Contractor shall determine the means of such removal. The sediment removal may be subaqueous in nature and may be removed with dredging equipment or other similar means or, at the discretion of GCDWR, the pond may be drained, thus excavation and removal may be by surface removal with excavation equipment.
- F. For subaqueous removal, the Contractor shall determine the depth of water and necessary equipment for removal of sediment from pond bottom and conveyance of sediment to shore for subsequent removal from Project site.

- G. For traditional surface excavation and removal, the Contractor should anticipate unstable ground and shall determine the necessary means to support its excavation equipment and means of conveyance of excavated material to stable ground for traditional haul off.

## Part 4 Measurement and Payment

### 4.1 General

- A. Excavation and fill outside of the defined limits as described in the Contract Documents where excavation was performed without prior approval by GCDWR shall not be included in measurement for payment.
- B. No additional measurement and payment shall be made for excavation considered incidental under other Pay Items.
- C. Excavation and Backfill for Minor Structures shall not be measured but the cost will be incidental to other pertinent items specified in the contract documents.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. This Section includes compaction, moisture conditioning, testing and correction of the subgrade. This section also includes subgrade preparation activities for the installation of stormwater BMPs, including but not limited to, scarification, ripping, disking, raking, and other construction activities.

### 1.2 Definitions

- A. Subgrade: Layer of existing soil after completion of clearing, grubbing, and stripping of topsoil prior to placement of fill, roadway structure, base for floor slab, or stormwater facility.
- B. Optimum Moisture Content
  - 1. Determined in accordance with ASTM Standard D698 or D1557 to determine maximum dry density for relative compaction.
  - 2. Determine field moisture content on basis of fraction passing 3/4-inch sieve.
- C. Prepared Ground Surface: Ground surface after completion of clearing and grubbing, scalping of sod, stripping of topsoil, excavation to grade, and scarification and/or compaction of subgrade.
- D. Relative Compaction
  - 1. Ratio, in percent, of as-compacted field dry density to laboratory maximum dry density as determined in accordance with ASTM D698 or ASTM D1557, where specified in the Contract Documents.
  - 2. Apply corrections for oversize material to either as-compacted field dry density or maximum dry density, as determined by GCDWR.
- E. Relative Density: Calculated in accordance with ASTM D4254 based on maximum index density determined in accordance with ASTM D4253 and minimum index density determined in accordance with ASTM D4254.
- F. Proof-rolling: Testing of subgrade by compactive effort to identify areas that will not support the future loading without excessive settlement.
- G. Infiltrative stormwater best management practice (BMP): Any stormwater BMP that relies on or in any way benefits from or has capacity to allow, accommodate, or enhance infiltration of stormwater into the surface or subgrade soil or media below or adjacent to the BMP. Examples of infiltrative BMPs include, but are not limited to, enhanced dry swales (EDS), bioretention areas, grass swales, permeable pavers, porous asphalt, pervious concrete, etc.

### 1.3 Sequencing and Scheduling

- A. Complete applicable Work specified in Sections 31 10 00 - Site Clearing and Section 31 23 00 - Excavation and Fill, prior to subgrade preparation.

### 1.4 Quality Assurance

- A. Notify GCDWR when subgrade is ready for compaction or proof-rolling or whenever compaction or proof-rolling is resumed after a period of extended inactivity. In the case where subgrade is to be prepared without compaction, notify GCDWR when testing, scarification, or other subgrade preparation will be occurring or resumed or when the first layer or stratum of feature or material will be placed on the subgrade.

## Part 2 Products

(not used)

## Part 3 Execution

### 3.1 General

- A. Keep subgrade free of water, debris, and foreign matter during compaction or proof-rolling, scarification, or other subgrade preparation activities.
- B. Bring subgrade to proper grade and cross-section and if subgrade is to be compacted, uniformly compact surface. If subgrade is to be preserved as non-compacted surface, scarify as specified in the Contract documents or directed by GCDWR.
- C. Do not use sections of prepared ground surface as haul roads. Protect prepared subgrade from traffic.
- D. Maintain prepared ground surface in finished condition until next course is placed.
- E. Prepare subgrade when unfrozen and free of ice and snow.

### 3.2 Compaction

- A. Where subgrade is to be compacted, compact in accordance with B or C below.
- B. Under Earth Fill: Compact upper 8 inches to minimum of 90 percent relative density as determined in accordance with ASTM D698.
- C. Under pavement structure, floor slabs on grade, or granular fill under structures: Compact the upper 8 inches to minimum of 98 percent relative density as determined in accordance with ASTM D698.

### 3.3 Preservation or Preparation of Non-compacted Subgrade

- A. Under infiltrative stormwater BMPs such as, but not limited to, enhanced dry swales (EDS), bioretention areas, porous asphalt, pervious concrete, permeable pavers, etc., the subsurface area shall be protected from such construction traffic or other activities that could compact and reduce the infiltrative capacity of the subgrade, unless otherwise specified in the Contract Documents.
- B. If the subgrade beneath a stormwater BMP or vegetated or pervious surface, designed to infiltrate, partially infiltrate, or maintain its preconstruction infiltration capacity, has its infiltrative capacity reduced during construction or implementation of the Work, the subgrade in the affected area/area with reduced infiltration capacity shall be corrected in accordance with Section 3.6 of this specification.

### 3.4 Moisture Conditioning

- A. Dry Subgrade: Add water, then mix to make moisture content uniform and opt throughout.
- B. Wet Subgrade: Aerate material by blading, discing, harrowing, or other methods, to hasten drying process.

### 3.5 Testing

- A. In-Place density test in accordance with ASTM D1556 or D6938. Contractor shall coordinate in-place testing to be performed by GCDWR Testing Contractor. Density testing shall be determined in accordance with the Contact Documents.
- B. Infiltration testing in accordance with methods specified in the GCSMM. Contractor shall coordinate in-place infiltration testing to be performed by the GCDWR Testing Contractor. Infiltration testing requirements shall be determined in accordance with the Contract documents.

### 3.6 Correction

- A. Soft or Loose Subgrade:
  - 1. If subgrade is to be compacted, adjust moisture content and recompact, or
  - 2. Over excavate and replace with suitable material from excavation as specified in 31 23 00, Excavation and Fill.
- B. Subgrade treatment under infiltrative stormwater BMPs
  - 1. If the subgrade under infiltrative stormwater BMPs or other vegetated or pervious surface requires treatment to increase infiltrative capacity relative to pre-construction conditions and such treatment is directed in the Contract Documents, the subgrade shall be corrected by treatments/activities, including but not limited to, scarification, ripping, diskings, raking, etc., to prepare the

subgrade for BMP installation or final stabilization to the satisfaction of GCDWR.

2. If the infiltration capacity of the subgrade under infiltrative stormwater BMPs, or vegetated or pervious surfaces is detrimentally reduced due to undue compaction related to construction activities, the subgrade shall be corrected by treatments/activities, including but not limited to, scarification, ripping, disk, raking, etc., to prepare the subgrade for BMP installation or final stabilization to the satisfaction of GCDWR.
- C. Unsuitable Material: Over excavate and replace with suitable material from excavation as specified in 31 23 00, Excavation and Fill.
  - D. Where existing conditions are known and corrective action is specified in the Contract Documents, corrective action shall be eligible for payment as described in Specification Section 31 23 00 – Excavation and Fill and Specification Section 32 91 13 – Soil Preparation.

## Part 4 Measurement and Payment

### 4.1 General

- A. No separate measurement and payment shall be made for any Work performed or material used for this section. Full compensation for such work shall be considered as incidental to other items of Work. Costs in connection therewith shall be considered a subsidiary obligation of the Contractor and shall be included in the overall cost of the work.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section Includes the various methods of dewatering including temporary stream bypass pumping and well point systems. Contractor shall implement appropriate methods to maintain flow around the Work area and dewatering such that grading can be performed and compacted satisfactorily as shown in the Contract Documents. This section does not apply to incidental dewatering of small excavations, trenches, or other low areas where water has collected or entered using sump pumps, small diameter (4-inches and less) pumps, ditches, gravity drains, or other similar means. Such dewatering shall be incidental to other items of Work.
- B. The Contractor may use a combination of dewatering methods in lieu of well point system and temporary bypass pumping, subject to approval of GCDWR. The Contractor shall be responsible for pursuing written approval.

### 1.2 System Requirements

#### A. Stream Bypass Pumping

##### 1. Performance Requirements:

- a. It is essential to the operation of the existing stream that there be no interruption in the flow of water throughout the duration of the Project. Provide, maintain, and operate all temporary facilities such as dams, plugs, pumping equipment (both primary and backup units as required), conduits, and all necessary power to intercept the water flow before it reaches the point where it would interfere with the Work, carry it past the Work, and return it to the existing stream downstream of Work.
- b. Sufficient bypass pumping and dewatering shall be implemented to prevent delays in schedule.
- c. Design, install, and operate the temporary pumping system.
- d. Convey the water safely past this Work area. Only base flow is required to be pumped. Do not stop normal stream flows under any circumstances. Flows may only be impeded for the installation of dikes or diversions associated with bypass pumping operations.
- e. Maintain water flow around the Work area in a manner that will protect public and private property from damage and flooding.
- f. Protect water resources, wetlands, and other natural resources.

##### 2. Design Requirements:



- a. Provide all pipeline plugs, pumps of adequate size to handle base flow, and temporary discharge piping, to ensure that the total flow can be safely diverted around the channel or channel section under construction. Bypass pumping system will be required to be operated 24 hours per day 7 days per week, including holidays, during bypass pumping operations, unless otherwise specified in the Contract Documents or directed by GCWR. The maximum allowable discharge velocity shall be 8 fps.
- b. Pump(s) must be capable of bypassing stream base flow and the removal of seepage flow from the work area.
- c. To prevent flooding during storm events and on weekends, the Contractor shall maintain a combination of existing channel sections and stable proposed channel sections capable of conveying flow.
- d. The Contractor may use a combination of existing or constructed bypass channels in lieu of pumping, pending approval of GCDWR and Permitting Agencies. The Contractor shall be responsible for pursuing written approval, as well as provide all engineering required for that approval with such signed and sealed by a licensed professional engineer registered in Georgia.
- e. Provide temporary enclosure around all bypass pumping equipment, including a minimum 6-foot-high chain link fence. The enclosure shall be lockable to prevent unauthorized entry. Submit plan of temporary enclosure construction and materials to GCDWR for approval.

## B. Well Point System

### 1. Performance Requirements:

- a. The well point system shall be developed to the point that is capable of dewatering such that grading can be performed and compacted satisfactorily as shown in the Construction Documents. Each well point system shall be capable of dewatering and maintaining specified groundwater levels or groundwater at sufficient levels at the respective structures such that the Work can be completed. Work, in general shall include:
  - 1) Designing, furnishing, installing, testing, operating, monitoring, and maintaining a system to control ground water and surface water as required to comply with the performance requirements specified.
  - 2) Controlling and removing seepage and surface water from the excavation, including excavation slope erosion control.
  - 3) Prevention of surface water from entering the trench and diverting the surface water away from the site and maintenance of groundwater level below the work level, as specified or required to complete the Work.

- 4) Removal of the temporary dewatering system after completion of the specified portion of work.
  - 5) Removal of ground water and surface water from all remaining excavation, after removal of the temporary dewatering system, until construction has reached finished grades.
  - 6) Filling and stabilization of the well-point holes and other areas disturbed by installation, use, and the removal of the well-point system.
2. Design Requirements:
- a. The Contractor shall be responsible for the design of the entire temporary dewatering system and shall make whatever modifications and additions to the system as may be required for the system to fulfill its requirements. The installed system shall be capable of lowering and maintaining the groundwater to at least 2 feet below the bottom of the excavation and until the required work is completed and maintain the excavation free of groundwater seepages and surface water, regardless of source.

### 1.3 Submittals

- A. Stream Bypass Pumping Submittals: If required by GCDWR, provide detailed plans and descriptions outlining all provisions and precautions regarding the handling of existing water flows. This plan must be specific and complete, including such items as schedules, locations, elevations, capacities of equipment, materials, and all other incidental items necessary and/or required to ensure proper protection of the facilities, including protection of public and private property from damage and flooding. The plan shall include but not be limited to details of the following:
1. Staging areas for pumps.
  2. Cofferdam methods.
  3. Number, size, material, location, and method of installation of suction piping.
  4. Number, size, material, method of installation and location of installation of discharge piping.
  5. Bypass pump sizes, capacity, number of each size to be on-site and power requirements.
  6. Determination of static lift, friction losses, and flow velocity (pump curves showing pump operating range shall be submitted).
  7. Standby power generator size, location.
  8. Downstream discharge plan.

9. Thrust and restraint block sizes and locations.
  10. Sections showing any suction and discharge pipe depth, embedment, select fill and special backfill where required.
  11. Method of noise control and sound monitoring for each pump and/or generator.
  12. Any temporary pipe supports and anchoring required.
  13. Plans for access to bypass pumping locations.
  14. Basis for selection of bypass pumping pipe size.
  15. Schedule for installation, operation, and maintenance of bypass pumping lines.
  16. Plan indicating selected location of bypass pumping line and air valve locations.
  17. Copy of dewatering permit, as needed.
  18. Certification of vendor's compliance with qualifications specified in Article 1.4 Quality Assurance below.
- B. Well Point submittals: If required by GCDWR, submit:
1. Description of the well point system, including basis of pump and system size selection.
  2. Layout of all piping involved.
  3. Method of noise control.
  4. Downstream discharge plan.
  5. Schedule for installation and maintenance of well point system.
  6. Copy of dewatering wells permit, if applicable.
  7. Method and materials for abandonment and stabilization of well-point system.
- C. Quality Control Submittals: If required by GCDWR, submit:
1. Certification of vendor's compliance with qualifications specified in Article 1.4 Quality Assurance below.
  2. Bypass system operators' resumes.
  3. Weekly maintenance and inspection logs.

## 1.4 Quality Assurance

### A. Stream Bypass Pumping

1. Utilize a subcontractor specializing in design and operation of temporary bypass pumping systems. If requested by GCDWR, provide five references from projects of similar size performed by vendor in the past 3 years. Should the Contractor desire to self-perform such work, see General Conditions Paragraph 6.06.I.
2. System operators shall be full-time employees of subcontractor or Contractor with minimum one year experience in operating and maintaining bypass systems.

### B. Well Point System

1. The dewatering system work shall be performed by a subcontractor which has at least five years of successful experience in the field of dewatering or the Contractor if they have at least five years of successful experience in the field of dewatering.
2. The Contractor or well pointing firm shall engage a qualified surveyor to perform all layouts and measurements in accordance with Section 01 71 23.16. The surveyor shall layout the work to the lines and grades required before installation and shall determine the location of each well point, piezometer, and other data, as required.
3. The surveyor shall record and maintain all information pertinent to each well point. The temporary dewatering system in these specifications shall be the minimum system required for controlling groundwater, regardless of source.

## 1.5 Sequencing and Scheduling

### A. General

1. To meet the overall objectives of the Project, certain tasks and task elements shall be generally performed, completed, or substantially completed in the herein specified sequences. However, two or more of the tasks or task elements may be pursued simultaneously when consistent with the requirements specified herein, the requirements of Sequence Constraints, specified hereinafter, and the approved Project Schedule.
2. The specified sequences are not all inclusive. They are intended to convey overall sequence requirements. The Contractor shall plan its Work and provide for temporary connections as necessary in appropriate sequences to perform the Work while minimizing interferences with and providing for the continuous flow of the existing stream baseflow.
3. Any part of the Work that is necessary or required to make each task item

installation satisfactory and operable for its intended purpose, even though it is not specifically included in the task description, shall be performed as if it were described in the task description.

4. Proceed with construction sequence as shown on the Contract Documents.
- B. Sequence Constraints: Erosion control provisions, either permanent or approved temporary, must be in place prior to any construction activities in an area subject to the erosion control provisions. Delineation of the limits of disturbance and tree protections areas must be implemented prior to any construction activities as shown on the Contract Documents.
- C. Stream Flow Bypass Pumping System: The Contractor may propose as part of its flow bypass pumping system plan to use alternate pumping arrangements, subject to approval by GCDWR.

## 1.6 Maintenance

- A. Ensure that the temporary pumping system is properly maintained at all times.
  1. Provide 24-hour supervision of dewatering system by personnel skilled in operation, maintenance, and replacement of system components. If authorized by GCDWR, at Contractor's option, personnel may be replaced with electronic monitoring equipped with an alarm device and telemetry that notifies personnel that are on-call 24 hours a day, 7 days a week to respond. For this option, a monitoring plan must be submitted for review and approval by GCDWR. The monitoring plan must describe the monitoring and notification system(s) and the maximum response time.
  2. Fill fuel tanks before tanks reach 25 percent capacity.
  3. Start/exercise emergency generator(s) at least twice each week to check operating condition.
  4. When dewatering system cannot control water within excavation, notify GCDWR and stop excavation:
    - a. Supplement or modify dewatering system and provide other remedial measures to control water within excavation.
    - b. Demonstrate dewatering system operation complies with performance requirements before resuming excavation operations.
  5. Correct unanticipated pressure conditions affecting dewatering system performance.
  6. Do not discontinue dewatering operations without the GCDWR approval.
- B. Extra Materials: Spare parts for pumps and piping shall be kept on-site. Spare parts shall include but not be limited to 100 feet of extra pipe and necessary fittings,

including pipe repair clamps for each size. For pipe being joined by thermo-fusion, a fusion weld machine available to be on-site within 3 hours any time of the day, including holidays. A spare pump shall be available within 24 hours if primary pumping system fails. Contractor shall maintain on-site at all times at least two pipe repair clamps for all bypass pumping piping sizes used on the project.

- C. Adequate hoisting equipment for each pump and accessories shall be maintained on the Site.

## Part 2 Products

### 2.1 Bypass Piping Materials

- A. Header Piping: The rated working pressure of the header piping shall be a minimum of 125% of the maximum expected pressure in the pipe.
- B. Discharge Piping: Discharge piping shall be used from the connection at the header piping to the discharge point. Discharge piping may be reused for subsequent flow bypass pumping system placements, however, GCDWR at their sole discretion shall have the right to reject sections of discharge piping deemed to be unserviceable. Discharge piping, valves, and fittings shall be of appropriate size and materials to perform bypass operations of normal stream flow under system operating pressures.

### 2.2 Well Point System

- A. The well point system shall be developed to the point that system is capable of dewatering such that excavation, backfill, and grading can be performed and compacted satisfactorily as shown in the Contract Documents. Each well point system shall be capable of dewatering and maintaining groundwater levels.

### 2.3 Equipment

- A. All pumps used shall be fully automatic self-priming units that do not require the use of foot-valves or vacuum pumps in the priming system. The pumps may be electric or diesel powered. All pumps used must be constructed to allow dry running for long periods of time to accommodate the cyclical nature of stream flows.
- B. Provide the necessary stop/start controls and a visual alarm indicating a pump malfunction for each pump.
- C. The main flow back-up pumps shall be online, isolated from the primary system by a valve.
- D. Incorporate noise control measures for any and all equipment being used to ensure minimum noise impact on the surrounding areas.
  - 1. Include silencers or mufflers, equipment modifications, and special equipment or sound barrier walls as necessary to limit noise levels below 55 decibels at a distance of 25 feet from the pumping equipment in the direction of any

residential home.

2. Comply with the requirements of Section 01 50 00, Article 1.11.
  3. In the event the Contractor fails to comply with maximum permissible noise level decibels in the operation of the flow bypass pumping system, GCDWR may order the Contractor to restore gravity flow in the stream and stop operation of the flow bypass pumping system until such time as specified noise levels are achieved. The termination of the flow bypass pumping system for such reason shall not be the basis for any extension of Contract time nor for any claim for additional compensation.
- E. Repair clamps shall be full circle, stainless steel clamps.

## Part 3 Execution

### 3.1 Temporary Stream Bypass Pumping

#### A. Preparation

1. Locate any existing utilities in the area selected to determine layout of bypass pipelines. Locate bypass pipelines to minimize any disturbance to existing utilities.
2. Obtain approvals for placement of the temporary pipeline within public rights-of-ways.
3. Coordinate all bypass pumping operations with GCDWR.

#### B. Installation

1. Bypass pump all water base flows during all phases of the Work requiring bypass.
2. The bypass pipeline must be located off streets, sidewalks, and shoulders of the roads. When the bypass pipeline crosses local streets and private driveways, place the bypass pipelines in trenches and cover with temporary pavement or other approved methods.
3. Protect the bypass discharge line from damage in the areas of other equipment operations. Protection shall be by either concrete jersey barriers or wood timbers or as specified in the Contract Documents.
4. Confine the bypass discharge pipeline to the area within the temporary construction area and construction easement, for construction of the pipeline. Concrete barriers or timber dead-man posts can be used to confine the movement of the discharge pipeline during relocation.

C. Field Quality Control

1. Perform a hydrostatic pressure test for each section of discharge piping with a minimum pressure equal to 1.5 times the maximum operating pressure of the system.
2. Operator shall inspect bypass pumping system on an hourly basis during normal working hours, or on a schedule approved by GCDWR.
3. An inspection log shall be kept at each pumping location. Each inspection log shall be marked with the time of inspection to ensure required maintenance and inspections are being performed.
4. Discharge area shall be inspected to confirm bypass water is being discharged in a manner that will not cause erosion or flooding, or otherwise damage existing facilities, work in progress, completed work, or adjacent property. Discharge of water must meet the requirements in Section 31 25 00 - Erosion and Sedimentation Controls.

- D. Cleaning: Upon completion of the bypass pumping operation, clean up all areas disturbed by these operations, restoring the site to the general condition which existed prior to the start of the Work or as shown on the Contract Documents or to a manner approved by GCDWR.

## 3.2 Well Point System

A. Preparation

1. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by temporary dewatering system installation and operation.
2. The periphery of the excavation shall be suitably diked, and the dikes maintained to prevent surface water from entering the excavation.
3. Take appropriate and use approved measures to prevent erosion of the excavated soils and ramp slopes.
4. Coordinate all well-point dewatering operations with GCDWR.

B. Installation

1. The Contractor shall install a temporary well point system for the removal of subsurface water encountered during construction of the proposed structures and/or piping.

C. Execution

1. At all times during the progress of the Work the Contractor shall use all



reasonable precautions to prevent either tampering with the well points or the entrance of foreign material.

2. All water seeping, falling, or running into the excavation as it is dug, and until the temporary dewatering system is removed as specified, shall be promptly pumped out or otherwise suitably removed, as approved by GCDWR.
3. Dispose of all seepage and surface water removed from the project, regardless of source, by methods in accordance with the erosion and sedimentation control provisions of these Specifications and as approved by GCDWR. All seepage and surface water removed from the project shall be disposed in a manner as to not create nuisance flooding or other deleterious conditions to properties or receiving waters affected by well point system and shall be in accordance with all federal, State, and local regulations.

D. Field Quality Control

1. Operator shall inspect Well Point system on an hourly basis during normal working hours, or on a schedule approved by GCDWR.
2. An inspection log shall be kept at an accessible location. Each inspection log shall be marked with the time of inspection to ensure required maintenance and inspections are being performed.
3. Discharge area shall be inspected to ensure well point water is being discharged in a manner that will not cause erosion or flooding, or otherwise damage existing facilities, work in progress, completed work, or adjacent property. Discharge of well point water must meet the requirements in Section 31 25 00 - Erosion and Sedimentation Controls.

- E. Cleaning: At such time that the well pointing operation is completed, the Contractor shall remove all of its equipment, materials, and supplies from the site of the work, remove all surplus materials and debris, abandon all bored holes by backfilling with bentonite or as required in the contract documents or directed or approved by GCDWR, fill all associated excavations and grade the site to elevations of the surface levels which existed before work started or as shown in the Contract Documents.

### 3.3 System Maintenance

- A. The Contractor shall provide system maintenance including, but not limited to, at least daily supervision, or more if required by the Contract Documents, by someone skilled in the operation, maintenance, and replacement of system components and all other equipment and work required by GCDWR to maintain the excavation in a dewatered and hydrostatically relieved condition.
- B. Dewatering and pressure relief shall be a continuous operation and interruptions due to power outages, or any other reason, shall not be permitted. A responsible operator capable of starting, finishing, and maintaining the dewatering system and starting standby equipment shall be on duty at all times. Responsible personnel shall continuously monitor the dewatering and surface water central systems, until the

Contractor has received approval from GCDWR that he may discontinue surface and/or groundwater control. At Contractor's option, personnel may be replaced with electronic monitoring equipped with an alarm device that notifies personnel that are on-call to respond if approved by GCDWR.

- C. The Contractor shall be fully responsible for the failure of any and all components of the temporary dewatering work and for damages to the Work in the excavation area caused by the failure to provide, maintain, and operate the temporary dewatering system, as specified. Contractor shall restore all damaged Work, including failed components of the work in this specification to the general that existed prior to failure of components or in a manner approved by GCDWR.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section Includes furnish all the materials for and shall place all flowable fill, also known as Controlled Low Strength Material (CLSM), as required by the Contract Documents or where otherwise directed by GCDWR. Applications include, but are not limited to, beddings, encasements, plugging or filling abandoned utilities and structures, general backfill for trenches and abutments, and any other incidences where such work is described/specified in the Contract Documents or requested by GCDWR.

### 1.2 Submittals

- A. If required by GCDWR, submit mix design for approval by GCDWR.

## Part 2 Products

### 2.1 Flowable Fill

- A. Flowable fill shall meet the requirements of GDOT Standard Specification 600.
- B. Alternative mix designs to that specified above may be accepted by GCDWR for either ready mix or volumetric on-site mixing designs at the discretion of GCDWR.

## Part 3 Execution

### 3.1 Construction

- A. When flowable fill/CLSM is used in or around objects subject to floating, i.e., pipes, tanks, drainage structures, etc., the Contractor shall take appropriate measures using straps, soil anchors, or other approved means of restraint to prevent floatation or misalignment.
- B. Contractor shall take all necessary precautions to protect form work, walls, embankments, or other containment structures from displacement or damage due to the hydraulic pressure exerted by flowable fill/CLSM prior to initial set.
- C. Install flowable fill/CLSM where and as shown in the Contract Documents in such manner to fill all voids indicated, properly bed pipe(s) if applicable, and to not displace pipe(s) and other features or structures constituting the Work.
- D. Protect flowable fill from freezing for 36 hours after placement.
- E. The Contractor shall not disturb or cover the flowable fill/CLSM material for at least 24-hours after placement. The Contractor may reduce this period, if they demonstrate at their own expense, through testing in accordance with ASTM D 6024 Standard Test

Method for Ball Drop on Controlled Low Strength Material (CLSM) to Determine Suitability of Load Application, that the flowable fill is sufficiently cured to receive proposed loading.

### 3.2 Temperature and Weather Limitations

- A. Flowable fill shall not be mixed or installed at any time during freezing, inclement weather, or at night without explicit permission, and then only at the Contractor's risk.

### 3.3 Quality Assurance and Acceptance

- A. Acceptance of flowable fill is based on documentation as outlined in GDOT Standard Specification 500.1.03 and a minimum temperature of flowable fill at the point of delivery of 50 degrees F.
- B. GCDWR reserves the right to conduct field testing of flowable fill/CLSM through the County's material testing annual services contract. Testing and collection of Flowable fill/CLSM samples shall be performed to the following standards:
  1. ASTM D 4832, Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders
  2. ASTM D 5791, Standard Practice for Sampling Freshly Mixed Controlled Low Strength Material (CLSM)
  3. ASTM D 6023, Standard Test Method for Unit Weight, Yield, Cement Content, and Air Content (Gravimetric) of Controlled Low Strength Material (CLSM)
  4. ASTM D 6024, Standard Test Method for Ball Drop on Controlled Low Strength Material (CLSM) to Determine the Suitability of Load Application
  5. ASTM D 6103, Standard Test Method for Flow Consistency of Controlled Low Strength Material (CLSM)

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all materials and transportation, labor, tools, and appliances necessary to place, test, and complete the engineered soil media (ESM) as required by the Contract Documents or directed by GCDWR.

### 1.2 Definitions

- A. Engineered Soil Media (ESM): Mix of compost, sand, and fines specified for use within stormwater best management practices.
- B. Relative Compaction
  - 1. Ratio, in percent, of as-compacted field dry density to laboratory maximum dry density as determined in accordance with ASTM D698.
  - 2. Apply corrections for oversized material to either as-compacted field dry density or maximum dry density, as determined by GCDWR.
- C. Optimum Moisture Content
  - 1. Determined in accordance with ASTM Standard D698, specified to determine maximum dry density for relative compaction.
  - 2. Determine field moisture content on basis of fraction passing 3/4-inch sieve.
- D. Relative Density: Calculated in accordance with ASTM D4254 based on maximum index density determined in accordance with ASTM D4253 and minimum index density determined in accordance with ASTM D4254.
- E. Organic Matter Content: Determined in accordance with ASTM D2974 Method C.
- F. Permeability / Infiltration / Hydraulic Conductivity: Determined in accordance with ASTM D3385, Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer.
- G. Laboratory-determined Permeability/Hydraulic Conductivity: For granular soils with no more than 10% passing the No. 200 sieve, and generally having saturated hydraulic conductivity greater than  $1 \times 10^{-5}$  m/s, determined in accordance with ASTM D 2434: Standard Test Method for Permeability of Granular Soils (Constant Head) (Historical Standard) or, for fine-grained soils with more than 10% passing the No. 200 sieve, and generally having saturated hydraulic conductivity less than  $1 \times 10^{-5}$  m/s, determined in accordance with ASTM D5084.
- H. Phosphorous index: The P Index is a field evaluation tool that was developed to identify areas that have a high risk of P loss to bodies of surface water. This tool

combines indicators of P source and of P transport. Methodology for determining P-Index shall be that described in University of Georgia (UGA)/USDA methodology paper dated 12/20/2012 or later version.

- I. Prepared Ground Surface: Ground surface after completion of required demolition, clearing and grubbing, scalping of sod, stripping of topsoil, excavation to subgrade elevation, and subgrade preparation.
- J. Completed Course: A course or layer that is ready for next layer or next phase of Work.
- K. Lift: Loose (uncompacted) layer of material.
- L. Geosynthetics: Geotextiles, geogrids, or geomembranes.
- M. Borrow Material: Material from required excavations or from designated borrow areas on or near Site.

### 1.3 Submittals

- A. If required by GCDWR, submit:
  - 1. Product Data: Submit manufacturer's product data and installation instructions. Include required substrate preparation, list of materials, application rate/testing, and permeability rates.
    - a. Contractor to obtain letter of verification from the Manufacturer that the products meet or exceed all physical property, endurance, performance, and packaging requirements.
  - 2. Manufacturer certification that the organic compost material meets the specifications, including certified laboratory test results dated within 60 days of placement of material.
    - a. As construction progresses, resubmit every 60 days manufacturer certification that the organic compost material meets the specifications including certified laboratory test results dated within 60 days of placement of material.
  - 3. Certified test results from independent testing agency in accordance with the tests specified in Part 1.2, above.
  - 4. Grain-size distribution analysis in accordance with ASTM D6913 (Standard Test Method for Particle-Size Distribution [Gradation] of Soils Using Sieve Analysis) and ASTM D7928 (Standard Test Method for Particle-size Distribution [Gradation] of Fine-Grained Soils Using the Sedimentation [Hydrometer] Analysis) from a representative sample of the soil portion of the ESM used or to be used and sample duplicate to demonstrate material meets specified gradation.

5. Organic content results demonstrating the ESM mixture meets the requirements specified.
6. Permeability test results demonstrating the ESM mixture meets the requirements specified.

## 1.4 Quality Assurance

- A. Notify GCDWR when:
  1. Stormwater BMP or excavation is ready for backfilling, and whenever backfilling operations are resumed after a period of inactivity.
  2. Hydraulically restrictive layer, such as but not limited to, excessively compact layer, rock, clay, or groundwater, is encountered at or within 2 feet below subgrade elevation.
  3. Preparation or testing of the Stormwater BMP subgrade, in accordance with the Contract Documents and Section 31 23 13 – Subgrade Preparation, is to be performed.
  4. Soft or loose subgrade materials are encountered wherever embankment or compacted earth fill is to be placed.
  5. ESM deviates from Specifications.
- B. No time extensions will be granted should the proposed ESM fail to meet the requirements. Once a stockpile of ESM has been sampled, no material may be added to the stockpile.

## 1.5 Sequencing and Scheduling

- A. Complete applicable Work specified in Section 31 23 00 - Excavation and Fill and Section 31 23 13 – Subgrade Preparation, prior to placing ESM.
- B. Backfill against concrete structures only after concrete has attained compressive strength specified in Section 03 30 00 - Cast-In-Place Concrete. Obtain GCDWR's acceptance of concrete work and attained strength prior to placing backfill.

## Part 2 Products

### 2.1 Engineered Soil Media

- A. ESM shall be a homogeneous soil mix with approximate portions of:
  1. Soil portion gradation by weight:
    - a. 85 to 92 percent washed sand meeting gradation requirements specified in ASTM C33 or AASHTO M 6 or approved equivalent.

- b. 8 to 15 percent soil fines (silt and clay) passing No. 200 sieve.
  - c. 5 percent maximum clay.
  - d. Slight departures from the above-listed gradations may be considered and allowed by written permission at the discretion of GCDWR, if and only if, the material requirements of Section 2.1 A.2 and Section 2.1 B and the infiltration rate requirement in Section 3.2 J are met.
2. 5 to 15 percent organic matter from compost meeting the following requirements:
    - a. Decomposed, fully mature, stable, weed-free organic matter source, not including manure or biosolids.
    - b. Grading criteria of 100 percent passing through a ½-inch screen.
- B. ESM mixture shall have the following properties:
1. pH range between 6.0 and 8.0.
  2. Will result in a P-Index for the BMP between 10 and 30.
  3. Cation Exchange capacity (CEC): Greater than 10 milliequivalents per 100 grams (meq/100g) of dry weight.

## 2.2 Water for Moisture Conditioning

- A. Free of hazardous or toxic contaminants, contaminants deleterious to proper compaction, and other constituents or conditions rendering the ESM unsuitable for use in a stormwater BMP or deleterious to plant survival and growth.

## Part 3 Execution

### 3.1 General

- A. Keep placement surfaces free of stormwater, debris, and foreign material during placement, prevent compaction and smearing of the subgrade surfaces, and place ESM in horizontal lifts of uniform thickness, in a manner that avoids segregation, and compact each lift to specified densities prior to placing succeeding lifts. Slope lifts only where necessary to conform to final grades or as necessary to keep placement surfaces drained of water.
- B. Do not place ESM if ESM is frozen, or if surface upon which ESM is to be placed is frozen.
- C. Tolerances
1. Final Lines and Grades: Within a tolerance of 0.1 foot unless dimensions or



grades are shown or specified otherwise.

2. Grade to establish and maintain slopes and drainage as shown. Reverse slopes are not permitted.
- D. Settlement: Correct and repair any subsequent damage to structures, pavements, curbs, slabs, piping, and other facilities, caused by settlement of fill or backfill material.
- E. Underdrain: Contractor shall install underdrain system as detailed in the Contract Documents or as directed by GCDWR.

### 3.2 Installation

- A. Coordinate construction sequencing so that all areas surrounding and tributary to the ESM installation are stable, protected from erosion, and sediment-laden water will not enter ESM mix during installation or once installed.
- B. The ESM must be mixed prior to delivery on site. No project on-site mixing will be accepted.
- C. Store stockpiles of ESM mix in a manner that prevents them from becoming wet from rain, stormwater runoff, or other sources of water contaminated by fine soil or other undesirable materials.
- D. No other materials or substances must be mixed or dumped within the ESM stockpile or installation area that may be harmful to plant growth or prove a hindrance to the planting or maintenance operations.
- E. Heavy equipment shall not be used in facility footprint during excavation and ESM placement.
- F. ESM shall be loosely placed in 8-inch to 12-inch lifts with machinery adjacent to the facility. After each lift is placed, rake the surface to a uniform grade.
- G. Means of compacting ESM lifts shall be limited to the following methods:
  1. Following the placement of each lift, the entire surface area of the soil media shall be wetted with potable water until just saturated to facilitate 'natural compaction'. Once watered media is workable, scarify and level ESM by lightly raking the media surface prior to placement of subsequent lifts.
  2. Following the placement of each lift, consolidate the entire surface area of the soil media by boot compaction or a sod roller. Scarify and level ESM by lightly raking the media surface prior to placement of subsequent lifts.
- H. No additional manual compaction of soil is allowed. Overfill above the proposed surface invert to accommodate up to 20% natural settlement to proper grade.
- I. Do not drive or park any equipment on the ESM mix during installation or once installed. If use or movement of heavy equipment over these areas is unavoidable,

temporary surface protection must be placed over installed areas to protect the ESM. Such protection shall be “swamp mats” of wood, HDPE, or other material specifically manufactured to support heavy equipment and prevent sinking into or compaction of substrate material on which the matting is set. All surface protection is subject to review and approval by GCDWR. Any compaction or disturbance causing infiltration test results outside the requirements in Section 3.2 J, shall be corrected at the Contractor’s expense.

- J. In-place ESM shall have a minimum infiltration rate of 1 inch per hour and a maximum of 10 inches per hour in accordance with ASTM D3385. An infiltration rate of 2 to 8 inches per hour is preferred.

### 3.3 Testing

#### A. Gradation

1. Contractor shall coordinate site testing to be performed by GCDWR Testing Contractor or Testing Contractor experience and certified in the test method.
2. One sample for each 500 CY or portion thereof, if total installed is less than 500 CY of finished product, or more often as determined by GCDWR, if variation in gradation is occurring, or if material appears to depart from Specifications.
3. Gradation testing shall be grain-size distribution analysis in accordance with ASTM Designation D6913 (Standard Test Method for Particle-Size Distribution of Soils Using Sieve Analysis) from a representative sample and duplicate of the ESM used or to be used.
4. If test results indicate material does not meet Specification requirements, terminate material placement until corrective measures are taken.
5. Contractor shall remove material placed in Work that does not meet Specification requirements at no additional cost to GCDWR.

#### B. Infiltration Testing

1. Contractor shall coordinate site testing to be performed by GCDWR Testing Contractor or Testing Contractor experienced and certified in the testing methods.
2. The number of tests to be performed on placed ESM shall be as follows:

Surface Area of Installed ESM	Minimum Number of Infiltration Tests
< 1,000 square feet	1
1,000 – 1,999 square feet	2
2,000 -9,999 square feet	3
≥ 10,000 square feet	Add one (1) test for each additional 10,000 square feet of area.

3. Additional tests may be required by GCDWR, where variation in material composition is apparent.
4. In-Situ infiltration testing shall be in accordance with ASTM D3385 (Standard Test Method for Infiltration Rate of Soils in Field Using Double-Ring Infiltrometer).
5. Test results shall meet the requirements of Section 3.2 J.
6. Contractor shall remove and replace material placed in Work that does not meet Specification requirements at no additional cost to GCDWR.

END OF SECTION

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Erosion and Sedimentation Controls

## Part 1 General

### 1.1 Summary

The Contractor shall furnish all labor, equipment, and materials necessary for implementing best management practices (BMPs) to prevent and minimize erosion and resultant sedimentation in all cleared and grubbed areas during and after construction. The Work includes necessary work for the installation of structures and measures for the prevention and control of soil erosion and sediment. The Contractor shall furnish all material, labor, and equipment necessary for the proper installation, maintenance, inspection, monitoring, reporting, and removal (where applicable) of erosion prevention and control measures and to cause compliance with the General NPDES Permit for Stormwater Discharges from Construction Activities and Land Disturbing Permits.

### 1.2 References

- A. Contractor shall be familiar with the current edition of the following referenced documents and keep a paper copy at the construction site at all times.
  - 1. General NPDES Permit for Stormwater Discharges from Construction Activities (NPDES permit).
  - 2. Manual for Erosion and Sediment Control in Georgia (Green Book).
  - 3. Erosion, Sedimentation, and Pollution Control Plan (ESPC Plan) as required by the NPDES Permit.
  - 4. Municipal Separate Stormwater Sewer System (MS4) Permit.

### 1.3 Definitions

- A. Designer: For the purpose of this item, the term “Designer” is synonymous with Consulting Engineer, Licensed Professional, Designer, and Consultant contracted with GCDWR used in permits, laws, rules, regulations, ordinances, and other soil erosion and sediment control references.
- B. Contractor: For the purposes of this item, the term “Contractor” is synonymous with General Contractor, Discharger, Operator, Primary Permittee and Permittee (Permit Holder) as used in permits, laws, rules, regulations, ordinances, and other soil erosion and sediment control references.
- C. Certified Personnel: For the purposes of this item, the terms Certified Personnel or Certified Person mean a person who has successfully completed an erosion and sediment controls short course eligible for continuing education units, or an equivalent course approved by Environmental Protection Division of the Georgia Department of Natural Resources and the Georgia Soil and Water Conservation Commission.

## 1.4 Regulatory Compliance

- A. Land disturbance activities are not authorized to begin until after all required erosion and sediment control permits are obtained from the United States, the State of Georgia, and/or Gwinnett County. Contractor shall be the Co-Primary Permittee and Operator under the provisions of the NPDES Permit. As such, Contractor shall be required to sign certain certifications as described in the NPDES Permit. Contractor shall also comply with all other laws, rules, regulations, ordinances, and requirements concerning soil erosion and sediment control established in the United States, the State of Georgia, and/or Gwinnett County. The following documents and the documents referenced therein define the regulatory requirements for this item:
1. NPDES Permit: The Georgia National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction Activity governs land disturbance or construction activities of one acre or more. On applicable sites, Contractor is responsible for complying with terms and conditions of this permit.
  2. Manual for Erosion and Sediment Control: Contractor shall follow Practices and Standards of the Georgia Soil and Water Conservation Commission Manual for Erosion and Sediment Control in Georgia.
  3. SWPPP: When a Stormwater Pollution Prevention Plan (SWPPP) is provided in the Contract Documents, the Contractor shall follow the practices described in the SWPPP.
  4. ESPC Plan: Erosion, Sedimentation and Pollution Control Plan.
  5. Gwinnett County Department of Planning and Development Erosion & Sediment Control & Solid Waste Management Affidavit.

## 1.5 Permitting

- A. Land disturbance activity shall not commence until the Land Disturbance Permit has been issued.
- B. GCDWR's Consultant Engineer shall be responsible for performing the following duties with respect to the Stormwater Discharge Permit:
1. Prepare an ESPC Plan and submit ESPC Plan to the local issuing authority for approval.
  2. Obtain a Land Disturbance Permit from local governments.
  3. Provide an approved copy of the ESPC Plan to GCDWR to provide to the Contractor.
  4. Inspect the installation of the initial sediment storage requirements and perimeter control BMPs within 7 days after installation. Upon their approval by

the Consultant Engineer, the Consultant Engineer will provide a letter to GCDWR.

5. Submit the Notice of Intent (NOI) to the Georgia Environmental Protection Division (GAEPD) for NPDES Permit Coverage.
- C. Contractor shall be responsible for performing the following duties with respect to the Stormwater Discharge Permit:
1. Execute the NOI as “Operator” using the GAEPD online permitting portal and submit any applicable fees as outlined in permit document Part II, D. Contractor shall provide a copy of the submitted NOI to Gwinnett County Department of Planning and Development. No work shall be started until 14 days after the Notice of Intent is submitted to EPD.

## Part 2 Products

### 2.1 General

- A. Erosion and sedimentation control products shall be as shown on the Construction Documents and as specified in the current edition of the Manual for Erosion and Sediment Control in Georgia.
- B. Unless otherwise specified herein or in the current edition of the Manual for Erosion and Sediment Control in Georgia, stone used for erosion and sediment control shall meet the requirements of Specification Section 31 05 16 – Aggregates for Earthwork and Specification Section 31 37 00 – Rip Rap.

### 2.2 Filter Socks

- A. Filter socks may consist of synthetic fiber, excelsior fiber, or compost, enclosed in natural or synthetic fibers.
  1. Filter sock products consisting of synthetic or excelsior fibers must be listed on the Georgia Soil and Water Conservation Commission (GSWCC) Equivalent Best Management Practice List.
  2. Compost used in Filter socks shall comply with requirements of GDOT Standard Specification Section 893.

### 2.3 Coir Wattles, Straw Wattles, and Coir Logs

- A. Coir Wattles and Coir Logs:
  1. Shall be 100% coir fibers encased in coir netting with 2-inch by 2-inch openings.
  2. Shall have a minimum dry density of 7 pounds per cubic feet and a maximum dry density of 9 pounds per cubic feet.

3. Wattles shall have a minimum diameter of 6 inches and Logs shall have a minimum diameter of 15 inches.
- B. Straw wattles:
1. Shall be 100% wheat straw encased in photodegradable or biodegradable netting.
  2. Shall have a minimum dry density of 2 pounds per cubic foot.
  3. Shall have a minimum diameter of 6 inches.

## 2.4 Silt Bag

- A. Silt bags used to filter sediment-laden water, pumped from low, excavated, or other areas prior to discharge, shall meet the following requirements:
1. The geotextile shall be a double-stitched seam using a high-strength thread. The sleeve must be able to accommodate a maximum four-inch diameter pump discharge hose. Minimum physical property requirements for non-woven geotextile bag shall comply with the listed in Table 1.

**Table 1**  
**Physical Property Requirements for Non-Woven Geotextile Silt Bag**

Property	Requirement	Test Method
Weight	10 oz./sy	ASTM D 3776
Grab Tensile	270 lb	ASTM D 4632
Puncture	150 lb	ASTM D 4833
Bursting Strength	550 psi	ASTM D 3786
Permittivity (sec <sup>-1</sup> )	1.3 sec <sup>-1</sup>	ASTM D 4491
UV Resistance	70% tensile strength at 500 hours	ASTM D 4355
Apparent Opening Size (AOS)	0.15 – 0.18 mm	ASTM D 4751
Seam Strength	100 lb/in	ASTM D 4884

## 2.5 Concrete Washout Structure

- A. Concrete washout structures shall be a minimum of 3 feet deep.
- B. Concrete washout structures shall be of the length and width as shown on the Construction Documents. If dimensions are not indicated on the Construction Documents, concrete washout structures shall have minimum internal dimensions of 10 feet long by 10 feet wide.
- C. Concrete washout structures shall be lined with 10 mil or thicker UV resistant, impermeable sheeting, free of holes, tears or other defects.

## 2.6 Turbidity Curtain (Tc)

- A. The floatation section of the turbidity curtain shall be 6-inch to 12-inch diameter expanded polystyrene foam encased in 18-oz. to 22-oz. PVC-coated nylon fabric. The fabric shall be bright yellow or orange color to increase visibility.
- B. The skirt section of the turbidity curtain shall consist of a geosynthetic fabric having a minimum grab strength of 300 psi when tested in accordance with ASTM D 4632.
- C. The skirt section shall have a maximum filtration apparent opening size (AOS), when tested in accordance with ASTM D 4751 of:
  - 1. 0.220 mm for non-woven geotextiles
  - 2. 0.425 mm for woven geotextiles.

## Part 3 Execution

### 3.1 General

- A. Installation and maintenance of products shall be performed as shown on the Construction Documents and as specified in the Manual for Erosion and Sediment Control in Georgia, 2016 Edition. Products listed on the GSWCC) Equivalent Best Management Practice List shall be installed in accordance with the Construction Documents and Manufacturer Specifications.

### 3.2 Filter Socks

- A. Filter socks composed of synthetic fibers shall not be staked unless the product contains a pre-made stake hole. Filter socks made of natural non-synthetic materials may be staked in accordance with manufacturer's recommendations.

### 3.3 Silt Bags

- A. Silt bags shall be placed on a suitable base. Examples of acceptable base materials are mulch, leaf/wood compost, woodchips, sand, No. 57 Stone or straw bales.
- B. Discharge area from silt bags shall be protected from erosion and excess sedimentation.

### 3.4 Concrete Washout Structures

- A. Concrete washout structures shall be located a minimum of 50 feet away from open channels, storm drains, inlets, sensitive areas, wetlands, buffers, and water courses and away from construction traffic.
- B. Concrete washout structures may be excavated or constructed with straw bales.



1. For excavated washout structures impermeable sheeting shall be anchored with sandbags at the top of the structure, with no more than 1 foot between sandbags.
2. For straw bale washout structures, bales shall be anchored to the ground using wood or metal stakes of sufficient length, spaced no more than 18 inches apart. Impermeable sheeting shall be fastened to the structure at the top of the bale with a minimum 4-inch long, 11-gauge steel wire staples.

### 3.5 Removal of Temporary Sediment Control Structures

- A. At such time that temporary erosion and control structures are no longer required under this item, the Contractor shall notify GCDWR of its intent and schedule for the removal of the temporary structures and obtain GCDWR's approval in writing prior to removal. Once the Contractor has received such written approval from GCDWR, the Contractor shall remove, as approved, the temporary structures and all sediments accumulated at the removed structures. In areas where temporary control structures are removed, the site shall be left in a condition that shall restore original drainage or as shown in the Construction Documents. Such areas shall be evenly graded and seeded or otherwise stabilized in accordance with the Construction Documents.

### 3.6 Notice of Termination

- A. When all construction activities have ceased, final stabilization has been implemented by the Contractor, and the site is in compliance with the NPDES permit, the Contractor, together with GCDWR, will submit a Notice of Termination.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. This section includes hydraulic erosion control products. These products are a mixture of cut or shaved wood fiber, straw, or other natural bonded fiber matrix and a stabilizing emulsion or tackifier applied with hydro-mulching equipment. The products are used to temporarily protect exposed soil from erosion by raindrop impact or wind and may be used in combination with seed and fertilizer for revegetation.

### 1.2 Definitions

- A. Hydraulic Erosion Control Products (HECPs): A hydraulically applied mixture of materials composed of a continuous layer of elongated fiber strands suspended in a fluid, which upon drying, adheres to the soil in the form of a continuous, biodegradable erosion control blanket.

### 1.3 Submittals

- A. Product Data: Submit manufacturer's product data and installation instructions. Include required substrate preparation, list of materials, and application rate.
- B. Certifications: Manufacturer shall submit a letter of certification that the product meets or exceeds all technical and packaging requirements.

### 1.4 Delivery, Storage and Handling

- A. Deliver materials and products in ultraviolet- and weather-resistant factory-labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from damage, weather, excessive temperatures, and construction operations.

## Part 2 Products

### 2.1 Hydraulic Erosion Control Products

- A. Hydraulic erosion control products shall be as shown on the Drawings and as specified in the Manual for Erosion and Sediment Control in Georgia, 2016 Edition.
- B. All tackifiers, binders, or hydraulic mulch shall be specifically designed to tack mulch or other soil covers and should be verified to be non-toxic through EPA 2021.0 testing and shall be determined to be non-toxic in accordance with EPA-821-R-02-012.
- C. HECPs shall not have any germination or growth inhibiting factors nor form a water-resistant crust that can inhibit plant growth.
- D. HECPs shall be furnished with all components pre-packaged by the manufacturer to

assure material performance and compliance. Under no circumstances will field mixing of HECP components be accepted.

- E. HECPs shall not include materials composed of paper, cellulose fiber, or any mixture containing paper or cellulose.
- F. Flexible Growth Medium (FGM):
  - 1. FGM shall be a hydraulically applied matrix composed of non-toxic defibrated organic fibers, cross-linked insoluble hydro-colloidal tackifiers, and reinforcing natural and / or synthetic fibers. FGM shall be composed of the following:
    - a. A minimum of 70% non-toxic, long strand organic fibers.
    - b. Non-toxic thermally processed or refined long strand organic fibers heated to a minimum temperature of 212 degrees Fahrenheit for sterilization purposes.
    - c. Non-toxic interlocking natural fibers.
    - d. Non-toxic water insoluble cross-linked hydro-colloidal tackifiers.
- G. Bonded Fiber Matrix (BFM):
  - 1. BFM shall be a hydraulically applied matrix composed of a minimum of 70% of non-toxic defibrated organic fibers with, at a minimum, one of the following non-toxic additives that upon drying become insoluble and non-dispersible to eliminate direct raindrop impact on soil:
    - a. Soil tackifiers,
    - b. Soil flocculants,
    - c. Soil Polymers,
    - d. Cross-linked hydro-colloidal polymers, or
    - e. Cross-linked tackifiers.
  - 2. BFM shall be completely photo-degradable or biodegradable and be composed of the following:
    - a. A minimum of 70% non-toxic long strand organic fibers.
    - b. Non-toxic thermally processed or refined long strand organic fibers heated to a minimum temperature of 212 degrees Fahrenheit for sterilization purposes.
- H. Stabilized Mulch Matrix (SMM):

1. SSM shall be a hydraulically applied matrix composed of a minimum of 70% of non-toxic defibrated organic fibers with, at a minimum, one of the following non-toxic additives that upon drying become insoluble and non-dispersible to eliminate direct raindrop impact on soil:
    - a. Soil tackifiers,
    - b. Soil flocculants,
    - c. Soil Polymers,
    - d. Cross-linked hydro-colloidal polymers, or
    - e. Cross linked tackifiers.
  2. SSM shall be completely photo-degradable or biodegradable.
- I. HECP Products shall comply with the requirements of Table 1:

Table 1  
Minimum HECP Performance and Physical Requirements

HECP Property	Test Method	FGM	BFM	SSM
Color	Observed	Colored to contrast application area, shall not stain concrete or painted surfaces		
Organic Matter	ASTM D2974	90% minimum		
Water Holding Capacity	ASTM D7367	700% minimum	500% minimum	400% minimum
Acute Toxicity	ASTM 7101 EPA 2021.0-1	Non-Toxic		
Functional Longevity	Observed	365 days	180 days	90 days
Max Slope Application	Observed	1.0H:1V	2.0H:1V	3.0H:1V
Rainfall Event (R-Factor)	ASTM D6459 <sup>1,2</sup>	175 < R	140 < R	75 < R
Cover Factor	ASTM D6459 <sup>1,2</sup>	C ≤ 0.01	C ≤ 0.05	C ≤ 0.10
Vegetation Establishment	ASTM D7322 <sup>1</sup>	500% minimum	400% minimum	300% minimum

<sup>1</sup>ASTM test methods developed for Rolled Erosion Control Products (RECPs) that have been modified to accommodate Hydraulic Erosion Control Products (HECPS).

<sup>2</sup>Utah State Protocol of 2.5:1 slope with rainfall simulated at 5 inches per hour for 60-minute duration, or Texas A&M Transportation Institute Protocol of 2:1 slope with rainfall simulated at 3.5 inches per hour with 3 successive test durations of 30 minutes each test in 24-hour intervals may be substituted for ASTM 6459.

## Part 3 Execution

### 3.1 General

- A. Installation and maintenance of products shall be performed as shown on the Drawings, in accordance with Manufacturer's recommendations, and as specified in the Manual for Erosion and Sediment Control in Georgia, 2016 Edition.
- B. Add seed, lime, and fertilizer with HECP mixture as outlined in Specification Section 32 91 13 – Soil Preparation and Specification 32 92 00 – Turf and Grasses and in accordance with Section 3.2 and 3.3.

### 3.2 Soil Testing

- A. Amendments shall be applied with the HECP at manufacturer recommended rates according to soil test results in accordance with Section 32 91 13 - Soil Preparation, unless otherwise directed in the Contract Documents or as directed by GCDWR.

### 3.3 Vegetation Species Selection

- A. Once soils have been analyzed for agronomic potential and amendment recommendations, suitable plant species for achieving sustainable growth and effective erosion control shall be determined by the Contract Documents or as directed by GCDWR. Species selection and establishment shall be compliant with Section 32 92 00 - Turf and Grasses.

### 3.4 Substrate and Seedbed Preparation

- A. Examine substrates and conditions where materials will be applied. Subgrade shall be prepared as outlined in Specification Section 32 91 13 – Soil Preparation. Apply products to geotechnically stable slopes that have been designed and constructed to divert runoff away from the face of the slope. Do not proceed with installation until satisfactory conditions are established.

### 3.5 Application

- A. Strictly comply with equipment manufacturer's installation instructions and recommendations. Use approved hydroseeding machines with fan-type nozzle (50-degree tip), unless otherwise specified by the manufacturer. To achieve optimum soil surface coverage, apply hydraulically-applied erosion control products from opposing directions to soil surface. HECPs are not recommended for channels or areas with concentrated water flow unless used in conjunction with a rolled erosion control product designed to accommodate the anticipated hydraulic conditions. No chemical additives with the exception of fertilizer, soil neutralizers, and bio stimulant materials shall be added to this product.
- B. Mixing: A mechanically agitated hydroseeding machine is strongly recommended.

1. Fill 1/3 of mechanically agitated hydroseeder with water. Turn pump on for 15 seconds and purge and pre-wet lines. Turn pump off.
  2. Turn agitator on and load low density materials first (i.e. seed).
  3. Continue slowly filling tank with water while loading fiber matrix into tank.
  4. Consult application and loading charts to determine number of bags to be added for desired area and application rate. Mix at a rate of 50 pounds of HECF per 125 gallons. Contact Equipment manufacturer to confirm optimum mixing rates.
  5. All HECFs shall be completely loaded before water level reaches 75 percent of the top of tank.
  6. Top off with water and mix until all fiber is fully broken apart and hydrated (minimum of 10 minutes; increase mixing time when applying in cold conditions). This is very important to fully activate the bonding additives and to obtain proper viscosity.
  7. Add fertilizer and any other remaining amendments.
  8. Shut off recirculation valve to minimize potential for air entrainment within the slurry.
  9. Slow down agitator and start applying with a 50-degree fan tip nozzle or as specified by manufacturer.
  10. Spray in opposing directions for maximum soil coverage.
- C. Application Rates: Application rates in Table 2 are for standard conditions. Products shall be applied as shown in the Contract Documents or as directed by GCDWR.

Table 2  
Application Rates for Hydraulic Erosion Control Products

Slope Gradient / Condition	Application Rate (lb/ac)		
	FGM	BRM	SMM
≤ 4.0H:1V	2,500	2,500	2,500
> 4.0H:1V and ≤ 3.0H:1V	3,000	3,000	3,000
> 3.0H:1V and ≤ 2.0H:1V	3,500	3,500	3,500
> 2.0H:1V and ≤ 1.0H:1V	4,000	4,000	4,000
> 1.0H:1V	4,500	4,500	4,500
Below RECP or TRM	1,500	1,500	1,500

- D. For Erosion Control and Revegetation: To ensure proper application rates, measure and stake area. Best results and more rapid curing are achieved at temperatures exceeding 60°F. Curing times may be accelerated in high temperature, low humidity

conditions with product applied on dry soils.

1. Step One: Apply fertilizer with specified prescriptive agronomic formulations and typically 50 percent of specified seed mix with a small amount of hydraulically-applied erosion control product for visual metering. Do not leave seeded surfaces unprotected, especially if precipitation is imminent.
  2. Step Two: Mix balance of seed and apply HECPS at a rate of 50 pounds per 125 gallons of water or as specified by manufacturer over freshly seeded surfaces. Confirm loading rates with equipment manufacturer and adjust as recommended.
- E. Rough surfaces (rocky terrain, tracked and ripped soils) may require higher application rates to achieve 100% cover. Slope interruption devices or water diversion techniques are recommended when slope lengths (on a 3H:1V gradient) exceed the values identified in Table 3. Slope interruption interval distances may need to be decreased based on steeper slopes or other site conditions.

Table 3  
Recommended Maximum Slope Lengths  
without Slope Interruption Devices for HECPS

Product	Slope Length (ft)
Flexible Growth Medium (FGM)	100
Bonded Fiber Matrix (BFM)	75
Stabilized Mulch Matrix (SMM)	50

### 3.6 Cleaning and Protection

- A. After application, thoroughly flush the tank, pumps and hoses to remove all material. Wash all material from the exterior of the machine and remove any slurry spills. Once dry, material will be more difficult to remove.
- B. Clean spills promptly. Advise GCDWR of methods for protection of treated areas. Do not allow treated areas to be trafficked or subjected to grazing.

### 3.7 Inspection, Maintenance, And Warranty

- A. Refer to Section 32 92 00 - Turf and Grasses for details on inspection, maintenance, and warranty.

END OF SECTION

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## Woven Fabric Stabilization Products

### Part 1 General

#### 1.1 Summary

- A. Section includes all labor, equipment, and materials necessary for furnishing, placing, maintenance, removal, inspection, monitoring and reporting on woven coir or natural fiber erosion and sedimentation controls in conjunction with temporary or permanent ground cover.

#### 1.2 Definitions

- A. Biodegradable: Product will decompose under ambient conditions into carbon dioxide, water, and other naturally occurring materials within a period of six (6) to 36 months.
- B. Coir Fabric: Coir Blanket and/or Coir Mattress.
- C. Coir Blanket: 100 percent natural, biodegradable, organic blanket woven from machine-spun bristle coir twines.
- D. Coir Mattress: 100 percent natural, biodegradable, organic mattress of coir fiber stitched between two organic jute and scrim woven nets. The components are sewn together with biodegradable cotton.
- E. Dead Stout Stakes: Wooden stakes shall be of a length shown on the Contract Documents. These are referred to as "dead stout stakes" and are approximately 18 inches by 1 inch by 1.25 inch made of untreated pine or other hardwood. Only new, sound, unused stakes shall be used. The stakes shall be used to secure coir fabric in place. Two-foot long, 1/2-inch hooked rebar may be substituted when it is necessary to secure materials in rocky areas, as approved by GCDWR.
- F. Fasteners: Steel or plant-based molded plastic anchors driven through the soil stabilization matting and into the soil to hold product in place.
- G. Overlap: Distance measured perpendicular from overlapping edge of one sheet to underlying edge of adjacent sheet.
- H. Straw-based Erosion Control Matting: An erosion control blanket consisting of agricultural straw or a combination of agricultural straw and coconut fibers, free of seed, stitched in a single or double netting to the top side or both sides of the erosion control product.
- I. Wood Fiber Erosion Control Matting: Degradable matting consisting of excelsior or nonwoven coconut fibers with biodegradable netting on top and bottom; netting shall be cotton, cotton blend or coir.



### 1.3 Submittals

- A. If requested by GCDWR, submit description of proposed method of product deployment, and provisions for holding fabric in-place and permanently secured.
- B. If requested by GCDWR, submit one piece of fabric, minimum 18 inches long, taken across full width of roll of each type and weight of fabric furnished for Project. Label each with brand name and furnish documentation of lot and roll number from which each sample was obtained.
- C. If requested by GCDWR, submit certifications from each fabric manufacturer that furnished products have specified property values. Certified property values shall be either minimum or maximum average roll values, as appropriate, for fabrics furnished.
- D. If requested by GCDWR, submit manufacturer specifications and installation guidelines for rolled products.

### 1.4 Delivery, Storage, And Handling

- A. Deliver each roll with sufficient information attached to identify it for inventory and quality control.
- B. Handle products in manner that maintains undamaged condition.
- C. Do not store products directly on ground. Ship and store fabric with suitable wrapping for protection against moisture and ultraviolet exposure. Store fabric in way that protects it from elements. If stored outdoors, elevate and protect fabric with waterproof cover.

### 1.5 Scheduling and Sequencing

- A. Prior to fabric installation, prepare ground surface as specified in Section 32 97 00 - Landscaping.
- B. Notify GCDWR whenever fabrics are to be placed. Do not place fabric without GCDWR's approval of underlying materials.

## Part 2 Products

### 2.1 Wood Fiber Erosion Control Matting

- A. Excelsior (derived from aspen or pine) or nonwoven coconut fibers with biodegradable netting on top and bottom; netting shall be cotton, cotton blend or coir. Wood Fiber matting products shall be listed in the current AASHTO National Transportation Product Evaluation Program (NTPEP) Report for Erosion Control Products.
- B. Product shall consist of machine produced matting of uniform thickness, weave, or distribution of fibers, supplied in rolls at least 40-inches wide.

- C. Matting shall be smolder resistant.
- D. Physical properties shall conform to the requirements in Table 1, unless otherwise approved by GCDWR.

**Table 1**  
**Physical Property Requirements for Temporary Wood Fiber-Based Products**

Property	Test Method	Wood Fiber Matting
Thickness (in), min.	ASTM D6525	0.25
Weight (oz./sq. yd.), min	ASTM D6475	7.9
Tensile Strength - MD (lb/ft), min.	ASTM D6818	160
Tensile Strength – TD (lb/ft), min.	ASTM D6818	110
Light Penetration, min.	ASTM D6567	5%
Slope Erosion – C Factor, max.	ASTM D6459	0.2
Permissible Shear, unvegetated (lb/ft), max	ASTM D6460	2.1
Recommended slope	-	2:1 or flatter
Flow (ft/sec) probable maximum	ASTM D6460	7
Thread	-	Biodegradable
Functional Longevity, 75% remaining (month)	-	6
Target Service Life (month)	-	12

## 2.2 Straw-Based Erosion Control Matting

- A. Fiber fill material shall be 100% agricultural straw or a combination of agricultural straw and up to 30% coconut or hemp-based fiber.
- B. Netting shall biodegradable natural fibers or photodegradable polypropylene.
- C. Physical properties shall conform to the requirements in Table 2, unless otherwise approved by GCDWR.

**Table 2**  
**Physical Property Requirements for Temporary Straw-Based Products**

Property	Test Method	Single Net	Double Net
Thickness (in), min.	ASTM D6525	0.25	0.25
Weight (oz./sq. yd.), min	ASTM D6475	6.8	6.8
Fiber Length (in.) 80% greater than		3	3
Tensile Strength - MD (lb/ft), min.	ASTM D6818	70	160
Tensile Strength – TD (lb/ft), min.	ASTM D6818	50	110
Permissible Shear, unvegetated (lb/ft), max	ASTM D6460	1.5	1.75

Property	Test Method	Single Net	Double Net
Recommended slope	-	3:1 or flatter	3:1 or flatter
Flow (ft/sec) probable maximum	ASTM D6460	4.5	6.5
Functional Longevity, 75% remaining (month)	-	3	4.5
Target Service Life (month)	-	4	9

## 2.3 Woven Coir Fabric

- A. Woven coir fabric shall be composed of 100 percent natural, spun mattress coir yarn interlaced to form woven mat with uniform weave pattern.
- B. Calendared or finished so yarns shall retain their relative position with respect to each other.
- C. Unseamed Sheet Width: Minimum 8 feet.
- D. Physical properties shall conform to requirements in Table 3, unless otherwise approved by GCDWR.

Table 1  
Physical Property Requirements for Coir Fabrics

Property	Test Method	Coir Blanket	Coir Mattress
Weight (oz./sq. yd), min	ASTM D6475	10.7	26
Tensile Strength - MD (lb/ft), min.	ASTM D6818	240	-
Tensile Strength – TD (lb/ft), min.	ASTM D6818	164	-
Elongation, (MD x TD), max	ASTM D6818	10.9% x 16%	
Tensile Strength, dry (lb/ft), min	ASTM D4595	-	1900 x 1400
Tensile strength, wet (lb/ft)	ASTM D4595	-	1200 x 700
% Open area, min	Calculated	-	35%
Light Penetration, min	ASTM D6567	10%	-
Thickness (inch)	ASTM D1777	0.31	0.35
Recommended slope	-	1:1 or flatter	2:1 or flatter
Flow (ft/sec) probable maximum	ASTM D6460	9	16
Permissible Shear, unvegetated (lb/ft), max	-	2.25	5
Functional Longevity (years)	-	4 - 6	2
"C" Factor	-	0.002	-

## 2.4 Anchoring Devices

- A. Dead Stout Stakes

1. Spacing shall be as shown on the Contract Documents.
  2. Dimensions shall be as shown on the Contract Documents.
  3. Length shall be as shown on the Contract Documents.
- B. T-Head Pin.
1. Molded plastic; biodegradable. Single leg with barbs is driven into the soil so that molded T-Head top is flush with matting.
  2. 6-inch or 8-inch long, 3/8-inch, thick; 1-inch-wide head.
- C. Circle-Top Pin.
1. Steel wire. Single leg is driven into the soil so that coil or loop top is flush with matting.
  2. 6-inch or 8-inch long. 11 gauge.
- D. Round-Head Pin.
1. Molded plastic; biodegradable.
  2. Single leg with barbs is driven into the soil so that molded disk top is flush with matting.
  3. 6-inch or 8-inch long, 1-inch-diameter head.
- E. U-Shape Staple.
1. Steel wire. Two main legs are driven into the soil so that top of staple is flush matting.
  2. 6-inch or 8-inch long. 11 gauge bent into U shape, 1-inch to 1-1/2-inch wide top.

## Part 3 Execution

### 3.1 Laying Wood Fiber Erosion Control Matting

- A. Place wood fiber-based products within 24 hours after sowing the seed on that area.
- B. Unroll matting in the direction of water flow. Lay matting smoothly in firm, uniform contact with the soil surface without stretching or tenting.
- C. Overlap matting with the upslope portion on top. Overlap edges at least 2 in. and ends at least 6 in. Do not install longitudinal overlaps in channel bottoms.
- D. Key-in matting at the uppermost or leading edge and at edges adjacent to pavement, catch basins or structures. Key-in areas by digging a trench, fastening, and backfilling

one or more edges of the matting into the bottom of the trench. Trench into the soil perpendicular to the flow of water to at least 6 in. depth.

- E. Anchor products using biodegradable or steel fasteners with a minimum embedment length of six (6) inches in accordance with manufacturer specifications or at the following maximum spacings between fasteners:
  - 1. Uppermost or leading-edge of matting: 6-inches.
  - 2. Overlapping edges of matting: 18-inches.
  - 3. Center of Ditch: 18-inches.
  - 4. Lowermost or Toe-Edge of matting: 18-inches
  - 5. Throughout Matting: 24-inches
- F. Gently apply water with a sprinkler or water-breaker nozzle immediately after installation is completed to wet the soil to at least 2 in. depth.

### 3.2 Laying Straw-Based Erosion Control Matting

- A. Place straw-based products within 24 hours after sowing the seed on that area.
- B. For products with netting on two sides, place the side with the majority of thread stitching on the bottom.
- C. Roll out matting flat and parallel or perpendicular to the direction of water flow.
- D. Evenly spread the product without stretching, allowing the fibers to come in direct contact with the soil over the entire area.
- E. Shingle and overlap the edges parallel to water flow by at least 4 in. Shingle and overlap the edges perpendicular to water flow by at least 7 in.
- F. Anchor overlaps on slopes at 18-inch intervals and elsewhere using biodegradable or steel fasteners with a minimum embedment length of six (6) inches or in accordance with manufacturer's specifications.
- G. At the tops of slopes and at the beginning of each product used in ditch bottoms, bury the upgrade end of the blanket in a check slot 6 in. wide by 6 in. deep. Insert the product end to the full depth of the check slot. Backfill and compact the check slot. For slopes longer than 100 ft, dig a second check slot perpendicular to the slope gradient one-third of the slope length measured from the bottom of the slope. Place the product to the full depth of the check slot. Backfill, and compact the check slot.
- H. Anchor products using biodegradable or steel fasteners with a minimum embedment length of six (6) inches in accordance with manufacturer specifications or at the following anchor densities:

1. Slopes flatter than 2(H):1(V): 120 staples per 100 sq. yds
  2. Channel or ditch applications: 350 staples per 100 sq. yds.
- I. Gently apply water with a sprinkler or water-breaker nozzle immediately after installation is completed as needed to settle matting and soil.

### 3.3 Laying Coir Fabric

- A. Seed and mulch shall be placed under fabric prior to placement.
- B. Lay and maintain fabric smooth and free of tension, folds, wrinkles, or creases.
- C. Lay fabric pieces from upstream to downstream (overlap upstream end of fabric over the top of the next downstream end of fabric piece), from bottom of bank slope to top of slope.

### 3.4 Coir Fabric Orientation on Slopes

- A. Orient fabric with long dimension of each sheet in the direction of flow on channel banks or slopes.

### 3.5 Coir Fabric Joints

- A. Unseamed Joints: Overlap minimum of 12 inches or as shown in manufacturer's written recommendations, whichever is greater, unless otherwise shown on the Contract Documents.

### 3.6 Securing Coir Fabric

- A. Secure fabric during installation as shown on the Contract Documents, using trenches and dead stout stakes at the top and bottom of slopes.
- B. Roll out and install fabric from bottom of bank slope to top of slope.
- C. Install additional stakes at the break in bank slope at the back of the bankfull bench.
- D. Coir Blankets may be temporarily anchored using U-Staples or 60d nails, as approved by GCDWR.

### 3.7 Repairing Fabric

- A. Repair or replace torn, punctured, flawed, deteriorated, or otherwise damaged fabric with new unused fabric.
- B. Repair Procedure (Straw- or Wood Fiber-based products)
  1. Replace all damaged fabric as directed by GCDWR.

2. When matting is not firmly fastened to the soil, or if keyed-in areas or check trenches are not secure, repair the unsecured areas using fasteners as needed or directed by GCDWR.

C. Repair Procedure (Coir Fabric)

1. Place patch of undamaged fabric over damaged area and at least 18 inches in all directions beyond damaged area, minimum of 4 square feet of fabric.
2. Remove interfering material as necessary to expose damaged fabric for repair.
3. Permanently attach repair using dead stout stakes.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, equipment, and materials necessary for placing, maintenance, removal, inspection, monitoring, and reporting for Geotextiles.

### 1.2 Definitions

- A. Geotextile, a permeable synthetic, woven or nonwoven fabric, comprised solely of textiles, and generally used in geotechnical applications for drainage, separation, or stabilization purposes.
- B. Minimum Average Roll Value (MinARV): Minimum of series of average roll values representative of geotextile furnished.
- C. Maximum Average Roll Value (MaxARV): Maximum of series of average roll values representative of geotextile furnished.
- D. Nondestructive Sample: Sample representative of finished Work, prepared for testing without destruction of Work.
- E. Overlap: Distance measured perpendicular from overlapping edge of one sheet to underlying edge of adjacent sheet.
- F. Seam Efficiency: Ratio of tensile strength across seam to strength of intact geotextile, when tested according to ASTM D4884.

### 1.3 Submittals

- A. Geotextile Fabric
  - 1. Manufacturer material specifications and product literature.
  - 2. Installation drawings showing geotextile sheet layout, location of seams, direction of overlap, and sewn seams.
  - 3. Description of proposed method of geotextile deployment, sewing equipment, sewing methods, and provisions for holding geotextile temporarily in place until permanently secured.
- B. Informational Submittals:
  - 1. Certifications from each geotextile manufacturer that furnished products have specified property values. Certified property values shall be either minimum or maximum average roll values, as appropriate, for geotextiles furnished.
  - 2. Field seam efficiency test results.



3. See certification of proper installation requirement in Construction Notes on Contract Documents.

## 1.4 Delivery, Storage, And Handling

- A. Deliver each roll with sufficient information attached to identify it for inventory and quality control.
- B. Handle products in manner that maintains undamaged condition.
- C. Do not store products directly on ground. Ship and store geotextile with suitable wrapping for protection against moisture and ultraviolet exposure. Store geotextile in way that protects it from elements. If stored outdoors, elevate and protect geotextile with waterproof cover.

## 1.5 Scheduling and Sequencing

- A. Notify GCDWR whenever geotextiles are to be placed. Do not place geotextile without GCDWR approval of underlying materials.

# Part 2 Products

## 2.1 Geotextile

- A. The fabric shall consist of strong rot-proof synthetic fibers formed into a woven fabric or a nonwoven needle punched fabric meeting all applicable requirements of this section and those specified in the Contract Documents.
- B. The fabric shall be free from any treatment or coating which might significantly alter its physical properties before or after installation.
- C. The fabric fibers shall contain stabilizers and/or inhibitors to make the filaments resistant to deterioration resulting from ultraviolet or heat exposure and any conditions anticipated in the application.
- D. The fabric shall be a pervious sheet of synthetic fibers oriented into a stable network so that the fibers retain their relative position with respect to each other.
- E. The edge of the fabric shall be finished to prevent the outer fibers from pulling away from the fabric.
- F. The fabric shall be free of defects or flaws which significantly affect its physical and/or filtering properties.
- G. Sheets of fabric may be sewn or bonded together with a fungus resistant material.
- H. No deviation from any physical requirements will be permitted due to the presence of the seam.

- I. During all periods of shipment and storage, the fabric shall be wrapped in a heavy-duty protective covering to protect the fabric from direct sunlight, mud, dust, dirt, and debris. The fabric shall not be exposed to temperatures greater than 140 degrees.
- J. Minimum physical property requirements for woven and non-woven geotextile fabric shall comply with the listed in Tables 1 and 2.

Table 1  
Physical Property Requirements for Woven Geotextile

Property	Test Method	Type 1
Typical Applications		Under In-Stream Structures, Rip Rap
Percent Open Area	GDT 88	4.0% to 6.5%
Apparent Opening Size	ASTM D 4751	N/A
Flow Rate	GDT 87	N/A
Grab Tensile Strength (min.)	ASTM D4632	200 lbs
Grab Elongation	ASTM D4632	10% to 35%
Bursting Strength (min.)	ASTM D 3786	500 psi
Fungus Resistance	ASTM G21	No Growth
Puncture Strength	ASTM D4833	80 lb, MinARV
Ultraviolet Radiation Resistance	ASTM D4355	140 lbs. 70 percent strength retention, MinARV after 500 hours
Minimum Roll Width		72 inches

Table 2  
Physical Property Requirements for Non-Woven Geotextile

Property	Test Method	Type 2	Type 3
Typical Applications	---	Under In-Stream Structures and Rip Rap	French Drains and Weed Block Fabric
Percent Open Area	GDT 88	4.0% to 6.5%	4.0% to 6.5%
Flow Rate	GDT 87	50 - 350 gal/min/ft <sup>2</sup>	50 - 150 gal/min/ft <sup>2</sup>
Grab Tensile Strength (min.)	ASTM D4632	65 lbs.	80 lbs.
Grab Elongation (min.)	ASTM D4632	40%	50%
Bursting Strength (min.)	ASTM D3786	500 psi	185 psi
Fungus Resistance	ASTM G21	No Growth	No Growth
Puncture Strength (min.)	ASTM D4833	30 lbs	55 lbs
Ultraviolet Radiation Resistance (min.)	ASTM D4355	140 lbs. 70 percent strength retention, MinARV after 500 hours	140 lbs. 70 percent strength retention, MinARV after 500 hours
Minimum Roll Width		72 inches	12.5 ft.

## 2.2 Sewing Thread

- A. Thread shall be polypropylene, polyester, or Kevlar thread.
- B. Thread durability shall be equal to or greater than durability of geotextile sewn.

## 2.3 Securing Pins

- A. Steel Rods or Bars shall be:
  - 1. 3/16-inch diameter.
  - 2. Pointed at one end.
  - 3. With head on other end sufficiently large to retain washer.
  - 4. Minimum Length: 12 inches.
- B. Steel Washers for Securing Pins shall be:
  - 1. Outside Diameter: Not less than 1.5 inches.
  - 2. Inside Diameter: 1/4 inch.
  - 3. Thickness: 1/8 inch.
- C. Steel Wire Staples shall be:
  - 1. U shaped.
  - 2. 10 gauge.
  - 3. Minimum Length: 6 inches.

## Part 3 Execution

### 3.1 Laying Geotextile

- A. Lay and maintain geotextile smooth and free of tension, folds, wrinkles, or creases.

### 3.2 Sheet Orientation on Slopes

- A. Orient geotextile with long dimension of each sheet parallel to direction of slope.

### 3.3 Joints

- A. Unseamed Joints
  - 1. Overlap such that downstream fabric is under upstream fabric (shingle in

direction of water flow).

2. Overlap, unless otherwise shown:
  - a. Foundation/Subgrade Stabilization: Minimum 18 inches.
  - b. Rip rap: Minimum 18 inches.
  - c. Drain trenches: Minimum 18 inches, except overlap shall equal trench width if trench width is less than 18 inches.
  - d. Other applications: Minimum 12 inches.
- B. Sewn Seams shall be made wherever stress transfer from one geotextile sheet to another is necessary. Sewn seams, as approved by GCDWR, also may be used instead of overlap at joints for applications that do not require stress transfer.
  1. Seam Efficiency
    - a. Minimum 70 percent.
    - b. Verified by preparing and testing minimum of one set of nondestructive samples per acre of each type and weight of geotextile installed.
    - c. Tested according to ASTM D4884.
  2. Types
    - a. Preferred: "J" type seams.
    - b. Acceptable: Flat or butterfly seams.
  3. Stitch Count: Minimum three to maximum seven stitches per inch.
  4. Stitch Type: Double thread chain stitch according to ASTM D6193.
  5. Sewing Machines: Capable of penetrating four layers of geotextile.
  6. Stitch Location: 2 inches from geotextile sheet edges, or more, if necessary to develop required seam strength.

### 3.4 Securing Geotextile

- A. Secure geotextile during installation as necessary with sandbags or other means approved by GCDWR.
- B. Secure Geotextile with Securing Pins:
  1. Insert securing pins with washers through geotextile.

2. Securing Pin Alignment:
  - a. Midway between edges of overlaps.
  - b. 6 inches from free edges.
3. Spacing of Securing Pins:

<u>Slope</u>	<u>Maximum Pin Spacing</u>
Steeper than 3:1	2 feet
3:1 to 4:1	3 feet
Flatter than 4:1	5 feet
4. Install additional pins across each geotextile sheet as necessary to prevent slippage of geotextile or to prevent wind from blowing geotextile out of position.
5. Push each securing pin through geotextile until washer bears against geotextile and secures it firmly to subgrade.

### 3.5 Placing Products over Geotextile

- A. Before placing material over geotextile, notify GCDWR. Do not cover installed geotextile until after GCDWR provides authorization to proceed.
- B. If tears, punctures, or other geotextile damage occurs during placement of overlying products, remove overlying products as necessary to expose damaged geotextile. Repair damage as specified in Article Repairing Geotextile.

### 3.6 In-Stream and Stormwater Treatment Structure Applications

- A. Overlap geotextile at each joint with upstream sheet of geotextile overlapping downstream sheet.
- B. Sew joints where wave run up may occur.
- C. Maximum Drop Height of Stone Fall onto Geotextile:
  1. 0 foot for greater than 200-pound rock. 2 feet for less than 200-pound rock.

### 3.7 Silt Fence Applications

- A. Install geotextile in one piece, or continuously sewn to make one piece, for full length and height of fence, including portion of geotextile buried in toe trench.
- B. Install bottom edge of sheet in toe trench and backfill in a way that securely anchors geotextile in trench.

- C. Securely fasten geotextile to wire mesh backing and each support post in a way that will not result in tearing of geotextile when fence is subjected to service loads.
- D. Promptly repair or replace silt fence that becomes damaged.

### 3.8 Repairing Geotextile

- A. Repair or replace torn, punctured, flawed, deteriorated, or otherwise damaged geotextile.
- B. Repair Procedure
  1. Place patch of undamaged geotextile over damaged area and at least 18 inches in all directions beyond damaged area.
  2. Remove interfering material as necessary to expose damaged geotextile for repair.
  3. Sew patches or secure them with heat fusion tacking or with pins and washers, as specified above in Article Securing Geotextile, or by other means approved by GCDWR.

### 3.9 Replacing Contaminated Geotextile

- A. Protect geotextile from contamination that would interfere, in GCDWR's opinion, with its intended function. Remove and replace contaminated geotextile with clean geotextile. See Construction Notes on Contract Documents.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, equipment, and materials necessary for pumping a slurry grout mixture to fill underground voids and provide stabilization of soils under and around storm sewer infrastructure.
- B. Use a grout mixture that can form a rigid and durable mass to fill voids under the pavement, structure, or other improvement. Regrout unstable areas after initial undersealing and stabilizing as directed by GCDWR.

### 1.2 Definitions

- A. Initial Set: Point at which grout has obtained the strength of 200 psi with 0.25 sq. in. probe according to AASHTO T 197 (Proctor Needle Test).

### 1.3 Submittals

- A. Submit mix design for pressure grout to be used showing materials, proportioning, and design strength.
- B. Submit documentation on pressure grouting equipment to verify its capacity to deliver grout at required pressures.

## Part 2 Products

### 2.1 Materials

- A. Pressure grouting shall meet the material and mix proportion requirements of GDOT Standard Specification Section 450.2 - Pressure Grouting Portland Cement Concrete Pavement Structures.
- B. Mixing water used shall be clean, fresh, and free from oils, acids, alkalis, organics, or other deleterious substances. Potable water will fulfill this requirement.

## Part 3 Execution

### 3.1 Pressure Grouting

- A. Perform pressure grouting in accordance with the applicable sections of GDOT Standard Specification Section 450.
- B. Use enough mixing water with dry ingredients to produce a grout consistency that makes the efflux time for the flow cone at least 14 seconds and no more than 20 seconds. Add cement, cement and limestone dust, cement and fly ash, or cement

and fine aggregate in the proper proportions to a mixed batch to produce the required consistency.

- C. Grout pumping equipment shall be a positive displacement or piston-type pump or screw-type worm pump.
  - 1. The discharge line shall be equipped with the following:
    - a. Pressure gauge at the pump capable of measuring from 0 to 200 psi.
    - b. Positive cut-off valve at the nozzle end.
    - c. Bypass return line for recirculating grout back into a holding tank or mixer.
- D. Pressure grouting operations shall be performed only when the ambient air temperature in the shade and away from artificial heat is 35°F and rising. Pressure grouting operations shall be stopped if the temperature is 40°F and falling or when the subgrade contains an abnormal amount of moisture.
- E. Care shall be taken to contain the grout during mixing and placement to prevent or minimize spillage and leakage. All grout spilled or leaked onto the Site or adjacent ROW or properties shall be immediately removed and surfaces shall be cleaned and restored to conditions existing prior to the leak or spill.

END OF SECTION



## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, materials, equipment, and incidentals required for the complete installation of turf reinforcement and permanent soil reinforcing mat.

### 1.2 Definitions

- A. Fabric: Turf Reinforcement Matting (TRM), a permeable, non-degradable, open geosynthetic rolled material comprised solely of stabilized synthetic fibers, filaments, and/or mesh arranged into a three-dimensional matrix typically used to provide reinforcement of vegetation and soil against displacement by rain, wind, water flow, and other forces.

### 1.3 Submittals

- A. If required by GCDWR, submit:
  - 1. Manufacturer material specifications and product literature.
  - 2. Installation drawings showing TRM sheet layout and direction and dimensions of overlaps.
  - 3. Description of proposed method of TRM deployment, sewing equipment, sewing methods, and provisions for holding TRM temporarily in place until permanently secured.
  - 4. Certifications from each TRM manufacturer that furnished products have specified property values. Certified property values shall be either minimum or maximum average roll values, as appropriate, for TRMs furnished.
  - 5. See certification of proper installation requirement in Construction Notes on the Contract Documents.

### 1.4 Delivery, Storage, And Handling

- A. Deliver each roll with sufficient information attached to identify it for inventory and quality control.
- B. Handle products in manner that maintains undamaged condition.
- C. Do not store products directly on ground. Ship and store TRM with suitable wrapping for protection against moisture and ultraviolet exposure. Store TRM in way that protects it from elements. If stored outdoors, elevate and protect TRM with waterproof cover.

## 1.5 Scheduling and Sequencing

- A. Notify GCDWR whenever TRMs are to be placed. Do not place TRM without GCDWR's approval of underlying materials.

## Part 2 Products

### 2.1 Turf Reinforcement Matting

- A. Turf reinforcement matting, including all stakes, staples, and fastening devices, shall conform to the applicable sections of GDOT Standard Specification 711 - Turf Reinforcement Matting.

## Part 3 Execution

### 3.1 Site Preparation

- A. Establish final grade before TRM installation commences.
- B. Soil shall be amended in accordance with Section 32 91 13 - Soil Preparation.
- C. Apply appropriate seed mixture, temporary and/or permanent, in accordance with Section 32 92 00 Turfs and Grasses and 31 25 00 - Erosion and Sedimentation Controls.

### 3.2 Laying TRM

- A. Lay and maintain TRM smooth and free of tension, folds, wrinkles, or creases.

### 3.3 Sheet Orientation on Slopes

- A. Orient TRM with long dimension of each sheet parallel to direction of slope.

### 3.4 Joints

- A. Overlap joints such that downstream fabric is under upstream fabric (shingle in direction of water flow).
- B. Overlap, unless otherwise shown or indicated in the manufacturer's written recommendations, whichever is greater:
  - 1. Foundation/Subgrade Stabilization: Minimum 4 inches.
  - 2. Rip Rap: Minimum 4 inches.
  - 3. Drain Trenches: Minimum 4 inches, except overlap shall equal trench width if trench width is less than 4 inches.

4. Other Applications: Minimum 4 inches.
- C. Provide stakes/staples every 12 inches along the seam, making sure both layers are staked/stapled together in place or closer, if specified by the manufacturer's instructions.

### 3.5 Securing TRM

- A. Secure TRM during installation as necessary, in accordance with manufacturer's instructions or by other means approved by GCDWR.
- B. Secure TRM with Securing Stakes or Staples by the following method or in accordance with manufacturer's instructions.
1. Insert securing stakes or staples through TRM.
  2. Securing Stake/Staple Alignment:
    - a. Midway between edges of overlaps.
    - b. 4 inches from free edges.
  3. Spacing of Securing Stakes/Staple every 5 ft.
  4. Install additional stakes or staples across each TRM sheet as necessary to prevent slippage of TRM or to prevent wind from blowing TRM out of position.
  5. Push each securing pin through TRM until washer bears against TRM and secures it firmly to subgrade.

### 3.6 Placing Products Over TRM

- A. Before placing material over TRM, notify GCDWR. Do not cover installed TRM until after GCDWR provides authorization to proceed.
- B. If tears, punctures, or other TRM damage occurs during placement of overlying products, remove overlying products as necessary to expose damaged TRM. Repair damage as specified in Article Repairing TRM.

### 3.7 Repairing TRM

- A. Repair or replace torn, punctured, flawed, deteriorated, or otherwise damaged TRM.
- B. Repair Procedure
1. Place patch of undamaged TRM over damaged area and at least 18 inches in all directions beyond damaged area.
  2. Remove interfering material as necessary to expose damaged TRM for repair.

3. Sew patches or secure them with heat fusion tacking or with stakes or staples and washers, as specified above in Article Securing TRM, or by other means approved by GCDWR.

### 3.8 Replacing Contaminated TRM

- A. Protect TRM from contamination that would interfere, in GCDWR's opinion, with its intended function. Remove and replace contaminated TRM with clean TRM. See Construction Notes on the Contract Documents.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, equipment, and materials necessary for and incidental to construction of the gabion structures at the locations and to the limits indicated on the Drawings or otherwise indicated in the Contract Documents.

### 1.2 Submittals

- A. Submit evidence that gabion structure was designed by a licensed professional engineer registered in the State of Georgia.
- B. If requested by GCDWR, the Contractor shall submit for approval to GCDWR, all working drawings and schedules of materials and methods proposed to follow in the execution of the Work under this item.
- C. Submittals shall show in detail the type, size, and location of wire mesh, wire mesh boxes, geotextiles, stone, coir fabric, topsoil, landscaping, and accessories to be used in construction as applicable.

### 1.3 Quality Assurance

- A. Gabion structures shall be designed by a licensed Professional Engineer registered in the State of Georgia.

## Part 2 Products

### 2.1 Gabion Structures

- A. Wire mesh, wire mesh boxes, stone, and geotextiles shall conform to the requirements of the Manual for Erosion and Sediment Control in Georgia regarding gabions and requirements on the project plans and documents.

## Part 3 Execution

### 3.1 Construction

- A. Construct gabion structures in accordance with the Manual for Erosion and Sediment Control in Georgia.
- B. Gabion structures shall be constructed on stable subgrade prepared in accordance with the Construction Documents and as specified in Section 31 23 13 – Subgrade Preparation.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, equipment, and materials necessary for supplying, hauling, and properly placing stone rip rap at the locations and to the limits indicated on the Contract Documents or as directed by GCDWR.

### 1.2 Submittals

- A. If requested by GCDWR, provide the following to demonstrate that the material meets the requirements of Section 2.1:
  - 1. Description and location of sources of rip rap.
  - 2. Quarry Certificate of Conformance and supporting documentation showing rip rap meets gradation and material requirements for the type specified.
  - 3. Certified test results for rip rap gradation, abrasion resistance, and bulk density.
- B. If requested by GCDWR, provide trip tickets showing source, type, and weight of each load of material delivered to the site.

## Part 2 Products

### 2.1 Materials

- A. Type 1 Rip Rap shall be aggregate stone which meets the Type 1 gradation and other requirements of the Georgia Department of Transportation Standard Specification for Road and Bridge Construction, Section 805.
- B. Type 3 Rip Rap shall be aggregate stone which meets the Type 3 gradation and other requirements of the Georgia Department of Transportation Standard Specification for Road and Bridge Construction, Section 805.
- C. Rip Rap aggregate meeting alternate gradation may be substituted, only as approved by GCDWR. Where approved alternate gradation is used, aggregate stone shall meet the gradation requirements of the Manual for Erosion and Sediment Control in Georgia and the aggregate quality requirements of the Georgia Department of Transportation Standard Specification for Road and Bridge Construction, Section 805.
- D. Well Graded Rip Rap shall be a mixture of clean coarse aggregate and rip rap material consisting of 60% Type 3 Rip Rap and 40% No. 3 Stone, by volume, unless otherwise specified in the Contract Documents. No. 3 Stone shall meet the requirements of GDOT Standard Specification 800 – Coarse Aggregate

- E. Grout for grouted rip rap shall meet requirements of the Georgia Department of Transportation Standard Specification for Road and Bridge Construction, Section 603.
- F. Geotextile shall be fabric shall be woven and meet the requirements of Type 1 geotextile in accordance with Section 31.32.19.16 Geotextiles, unless otherwise indicated in the Contract Documents or directed by GCDWR.
- G. Filter blanket material shall be a minimum 6-inch-thick layer of graded aggregate base or coarse aggregate mixture, as shown in the Contract Documents, to create a graded filter between the base material and riprap to prevent leaching of base material from under the riprap. Filter blanket material shall meet the requirements of Section 31 05 16 – Aggregates for Earthwork.

## Part 3 Execution

### 3.1 Rip Rap Construction

- A. Prepare the ground surface where the rip rap will be placed to conform to the correct lines and grades before beginning the placement. Ground surface shall be smooth and free from obstructions, depressions, or debris.
- B. Place woven geotextile under all rip rap, unless otherwise shown in the Contract Documents or directed by GCDWR. Woven geotextile shall not be used where a filter blanket is specified, unless directed by GCDWR.
  - 1. Prepare the surface to receive the fabric until it is smooth and free from obstructions, depressions, and debris.
  - 2. Place the fabric with the long dimension running up the slope. Minimize the number of overlaps.
  - 3. Place the strips to provide a width of at least 1 ft. (300 mm) of overlap for each joint.
  - 4. Anchor the filter fabric in place with securing pins of the type recommended by the fabric manufacturer. Place the pins on or within 3 in. (75 mm) of the centerline of the overlap.
  - 5. Place the fabric so that the upstream strip will overlap the downstream strip.
  - 6. Loosely place the fabric to prevent stretching and tearing during stone placement.
  - 7. Always protect the fabric during construction from clogging due to clay, silts, chemicals, or other contaminants.
  - 8. Remove contaminated fabric or fabric damaged during installation or rip rap placement. Replace with uncontaminated or undamaged fabric at no expense

to GCDWR.

- C. Place stone filter blanket as shown in the Contract Documents or directed by GCDWR. Stone filter blanket shall not be used where slopes are steeper than 2H:1V or in areas highly susceptible to erosion. Stone filter blanket shall not be used where woven geotextiles are specified, unless directed by GCDWR.
  - 1. Uniformly place stone filter blanket material to thickness shown on the plans and to a tolerance of 0.5 in.
  - 2. If no thickness is specified, place stone filter blanket to a minimum of 6 inches thick.
- D. Place rip rap to a uniform thickness as specified in the Project specific scope of work and/or Contract Documents. If no thickness is specified, place rip rap to a minimum of 18 inches thick.
- E. Do not drop the stones more than 3 ft. (1 m) during construction.
- F. When rip rap is to be built on existing rip rap, take special care to provide positive anchorage of the new riprap to the existing rip rap.
- G. Conform the finished rip rap surface to the slope lines shown on the drawings. No objectionable, hazardous, or unsightly projections above the general plane surface will be permitted.
- H. Carefully protect all structures from damage by equipment or impact of stones. Contractor shall correct all damage at their own expense.

### 3.2 Stone-Grouted Rip Rap Construction

- A. Grout mix shall not be allowed to free fall more than 5 feet unless suitable equipment is used to prevent segregation.
- B. The grout mix shall not be placed until the rock rip rap has been inspected and approved by GCDWR for the placement of grout.
- C. Rock to be grouted shall be kept moist for a minimum of 2 hours before grouting.
- D. The rock rip rap shall be flushed with water before placing the grout to remove the fines from the rock surfaces. The rock shall be kept moist before the grouting and without placing grout in standing or flowing water. Grout placed on inverts or other nearly level areas may be placed in one operation. On slopes, the grout shall be placed in two or more nearly equal applications consisting of successive lateral strips about 10 feet in width starting at the toe of the slope and progressing upward. The grout shall be delivered to the place of final deposit by approved methods and discharged directly on the surface of the rock. A metal or wood splash plate is used to prevent displacement of the rock directly under the grout discharge. The flow of grout shall be directed with brooms, spades, or baffles to prevent grout from flowing excessively along the same path and to assure that all intermittent spaces are filled.



Sufficient barring shall be conducted to loosen tight pockets of rock and otherwise aid in the penetration of grout to ensure the grout fully penetrates the total thickness of the rock blanket. All brooming on slopes shall be uphill. After the grout has stiffened, the entire surface shall be rebroomed to eliminate runs and to fill voids caused by sloughing. The surface finish, following the completion of grout installation, shall consist of one-third of the rock extended above the level of grout. The exposed rock shall not have a plastered appearance.

- E. After completion of any strip or panel, no individual(s) or equipment shall be permitted on the grouted surface for 24 hours. The grouted surface shall be protected from injurious action by the sun, rain, flowing water, mechanical injury, or other potential damaging activity.
- F. The completed finished surface shall be prevented from drying for a minimum curing period of 7 days following placement. Exposed surfaces shall be maintained in a moist condition continuously for the 7-day curing period or until curing compound has been applied as specified in this section. Moisture shall be maintained by sprinkling, flooding, or fog spraying or by covering with continuously moistened canvas, cloth mats, straw, sand, or other approved material. Water or moist covering shall be used to protect the grout during the curing process without causing damage to the grout surface.
- G. The grouted rock may be coated with an approved curing compound as an alternative method to maintaining a continuous moisture condition during the curing period. The compound shall be sprayed on the moist grout surface as soon as free water has disappeared and all surface finishing has been completed. The compound shall be applied at a minimum uniform rate of 1 gallon per 175 square feet of surface or according to manufacturer's instructions and shall form a continuous adherent membrane over the entire surface. Curing compound shall not be applied to surfaces requiring bond to subsequently placed grout and/or concrete. If the membrane is damaged during the curing period, the damaged area shall be resprayed at the rate of application specified for the original treatment.
- H. Grout mix shall not be placed when the daily minimum temperature is less than 40 degrees Fahrenheit unless facilities are provided to ensure that the temperature of the material is maintained at a minimum temperature of 50 degrees Fahrenheit and not more than 90 degrees Fahrenheit during placement and the curing period. Grout mix shall not be placed on a frozen surface or other subsurface materials or structure(s). When freezing conditions prevail or are anticipated in next 24 hours, rock to be grouted shall be covered and heated to within a range of 50 to 90 degrees Fahrenheit for a minimum of 24 hours before placing grouting material.
- I. The grout material shall be checked and tested throughout the grouting operation. Sampling of fresh grout shall be conducted in conformance with ASTM C 172. The volume of each batch will be determined by methods prescribed in ASTM C 138.
- J. GCDWR shall have free access to all parts of the Contractor's plant and equipment used for mixing and placing grout during the period of the contract. Proper facilities shall be provided for GCDWR to sample material and view processes implemented in the mixing and placing of grout as well as for securing grout test samples. All tests

and inspections shall be conducted so that only a minimum of interference to the contractor's operation occurs.

- K. For ready-mixed grout, the contractor shall furnish to GCDWR a statement-of-delivery ticket for each batch delivered to the site. The ticket shall provide as a minimum: weight in pounds of cement, aggregates (fine and coarse), water; weight in ounces of air-entraining agent; time of loading; and the revolution counter reading at the time batching was started.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the steel sheet piling as specified in the Contract Documents, or as otherwise directed by GCDWR.

### 1.2 Definitions

- A. Steel Sheet Piling: A long typically slender structural section/member that is pressed, molded, otherwise formed from sheet metal, so as to interlock with other piles to form a retaining wall or other piling installation.

### 1.3 Submittals

- A. Submit evidence that sheet pile wall or other sheet pile feature was designed by a licensed professional engineer registered in the State of Georgia, including all working drawings and design calculations. The furnishing of such documents shall not serve to relieve the Contractor of any part of their responsibility for the safety of the Work or for the successful completion of the Project.
- B. If requested by GCDWR, submit:
  - 1. Materials test certificates for each shipment and identified with specific lots prior to installing piling. Identification data shall include piling type, dimensions, section properties, heat analysis number, chemical composition, mechanical properties, and mill identification mark.
  - 2. Records of the sheet piling driving operations after driving is completed. These records shall provide a system of identification which shows the disposition of approved piling in the work, driving equipment performance data, piling penetration rate data, piling dimensions, and top and bottom elevations of installed piling.

### 1.4 Quality Assurance

- A. The Contractor shall establish and maintain quality control for pile driving operations to assure compliance with Contract Documents and maintain records of its quality control for all construction operations including, but not limited to, the following:
  - 1. Accurate location, alignment and plumbness of piling.
  - 2. Full and proper engagement of interlocks.
  - 3. Driving (pile hammer and rate of operation).

4. Final position; depth of penetration; tip and cut- off elevations.
  5. Uplift and vertical tolerances after driving.
  6. Location and elevation of any obstruction encountered and action directed by GCDWR.
  7. Pulled piles and re-driving.
  8. Length of cover plate and weld size.
  9. Manufacture and driving of fabricated sections.
  10. Cutting and splicing (welding).
  11. Stockpiling and storage.
  12. Removal and disposal of damaged piles.
- B. Permanent sheet pile wall systems shall be designed by a licensed Professional Engineer registered in the State of Georgia. Temporary sheet pile wall systems shall be designed in accordance with OSHA regulations.

## Part 2 Products

### 2.1 General

- A. Steel Sheet Piling
1. Steel for sheet piling shall conform to the requirements of ASTM A 690, Grade 50 or ASTM A 328.
  2. Sheet piling, including special fabricated sections, shall be of a design such that when in place they will be continuously interlocked throughout their entire length.
  3. All sheet piling provided with pulling holes located within 4 inches below the top of the pile will have the area from bottom of hole to top of sheet cut-off, unless otherwise shown or directed.
  4. All sheet piling shall be provided in full lengths.

## Part 3 Execution

### 3.1 Constructing Permanent Steel Sheet Piling

- A. Notify GCDWR at least one week prior to construction of steel sheet piling. GCDWR must be present on-site before Contractor may proceed with construction of steel sheet piling.

B. Placement

1. Any excavation required within the area where sheet pilings are to be installed shall be completed prior to placing sheet pilings unless the sheet piles are being installed to facilitate excavation of the area and/or protection of the area to be excavated.
2. Pilings shall be placed as true to line as possible.
3. Suitable temporary wales, templates, or guide structures shall be provided to ensure that the piles are placed and driven to the correct alignment.
4. Piles shall be placed in a plumb position with each pile interlocked with adjoining piles for its entire length, so as to form a continuous diaphragm throughout the length of each run of piling wall. Interlocks shall be properly engaged.

C. Driving

1. All piles shall be driven to the tip elevations as directed by GCDWR and shall extend up to the cut-off elevation indicated.
2. Pilings shall be driven by approved methods so as not to subject the pilings to damage and to ensure proper interlocking throughout their lengths.
3. Pile hammers shall be maintained in proper alignment during driving operations by use of leads or guides attached to the hammer.
4. A protecting cap shall be employed in driving, when required, to prevent damage to the tops of pilings.
5. Pilings damaged during driving or driven out of interlock shall be removed and replaced.
6. All piles shall be driven without the aid of a water jet, unless otherwise authorized.
7. Adequate precautions shall be taken to ensure that piles are driven plumb.
8. Sheet piling shall not be driven more than 3 inches per foot out of plumb in the plane of the wall nor more than 1/8-inch per foot out of plumb perpendicular to the plane of the wall. If at any time the forward or leading edge of the piling wall is found to be out-of-plumb more than 3 inches per foot in the plane of the wall or 1/8-inch per foot perpendicular to the plane of the wall, the assembled piling shall be driven to the required depth and tapered pilings shall be provided and driven to interlock with the out-of-plumb leading edge or other approved corrective measures shall be taken to ensure the plumbness of succeeding pilings.
9. The maximum permissible taper for any tapered piling shall be 13 inches per foot of length.

10. Unless specifically indicated otherwise, each run of piling wall shall be driven to grade progressively from the start and pilings in each run shall be driven alternately in increments of depth to the required depth or elevation.
11. On each day of sheet pile driving, the Contractor shall stab only the number of piles that can be driven to grade by the end of the day, and all piling stabbed shall be driven to grade by the end of each working day except that the last two piles may remain tapered up to receive the next day's piles.
12. No pile shall be driven to a lower elevation than those behind it in the same run except when the piles behind it cannot be driven deeper or in areas where obstructions are encountered. In this case, piling will be allowed to remain above final grade until the obstruction is removed or the penetration is completed. Alternately, if it is determined that an obstruction cannot be removed, the Contractor shall make such changes in design alignment of the pile structure as may be deemed necessary by GCDWR to ensure the adequacy and stability of the structure.
13. If the piling next to the one being driven tends to follow below final grade, it may be pinned to the next adjacent piling.
14. The Contractor is advised that buried stumps or similar debris may be encountered periodically on the sheet pile wall alignment and appropriate consideration shall be given to hard driving conditions should they occur.

D. Cut Off and Splice

1. Piles extending above grade in excess of the specified tolerance, and which cannot be driven deeper, shall be cut off to the required grade.
2. The Contractor shall also trim the tops of piles with an excess of batter during driving when directed to do so by GCDWR. Cut-offs shall become the property of the Contractor and shall be removed from the worksite.
3. Piles driven below the elevations indicated for the top of piles and piles which, because of damaged heads, have been cut off to permit further driving and are then too short to reach the required tip elevation, shall be extended to the required tip elevation by welding an additional length when directed by GCDWR.
4. Should splicing of additional lengths be necessary, the splice shall consist of a butt joint with a weld that fully penetrates the web, subject to the approval of GCDWR. Welded extensions shall be a minimum of 6-inches in length.
5. Piles adjoining spliced piles shall be full length unless otherwise approved.
6. When piles are to be driven in sections and spliced together, they shall be delivered on-site in full lengths and cut for splicing only after delivery.
7. Only those portions of the originally uncut pile shall be spliced together to form

the final in-place full-length permanent pile. Splices for these piles shall conform to the details shown on the Contract Documents.

8. Ends of pilings to be spliced together shall be squared before splicing to eliminate dips or camber.
9. Pilings shall be spliced together with concentric alignment of the interlocks so that there are no discontinuities, dips or camber at the abutting interlocks.
10. Spliced pilings shall be free-sliding and able to obtain the maximum swing with contiguous pilings.
11. The Contractor may cut holes in the piles for bolts or drains of sizes as directed. All cutting shall be done in a neat and workmanlike manner.
12. Bolt holes in steel piling shall be drilled or may be burned and reamed by approved methods, which will not damage the remaining metal. Holes, other than bolt holes, shall be reasonably smooth and of the proper size for rods and other items to be inserted.

E. Re-Driving

1. The Contractor may be required to pull selected permanent piles after driving, for test and inspection, to determine the condition of the piles.
2. Any pile so pulled and found to be damaged to the extent that its usefulness in the structure is impaired shall be removed from the work and the Contractor shall furnish and drive a new pile to replace the damaged pile.
3. Piles pulled and found to be in satisfactory condition shall be re-driven.

F. Painting Permanent Piling

1. All metal shall be painted with coal-tar epoxy from the top of piling to a minimum of two feet below the seasonal high groundwater line.

### 3.2 Constructing Temporary Steel Sheet Piling

- A. Temporary sheet piling shall be safely designed and carried to adequate depths and braced as necessary for proper performance of the Work.
- B. Construction shall be such as to permit excavation as required. Interior dimensions shall be such as to give sufficient clearance for completion of the Work.
- C. Installation shall of Temporary Steel Sheet Piling shall follow the requirements of Sections 3.1A through 3.1D.
- D. Extend temporary steel sheet piling a minimum of one foot or higher above the retained grade, unless otherwise shown on Plans or directed by GCDWR.

### 3.3 Inspections

1. The Contractor shall inspect the interlocked joints of driven pilings extending above ground.
2. Pilings found to be damaged or driven out of interlock shall be removed and replaced.

END OF SECTION



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## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the vinyl sheet piling as specified in the Contract Documents, or as directed by GCDWR.

### 1.2 Definitions

- A. Vinyl Sheet Piling: A pile that is pressed or molded from vinyl so as to interlock with other piles to form a retaining wall or other piling installation.

### 1.3 Submittals

- A. Submit evidence that permanent sheet pile wall was designed by a licensed professional engineer registered in the State of Georgia.
- B. If requested by GCDWR, submit:
  - 1. Materials test certificates for each shipment and identified with specific lots prior to installing piling. Identification data shall include piling type, dimensions, section properties, heat analysis number, chemical composition, mechanical properties, and manufacturer identification mark.
  - 2. Records of the sheet piling driving operations after driving is completed. These records shall provide a system of identification which shows the disposition of approved piling in the work, driving equipment performance data, piling penetration rate data, piling dimensions, and top and bottom elevations of installed piling.

### 1.4 Quality Assurance

- A. The Contractor shall establish and maintain quality control for pile driving operations to assure compliance with contract specifications and maintain records of its quality control for all construction operations including, but not limited to, the following:
  - 1. Accurate location, alignment and plumbness of piling.
  - 2. Full and proper engagement of interlocks.
  - 3. Driving (pile hammer and rate of operation).
  - 4. Final position; depth of penetration; tip and cut- off elevations.
  - 5. Uplift and vertical tolerances after driving.
  - 6. Location and elevation of any obstruction encountered, and action directed by

GCDWR.

7. Pulled piles and re-driving.
8. Manufacture and driving of fabricated sections.
9. Cutting and bolting.
10. Stockpiling and storage.
11. Removal and disposal of damaged piles.

B. Permanent vinyl sheet pile wall systems shall be designed by a licensed professional engineer registered in the State of Georgia. Temporary vinyl pile wall systems shall be designed in accordance with OSHA regulations.

## 1.5 Scheduling and Sequencing

A. After installation of structure proceed with installation of backfill as shown on the Contract Documents.

## Part 2 Products

### 2.1 General

A. Vinyl Sheet Piling

1. The vinyl sheet pile shall be Z-shaped with an I-Beam and socket interlock and shall be manufactured using industry standard methods in accordance with the following tables:

<b>PROPERTIES OF SECTIONS – VINYL SHEET</b>	
<b>Property</b>	<b>Minimum Value</b>
Moment of Inertia	165 in <sup>4</sup> /ft
Section of Modulus	33 in <sup>3</sup> /ft
Strength Rating	8800 ft-lb/ft
Design Stress	3200 psi
Impact Strength	15,000 in-lb/in <sup>2</sup>
Cross Sectional Area	11.9 in <sup>2</sup> /ft
<b>DIMENSIONS/TOLERANCES</b>	
<b>Specification</b>	<b>Value</b>
Width*	18.0" (+/- 0.10")
Depth	10.0" (+/- 0.05")
Thickness	0.425" (+/- 0.015")
* Measured from center of interlock to center of interlock	

2. All sheet piling shall be provided in full lengths.

## Part 3 Execution

### 3.1 Constructing Permanent Vinyl Sheet Piling

- A. Notify GCDWR at least one week prior to construction of vinyl sheet piling. GCDWR must be present on-site before Contractor may proceed with construction of vinyl sheet piling.
- B. Placement
  - 1. Any excavation required within the area where sheet pilings are to be installed shall be completed prior to placing sheet pilings unless the vinyl sheet piling is being installed to facilitate excavation or protect the excavated or unexcavated area(s).
  - 2. Pilings shall be placed as true to line as possible.
  - 3. Suitable temporary wales, templates, or guide structures shall be provided to ensure that the piles are placed and driven to the correct alignment.
  - 4. Piles shall be placed in a plumb position with each pile interlocked with adjoining piles for its entire length, to form a continuous diaphragm throughout the length of each run of piling wall. Interlocks shall be properly engaged.
- C. Driving
  - 1. All piles shall be driven to the tip elevations as directed by GCDWR and shall extend to up the cut-off elevation indicated.
  - 2. Pilings shall be driven by approved methods so as not to subject the pilings to damage and to ensure proper interlocking throughout their lengths.
  - 3. Pile hammers shall be maintained in proper alignment during driving operations by use of leads or guides attached to the hammer.
  - 4. A protecting cap shall be employed in driving, when required, to prevent damage to the tops of pilings.
  - 5. Pilings damaged during driving or driven out of interlock shall be removed and replaced.
  - 6. All piles shall be driven without the aid of a water jet, unless otherwise authorized.
  - 7. Adequate precautions shall be taken to ensure that piles are driven plumb.
  - 8. Sheet piling shall not be driven more than 3 inches per foot out of plumb in the plane of the wall nor more than 1/8-inch per foot out of plumb perpendicular to the plane of the wall. If at any time the forward or leading edge of the piling wall

is found to be out-of-plumb more than 3 inches per foot in the plane of the wall or 1/8-inch per foot perpendicular to the plane of the wall, the assembled piling shall be driven to the required depth and tapered pilings shall be provided and driven to interlock with the out-of-plumb leading edge or other approved corrective measures shall be taken to ensure the plumbness of succeeding pilings.

9. The maximum permissible taper for any tapered piling shall be 13 inches per foot of length.
10. Unless specifically indicated otherwise, each run of piling wall shall be driven to grade progressively from the start and pilings in each run shall be driven alternately in increments of depth to the required depth or elevation.
11. On each day of sheet pile driving, the Contractor shall stab only the number of piles that can be driven to grade by the end of the day, and all piling stabbed shall be driven to grade by the end of each working day except that the last two piles may remain tapered up to receive the next day's piles.
12. No pile shall be driven to a lower elevation than those behind it in the same run except when the piles behind it cannot be driven deeper or in areas where obstructions are encountered. In this case, piling will be allowed to remain above final grade until the obstruction is removed or the penetration is completed. Alternately, if it is determined that an obstruction cannot be removed, the Contractor shall make such changes in design alignment of the pile structure as may be deemed necessary by GCDWR to ensure the adequacy and stability of the structure.
13. If the piling next to the one being driven tends to follow below final grade, it may be pinned to the next adjacent piling.
14. The Contractor is advised that buried stumps or similar debris may be encountered periodically on the sheet pile wall alignment and appropriate consideration shall be given to hard driving conditions should they occur.

D. Cut Off

1. Piles extending above grade in excess of the specified tolerance, and which cannot be driven deeper, shall be cut off to the required grade.
2. The Contractor shall also trim the tops of piles with an excess of batter during driving when directed to do so by GCDWR. Cut-offs shall become the property of the Contractor and shall be removed from the worksite.
3. The Contractor may cut holes in the piles for bolts or drains of sizes as directed. All cutting shall be done in a neat and workmanlike manner.
4. Bolt holes in vinyl piling shall be drilled, which will not damage the remaining pile. Holes, other than bolt holes, shall be reasonably smooth and of the proper size for rods and other items to be inserted.

E. Re-Driving

1. The Contractor may be required to pull selected piles after driving, for test and inspection, to determine the condition of the piles.
2. Any pile so pulled and found to be damaged to the extent that its usefulness in the structure is impaired shall be removed from the work and the Contractor shall furnish and drive a new pile to replace the damaged pile.
3. Piles pulled and found to be in satisfactory condition shall be re-driven.

F. Bolts, Hardware, Wales, Tiebacks, and Caps

1. Bolts, nuts, washers, and other fasteners and/or connections shall be stainless steel in accordance with ASTM 193 and ASTM 194 and shall be of the 300 series alloy stainless steel.
2. Any nailed connections shall be stainless steel.
3. Cap shall be aluminum.
4. Tiebacks shall be galvanized steel with protective thermoplastic coating.

G. Inspections

1. The Contractor shall inspect the interlocked joints of driven pilings extending above ground.
2. Pilings found to be damaged or driven out of interlock shall be removed and replaced.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes the providing of temporary cofferdams as part of flow diversion needs for the Work within this Contract.
- B. Cofferdams shall be temporary in nature, and be made of sandbags, temporary sheet piling, or other approved materials.

### 1.2 Design

- A. Cofferdams shall be structurally adequate to withstand external and internal forces including the following, as applicable to each project's specific circumstances:
  - 1. Forces and pressures from an excavation depth of not less than six feet below the bottom elevation of an excavation.
  - 2. Forces and pressures from surcharge load from adjacent structures, roadbeds, tracks, slopes, and equipment.
  - 3. Cofferdams shall permit placing pumping equipment inside and/or outside the cofferdam as needed.
  - 4. Cofferdams shall be watertight to permit the construction in dewatered, dry work areas.
- B. Permanent cofferdam systems shall be designed by a licensed professional engineer registered in the State of Georgia. Temporary cofferdams systems shall be designed in accordance with OSHA regulations and all applicable regulations.

### 1.3 Submittals

- A. If requested by GCDWR, submit the design basis, details, dimensions, materials, products, and installation methods for the cofferdam.

## Part 2 Products

### 2.1 Materials

- A. Materials used in cofferdam construction may be of any type suitable for application on any specific project. Selection of specific materials and designs shall be determined by the Contractor. The Contractor's options include but are not limited to earthen cofferdam, sandbag cofferdam, and sheet piling cofferdam.
- B. Materials shall meet all environmental requirements and regulations and not introduce sediment or toxic material into the water or other environmental media.

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## Part 3 Execution

### 3.1 General

- A. Locations, sizes, and dimensions for cofferdams shown on the Drawings are approximate. The Contractor shall make adjustments as needed to complete the Work.

### 3.2 Construction

- A. Work areas protected by cofferdams shall be kept dewatered and adequately dry. The Contractor shall provide coarse aggregate bedding in the bottoms of excavations as needed at no additional cost to GCDWR.
- B. Sheet piling, if used, shall be driven to a depth of at least one foot below the bottom of any excavation or as otherwise required to prevent circular failure under the bottom of the sheet piling or quick conditions inside or outside of the protected areas.
- C. The Contractor shall provide any pumping needed to dewater work areas and maintain work areas free of water and prevent quick conditions during construction at no additional cost to GCDWR.
- D. Unless otherwise specified, remove all cofferdam material when construction is complete. All cofferdam material shall remain the property of the Contractor unless earthen material that can be incorporated into the Work.

## Part 4 Measurement and Payment

### 4.1 Cofferdam

- A. No separate payment will be made for temporary cofferdams constructed on the project. Full compensation for such work shall be considered as incidental to other items of Work. Costs in connection therewith shall be considered a subsidiary obligation of the Contractor and shall be included in the overall cost of the work.

END OF SECTION

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In-Stream and Stormwater Conveyance Structure Materials

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, equipment, materials, tools, and appliances as required for obtaining, stockpiling, and installing various materials of in-stream and stormwater conveyance structures as herein specified, shown, or ordered.

### 1.2 Products

A. Structure Materials

1. Fieldstone Boulders: Angular quartzitic sandstone, meeting ASTM C616 standards and sized to the dimensions as specified below.
2. Granite Quarry Boulders: Angular granite stone meeting ASTM C615 and sized to the dimensions as specified below.
3. Crest and Footer Stones are Granite Quarry Stone Boulders or Field Stone Boulders used for the construction of In-Stream and Stormwater Treatment structures. Crest and Footer Stones shall consist of stone of the required size and shape shown on the Contract Documents. The rock shall be clean, non-acid forming, sound, dense, resistant to the natural elements, and suitable for the purposes intended. Boulders shall be relatively flat on either side in the same dimension, preferably the long dimension. Boulder material shall be of type native to the surrounding area.
4. River Cobble shall be a mixture of angular and rounded stones ranging from 8 to 12 inches in diameter with a mean diameter of 10 inches. River Cobble shall be clean, non-acid forming, sound, dense, resistant to the natural elements, and suitable for the purposes intended. River Cobble excavated from the existing channel and temporarily stockpiled may be used pending GCDWR approval.
5. Riffle Rock shall be a mixture of angular and rounded stones ranging in size from 3 to 8 inches in diameter with a mean diameter of 6 inches. Riffle Rock shall be clean, non-acid forming, sound, dense, resistant to the natural elements, and suitable for the purposes intended. Riffle Rock excavated from the existing channel and temporarily stockpiled may be used pending GCDWR approval.
6. River Pebble shall be a mixture of angular and rounded stones ranging in size from 0.5 to 2 inches in diameter with a mean diameter of 1 inch. River Pebble shall be clean, non-acid forming, sound, dense, resistant to the natural elements, and suitable for the purposes intended. River Pebble excavated from the existing channel and temporarily stockpiled may be used pending GCDWR approval.
7. Rip Rap used for in-stream or stormwater conveyance structures shall meet the



requirements of Specification Section 31 37 00.

8. Aggregate Stone used for in-stream or stormwater conveyance structures shall meet the requirements of Specification Section 31 05 16.
  9. Logs shall be made of hardwood species and at least 12 inches in diameter. Logs shall consist of a straight portion of the tree and preferably felled on-site. Limbs shall be removed and log shall not be in a state of decay or show signs of rot or mold infestation.
- B. Over Excavation: Any excavation required for the installation of In-Stream and Stormwater Treatment structures outside the limits of excavation for the proposed channels. Over excavation shall be limited as described on the Contract Documents. The upstream and bottom limits of over excavation shall be dependent on the size of the crest and footer stones used in the structure, the size of the equipment necessary to install the material, and pending approval of GCDWR.

### 1.3 Submittals

- A. If requested by GCDWR, submit:
1. Description and location of proposed sources of rock and rock backfill material.
  2. Samples, which shall be delivered to site at location designated by GCDWR. Incorporate Samples into Work after material placement is nearly complete. Samples that may be requested include:
    - a. Rock
      - i. Crest and Footer Stones, Field Stone Boulders, Granite Quarry Boulders meeting minimum shape and size requirements shown on the Contract Documents.
      - ii. River Cobble.
      - iii. Riffle Rock.
      - iv. River Pebble.
      - v. Each Sample shall meet gradation requirements specified for corresponding rock type, include at least one piece of maximum size, and be representative of material to be furnished for incorporation into Work.
  3. Certified Test Results: For all Rock Types described in Part 2 of this section, including gradation, abrasion resistance, and bulk density for field stone and granite stone.
  4. Trip tickets showing source, type, and weight of each load of material delivered to Site.

5. The size of equipment to be used to install the structures. Include bucket dimensions and the minimum trench width required to maneuver.

## 1.4 Quality Assurance

- A. Rock Source: Quarries shall have produced rock, have performed satisfactorily on other projects, and be a GDOT-approved quarry. Native, on-site rocks may be used pending approval of GCDWR.
- B. Any rock for use in an In-Stream and/or Stormwater Conveyance Structure is subject to being approved individually on-site by GCDWR prior to placement and/or acceptance of the work.

## 1.5 Scheduling and Sequencing

- A. Complete proposed channel excavation and rough grading as specified in Section 31 23 00 - Excavation and Fill and in accordance with the Contract Documents, typical sections, and details.
- B. Complete any over excavation in accordance with the Contract Documents and installation of geotextiles as specified in Section 31 32 19.16 - Geotextile Soil Stabilization, prior to placing of rocks or logs.
- C. After installation of structure, proceed with installation of backfill as shown on the Contract Documents.

## Part 2 Products

### 2.1 Crest Stones and Footer Stones

- A. Crest Stones and Footer Stones shall be Fieldstone Boulders or Granite Quarry Stone Boulders, as specified in the Contract Documents or directed by GCDWR. Stone shall be clean, non-acid forming, hard and durable, free from fractures, bedding planes, pronounced weathering, and earth or other adherent coatings.
- B. Dimension of Individual pieces shall be in accordance with the Table 1 below and in the details shown on the Contract Documents.

**Table 1 – Crest and Footer Stone, Typical Dimensions**

Dimension	Small	Medium	Large	Extra Large
Depth	12" Min	18" Min	24" Min	30" Min
Width	24" Min	28" Min	30" Min	42" Min
Length	36" Min	42" Min	48" Min	60" Min

- C. Abrasion Resistance: Maximum 35 percent wear as determined in accordance with ASTM C535.
- D. Bulk Density: Minimum bulk density of Crest Stones and Footer Stones shall be in

accordance with Contract Documents, where bulk density is not specified, material shall meet the following:

1. Sandstone Fieldstone Boulders: 145 pounds per dry cubic foot, minimum.
  2. Granite Quarry Stone Boulders: 165 pounds per dry cubic foot, minimum.
- E. Gradation: Smaller pieces shall generally fill voids between larger pieces without either excess or deficiency of one or more sizes of stone.

## 2.2 Other Rocks

- A. Gradation: No more than 5 percent of the material furnished can be less than the minimum size specified nor no more than 10 percent of the material can exceed the maximum size specified. Sizes for granitic aggregate stone used in In-stream and Stormwater Conveyance structures shall be as specified in the Contract Documents or for equivalent use as the material listed in Table 2, meeting the gradation requirements therein, if directed by GCDWR.

**Table 2 - Required Stone, Typical Sizes**

	Minimum	Mean	Maximum
River Cobble	8"	10"	12"
Riffle Rock	3"	6"	8"
River Pebble	0.5"	1"	2"

- B. Rocks and stones shall be free of roots and other organic or deleterious matter.
- C. On-site material from clearing, excavations, or designated borrow sources that meets or is processed to meet requirements specified above may be used as rock backfill in lieu of importing material.

## 2.3 Logs

- A. Logs shall be hardwood unless otherwise approved by GCDWR.
- B. Log diameter shall be no less than 12 inches and no greater than 24 inches, unless otherwise approved or directed by GCDWR.
- C. Logs shall be generally uniform in shape and length with taper not exceeding 1.33 percent over the length of the log (maximum change in diameter of 1.6 inch per 10 feet of length) or as specified on the Contract Documents.
- D. Log root ball mass shall be included if specified on the Contract Documents.

- E. On-site materials resulting from clearing and grubbing that meets or is processed to meet requirements specified above may be used in lieu of importing material.

## 2.4 Geotextiles

- A. Geotextiles as specified in Section 31 32 19.16 - Geotextiles.

## Part 3 Execution

### 3.1 General Installation of In-Stream Materials

- A. In-Stream and Stormwater Conveyance materials shall be installed in accordance with Specification Section 31 80 03 through Section 31 80 19. If no In-stream or Stormwater Conveyance Structure Specification is referenced, then the Contractor shall follow the general installation notes listed below, as instructed by GCDWR, and as shown on the Drawings.
- B. The subgrade to receive each stone shall be excavated and any unstable material shall be removed. Approved material shall be placed in a maximum of 12-inch lifts and compacted with excavator bucket or approved equivalent to reestablish the subgrade of each stone. Unstable material shall be removed from the Project site and disposed of by Contractor. Removal and replacement of unstable material shall only be performed at the direction of GCDWR and shall be eligible for payment as Additional Excavation and Spoil Removal, as applicable, in accordance with Specification Section 31 23 00 – Excavation and Fill. Backfill behind stones shall be compacted with excavator bucket or approved equivalent. Care shall be taken during compaction to avoid disturbing and/or damaging integrity of the stone channel edge or the in-stream structure. The top of all stone elevations shall be as indicated on the Contract Documents. Finished grades and subgrades for stones will be determined from the height of each stone used.
- C. Install the geotextiles as shown on The Contract Documents and in accordance with Specification Section 31 32 19.16 – Geotextiles.
- D. The stones shall be carefully selected and arranged so that adjacent rock surfaces match within 0.1 foot in top elevation and 2 inches along the vertical exposed face or channel side of rock. Stones shall be placed such that adjacent stones “touch” each other and voids do not exceed 4 inches. It is the intent of construction to minimize voids between stones. Stones shall be placed such that upstream stones are wedged up against downstream stones, to prevent downstream movement of stones.
- E. Smaller rocks shall be “chinked in” to fill all voids between the stones. Placement shall be approved by GCDWR. Grout voids between the stones as directed by GCDWR and in accordance with Section 03 62 00 - Non-shrink Grouting.
- F. Crest stones and stormwater treatment structures shall be installed in accordance with the Contract Documents to tolerances of 0.1 feet from established final grade.
- G. Place crest and footer stones on woven filter fabric without puncturing or damaging

woven filter fabric. If accidentally damaged, repair woven filter fabric prior to proceeding.

- H. Contractor shall, if deemed necessary, support the stones from falling over before and during the placement of rip rap, backfill, and compaction work on either side of the stone.

### 3.2 Placing Backfill

- A. Place backfill upstream of the installed rock structure stones and log vanes. Work backfill as necessary to distribute it, prevent future settling, and to eliminate detrimental voids. Backfill shall be applied as needed to fill the excavation limits and match the established grade. The use of backfill is limited to locations shown on the Contract Documents or locations approved by GCDWR.
- B. Where shown in The Contract Documents, Contractor shall bring the channel bed upstream of in-stream structure crest stones to final grade using a well-graded mixture of riffle rock material. Contractor shall utilize existing coarse stream substrate material excavated and stockpiled from the existing channel within the limits of disturbance, provided that the material meets or can be amended to meet the Product requirements for riffle rock specified in the Contract Documents.
- C. Contractor shall place riffle rock material to armor the channel bed upstream of the in-stream structure crest stones continuously to the next riffle station, where applicable as shown in the Contract Documents.
- D. Intermix different sizes of pieces to eliminate segregation and to fill voids between larger pieces with smaller pieces and to keep the work surface free from irregularities.
- E. Use placement and intermixing methods that avoid disturbing the stream or stormwater treatment structure and the underlying woven filter fabric or damaging existing facilities, completed Work, or adjacent property.

## Part 4 Measurement and Payment

### 4.1 Method of Measurement

- A. Measurement for In-stream and Stormwater Conveyance Structure Materials used in the Work shall be as described in Specification Section 01 22 00 – Unit Prices for the applicable material items. The In-stream and Stormwater Conveyance devices/features listed below, utilizing materials described in this Section, shall be measured for payment under the applicable Unit Price Item for that specific feature and no additional measurement for payment shall be made for the material items described in this Section, unless otherwise directed by GCDWR.
  - 1. Stone Toe Protection & Bendway Weir (Specification Section 31 80 03 Stone Toe Protection and Bendway Weir)
  - 2. Root Wad Revetment (Specification Section 31 80 04 – Root Wad Revetment)

3. Cross Vane (Specification Section 31 80 06 – Cross-Vane)
4. J-Hook Vane (Specification Section 31 80 07 – J-Hook Vane and Boulder Vane)
5. Boulder Vane (Specification Section 31 80 07 – J-Hook Vane and Boulder Vane)
6. J-Hook Log Vane (Specification Section 31 80 08 – J-Hook Log Vane and Log Vane)
7. Log Vane (Specification Section 31 80 08 – J-Hook Log Vane and Log Vane)
8. Step Pool Series (Specification Section 31 80 09 – Step Pool Series)
9. Log Sill – Felled On-Site (Specification Section 31 80 10 – Log Sill)
10. Log Sill – Imported (Specification Section 31 80 10 – Log Sill)
11. Toe Wood Protection (Specification Section 31 80 12 – Toe Wood Protection)
12. Stone Cascade (Specification Section 31 80 15 – Stone Cascade)
13. Stormwater Outfall Steps (Specification Section 31 80 19 – Stormwater Outfall Steps)

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, equipment, materials, tools, and appliances as required for the installation of stone toe protection and bendway weirs as herein specified, shown, or ordered by GCDWR.

### 1.2 Definitions

- A. Stone Toe Protection: Toe of bank stabilization structure using filter bedding stone and well graded rip rap stone. Includes all earthwork and rock as required in accordance with the Contract Documents.
- B. Structure Components: Each component shall be embedded into the stream bank per plans or as directed by GCDWR.
  - 1. Stone Key: The bottom portion of the structure, located at the toe of the stream bank. Consisting of filter bedding stone and graded rip rap.
  - 2. Stone Toe Protection: The top portion of the structure, located above the stone key and extending up to the top of the stream bank. Consisting of filter bedding stone, graded rip rap, and topsoil.
  - 3. Bendway Weir: Located at the base of the stream bank and extending into the stream channel in an upstream direction across approximately one-third of the bank-full width. Consisting of filter bedding stone and graded rip rap.
  - 4. Live Poles: Large live cuttings planted in various locations throughout the structure, resulting in vegetative cover.
  - 5. Soil mound: A minimum 2-foot-thick cover of topsoil placed on top of the stone key and mounded to laterally direct sheet flow off of the stone key component.
  - 6. Topsoil: Soil used to cover structure and used as bedding material for live poles.
- C. Structure Materials
  - 1. Graded Rip Rap: As specified in Section 31 37 00 - Rip Rap.
  - 2. Filter Bedding Stone: National Stone Association (NSA) R-2 and AASHTO No. 57 stone shall be in accordance with GDOT Standard Specifications Section 800. Gradation requirements for NSA R-2 shall be in accordance with Appendix C of the Manual for Erosion and Sediment Control in Georgia.
  - 3. Live poles: As specified in Section 32 97 00 - Landscaping.
  - 4. Topsoil: As specified in Section 32 91 13 - Soil Preparations.

- D. Over Excavation: Any excavation required for the installation of the structure outside the limits of excavation for the proposed channels. Over excavation shall be limited as described on the Contract Documents. The upstream and bottom limits of over excavation shall be dependent on the size of the stones used in the structure, the size of the equipment necessary to install the material, and subject to approval of GCDWR.

### 1.3 Submittals

- A. If requested by GCDWR, submit:
1. Description and location of proposed sources of rock and rock backfill material.
  2. Samples, which shall be delivered to site at location designated by GCDWR. Incorporate Samples into Work after material placement is nearly complete. Samples that may be requested include:
    - a. Rock:
      - i. Type 1 & 3 Rip Rap.
      - ii. NSA R-2 and No. 57 Stone.
      - iii. Each Sample shall meet gradation requirements specified for corresponding rock type, include at least one piece of maximum size, and be representative of material to be furnished for incorporation into Work. See Table 1.
  3. Certified Test Results: All Rock Types described in Part 2 of this section, including gradation and abrasion resistance.
  4. Truck tickets showing source, type, and weight of each load of material delivered to Site. The size of equipment to be used to construct the structures. Include bucket dimensions and the minimum trench width required to maneuver.

### 1.4 Quality Assurance

- A. Rock Source: Quarries shall have produced rock, have performed satisfactorily on other projects, and be a GDOT approved quarry. Native, on-site rocks may be used pending approval of GCDWR.
- B. Any rock for use in the structure is subject to being approved individually on-site by GCDWR prior to placement and/or acceptance of the work.

### 1.5 Scheduling and Sequencing

- A. Complete proposed channel excavation and rough grading as specified in Section 31 23 00 - Excavation and Fill and in accordance with the Contract Documents, typical



sections and details.

- B. Complete any over excavation in accordance with Contract Documents and installation of geotextiles as specified in Specification Section 31 32 19.16 - Geotextiles, prior to placing rocks or logs.
- C. After installation of structure, proceed with installation of backfill as shown on the Contract Documents.

## Part 2 Products

### 2.1 Rocks

- A. Gradation: No more than 5 percent of the material furnished shall be less than the minimum size specified and no more than 10 percent of the material shall exceed the maximum size specified. Rock fines shall comprise a maximum of 10 percent of the total mass. Rock fines are defined as material passing a No. 4 sieve.
- B. Type 1 & Type 3 Rip Rap as specified in Section 31 37 00 - Rip Rap
- C. NSA R-2 and AASHTO No. 57 shall meet the gradation and material specifications by those respective organizations.
- D. Rocks and stones shall be free of roots and other organic or deleterious matter.
- E. On-site material from clearing, excavations, or designated borrow sources that meets or is processed to meet requirements specified above may be used as rock backfill in lieu of importing material.

### 2.2 Topsoil

- A. Topsoil shall be as specified in Section 32 91 13 - Soil Preparation.

### 2.3 Live Poles

- A. Live poles shall be as specified in Section 32 97 00 - Landscaping.

### 2.4 Geotextiles

- A. Geotextiles shall be as specified in Section 31 32 19.16 - Geotextiles.

## Part 3 Execution

### 3.1 Constructing Stone Toe Protection

- A. Notify GCDWR at least one week prior to construction of structure. GCDWR must be present on-site before Contractor may proceed with construction of stream and stormwater treatment structures with construction of stone toe protection.

- B. Excavate proposed structure area as shown on Contract Documents to proposed subgrade to receive bedding material and each stone.
- C. If the subgrade to receive each stone is unstable or contains otherwise unsuitable material, the unsuitable material shall be excavated and removed. Approved material shall be placed in maximum of 12-inch lifts and compacted with excavator bucket or approved equivalent to reestablish the subgrade of each stone. Unsuitable material shall be removed from the Project site and disposed of by Contractor. Removal and replacement of unstable material shall only be performed at the direction of GCDWR and shall be eligible for Additional Excavation and Spoil Removal in accordance with Specification Section 31 23 00 – Excavation and Fill.
- D. The top of all stone elevations shall be as indicated on the Contract Documents. Finished grades and subgrades for stones will be determined from the height of each stone used.
- E. Install the geotextiles as shown on Contract Documents and in accordance with Section 31 32 19.16 - Geotextile Soil Stabilization.
- F. Stone key shall be embedded into streambank in accordance with the Contract Documents or as otherwise directed by GCDWR.
- G. Live poles shall be installed on both sides of stone key trench in accordance with the Contract Documents.
- H. Voids in graded rip rap shall be filled with filter bedding stone, then filled with soil.
- I. Coir fabric shall be used as ground cover for stone keys or as indicated in the Contract Documents. Coir fabric shall be keyed in vertically a minimum of 1 foot on sides of the key trench.
- J. Soil mounds shall be constructed as detailed in the Contract Documents.

### 3.2 Placing Backfill

- A. Place the backfill to remove all voids and leave a surface free from irregularities.
- B. Backfill behind stones shall be compacted with excavator bucket or approved equivalent. Care shall be taken during compaction to avoid disturbing and/or damaging integrity of the stone toe structure.
- C. Protect the stream, structure, underlying geotextile, existing facilities, and adjacent property.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section Includes furnishing all labor, equipment and materials necessary to install root wad revetment as covered under this specification, including, but not limited to grading, installation, adjusting, excavating, placing backfill, and maintaining the feature through acceptance to complete the Work as specified in the Contract Documents, or as directed by GCDWR.

### 1.2 Definitions

- A. Root Wad Revetment: Use of multiple logs with intact root balls installed into the outside meander bend of a stream bank that protects the stream bank from erosion and provides habitat for macroinvertebrates and fish.
- B. Structure Components
  - 1. Root Wad: Log and root ball that intercepts the channel bank at angles of 25 to 30 degrees into the bank. Root Wad to be oriented upstream so that the stream flow meets the root wad at a 90-degree angle, deflecting water away from the bank.
  - 2. Crest Stone: May be used within structure to either weigh down, pinch, wedge, or lift root wad to desired location and to maintain that position.
- C. Structure Materials
  - 1. Root Wad – Log with root ball mass as specified in Section 31 80 02 - In-Stream Structure Materials
  - 2. Crest Stone as specified in Section 31 80 02 - In-Stream Structure Materials.
  - 3. Type 3 Rip Rap as specified in Section 31 37 00 – Rip Rap.
- D. Over Excavation: Any excavation required for the installation of the structure outside the limits of excavation for the proposed channels. Over excavation shall be limited as described on the Contract Documents. The upstream and bottom limits of over excavation shall be dependent on the size of the materials used in the structure, the size of the equipment necessary to install the material, and subject to approval of GCDWR.

### 1.3 Submittals

- A. If requested by GCDWR, submit:
  - 1. Description and location of proposed sources of rock and log material.

2. Samples, which shall be delivered to site at location designated by GCDWR. Incorporate Samples into Work after material placement is nearly complete. Samples may include Type 3 Rip Rap and Crest Stones.
3. Certified Test Results: All Rock Types described in Part 2 of this section, including gradation, abrasion resistance, and bulk density. Logs meeting minimum size requirements as specified in Section 31 80 02 In-Stream Structure Materials.
4. Truck tickets showing source, type, and weight of each load of material delivered to Site.
5. The size and type of equipment to be used to install the structures.

## 1.4 Quality Assurance

- A. Materials for use in the structure must be approved on-site by GCDWR prior to placement and/or acceptance of the work.

## 1.5 Scheduling and Sequencing

- A. Complete proposed channel excavation and rough grading as specified in Section 31 23 00 - Excavation and Fill, and in accordance with the Contract Documents, typical sections and details.
- B. Complete any over excavation, as applicable, in accordance with Contract Documents prior to placing of rocks or logs.
- C. After installation of structure, proceed with installation of backfill as shown on the Contract Documents.

## Part 2 Products

### 2.1 Crest Stone

- A. Stones shall be as specified in Section 31 80 02 - In-Stream Structure Materials.

### 2.2 Root Wad

- A. Logs with root ball shall be as specified in Section 31 80 02 - In-Stream Structure Materials.

## Part 3 Execution

### 3.1 Constructing Root Wad Revetment

- A. Notify GCDWR at least one week prior to construction of root wad revetment structure. GCDWR must be present on-site before Contractor may proceed with

construction of root wad revetment structures.

- B. Excavate proposed channel area as shown on Contract Documents.
- C. The Contractor shall temporarily pump stream flow around or divert flow away from the installation area.
- D. The Contractor shall over excavate to subgrade for and install the base Type 3 Rip Rap layer per the contract drawings at a thickness of 12 inches such that the root wad(s) shall lay on-top of the rip rap at the design elevation, as shown on the plans.
- E. The root wad(s) shall be placed on top of the base Type 3 Rip Rap layer per the Contract Drawings and oriented so that the flow of the stream is directly into the base of the root ball.
- F. Contractor shall support/weigh the log down with the placement of crest stone.
- G. The Contractor shall place backfill in the voids and on top of the root wad(s) as shown on the plans. If imported soil is used for backfill, the Contractor shall thoroughly wet the soil, after placing, using water from the stream or other approved source. Additional soil may be needed after wetting to reach the design elevation.
- H. The Contractor shall install soil encapsulated lifts until the structure reaches the bankfull elevation as shown on the plans and/or as directed by GCDWR.
- I. Root wad structure shall be installed in accordance with the Contract Documents to tolerances of 0.1 feet from established final grade.
- J. The roots shall be trimmed so as not to extend above the bankfull elevation and not to extend beyond 1/3 bankfull width of the channel.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, equipment, materials, tools, and appliances as required for the installation of cross-vanes as herein specified, shown, or ordered.

### 1.2 Definitions

- A. Cross-Vane: An in-stream structure primarily used for grade control, bank stability and bedform diversity. This structure serves to maintain the integrity of the upstream riffle while promoting scouring in the downstream pool. The structure has two arms, a center, and a sill feature on each side which ties into each bank. The structure directs flow away from the adjacent banks to provide bank stability and provides grade control of the channel bed (thalweg). Includes all earthwork, rock, and geotextiles as required in accordance with the Contract Documents.

- B. Structure Components

1. Structure Center: The portion of the structure that is in the center of the channel, at the thalweg elevation.
2. Structure Face: The downstream edge of the top of the center Cross-Vane boulders located in the thalweg of the stream (at the Run "N" station in the stream bed profile).
3. Structure Arm: The portion of the Cross-Vane structure that connects the structure center (at the thalweg elevation) to the structure sill (at the bankfull elevation).
4. Structure Sill: The portion of the Cross-Vane structure that intercepts the channel bank at 90 degrees and is embedded into the bank, preventing flow bypass and bank failure.
5. Structure Shoulder: The point of intersection of the structure arm and structure sill.

- C. Structure Materials

1. Crest and Footer Stones are large stones used for the construction of Cross-Vane structure. Rocks shall consist of the required size and shape shown on the Contract Documents. The rock shall be clean, non-acid forming, sound, dense, resistant to the natural elements, and suitable for the purposes intended.
2. Type 1 and Type 3 rip rap shall be in accordance with Section 31 37 00 - Rip Rap.
3. No. 3 and No. 57 stone gradation shall be in accordance with GDOT Standard

Specifications Section 800.

- D. Over Excavation: Any excavation required for the installation of Cross-Vane structure outside the limits of excavation for the proposed channels. Over excavation shall be limited as described on the Contract Documents. The upstream and bottom limits of over excavation shall be dependent on the size of the crest and footer stones used in the structure, the size of the equipment necessary to install the material, and subject to approval of GCDWR.

### 1.3 Submittals

- A. If requested by GCDWR, submit:
1. Description and location of proposed sources of rock and rock backfill material.
  2. Samples which shall be delivered to site at location designated by GCDWR. Incorporate Samples into Work after material placement is nearly complete. Samples that may be requested include:
    - a. Rock
      - i. Crest and Footer Stones meeting minimum shape and size requirements shown on Contract Documents.
      - ii. Type 1 Rip Rap.
      - iii. Type 3 Rip Rap.
      - iv. No. 3 Stone.
      - v. No. 57 Stone.
      - vi. Each sample shall meet gradation requirements specified for corresponding rock type. Include at least one piece of maximum size which is representative of material to be furnished for incorporation into Work.
  3. Certified Test Results: All Rock Types described in Part 2 of this section, including gradation, abrasion resistance and bulk density.
  4. Truck tickets showing source, type, and weight of each load of material delivered to Site.
  5. The size of equipment to be used to install the structures. Include bucket dimensions and the minimum trench width required to maneuver.
  6. Photograph(s) clearly documenting installation before backfill is placed over top of structure.

## 1.4 Quality Assurance

- A. Rock Source: Quarries shall have produced rock and have performed satisfactorily on other projects and be a GDOT approved quarry. Native, on-site rocks may be used pending approval of GCDWR.
- B. Any rock for use in the structure is subject to being approved individually on-site by GCDWR prior to placement and/or acceptance of the work.

## 1.5 Scheduling and Sequencing

- A. Complete proposed channel excavation and rough grading as specified in Section 31 23 00 - Excavation and Fill and in accordance with the Contract Documents, typical sections and details.
- B. Complete any over excavation in accordance with the Contract Documents and installation of geotextiles as specified in Section 31 32 19.16 - Geotextiles, prior to placing rocks.
- C. After installation of structure proceed with installation of backfill as shown on the Contract Documents.

## Part 2 Products

### 2.1 Crest Stones and Footer Stones

- A. Stones shall be as specified in Section 31 80 02 - In-Stream and Stormwater Conveyance Structure Materials.

### 2.2 Other Rocks

- A. Stones shall be as specified in Section 31 80 02 - In-Stream and Stormwater Conveyance Structure Materials.
- B. Type 1 Rip Rap shall be as specified in Section 31 37 00 – Rip Rap.
- C. Type 3 Rip Rap shall be as specified in Section 31 37 00 – Rip Rap.
- D. Rocks and stones shall be free of roots and other organic or deleterious matter.
- E. On-site material from clearing, excavations, or designated borrow sources that meets or is processed to meet requirements specified above may be used as rock backfill in lieu of importing material.

### 2.3 Geotextiles

- A. Geotextiles shall be as specified in Section 31 32 19.16 - Geotextiles.



## Part 3 Execution

### 3.1 Constructing Cross-Vane Structure

- A. Notify GCDWR at least one week prior to construction of Cross-Vane structure. GCDWR must be present on-site before Contractor may proceed with construction of Cross-Vane structure.
- B. The invert (center) of the cross vane shall be constructed first, followed by one vane arm and then the second vane arm. The bankfull sills shall be constructed last.
- C. Excavate the stream bed to a depth equal to the depth of the crest and footer stones.
- D. Place footer stones as shown in the Contract Documents. There shall be no gaps between stones.
- E. Install woven filter fabric as shown in the Contract Documents.
- F. Place the backfill behind the footer stones as shown in the Contract Documents.
- G. Install crest stones on top of and set slightly back from the footer stones as shown in the Contract Documents. Crest stones shall span the seams of the footer stones. There shall be no voids larger than 4 inches between the stones.
- H. Place backfill behind crest stones making sure any voids between the stones are filled.
- I. If the subgrade to receive each stone is unstable or contains otherwise unsuitable material, the unsuitable material shall be excavated and removed. Approved material shall be placed in a maximum of 12-inch lifts and compacted with excavator bucket or approved equivalent to reestablish the subgrade of each stone. Unsuitable material shall be removed from the Project site and disposed of by Contractor. Removal and replacement of unstable material shall only be performed at the direction of GCDWR and shall be eligible for Additional Excavation and Spoil Removal in accordance with Specification Section 31 23 00 – Excavation and Fill.
- J. The top of all stone elevations shall be as indicated on the Contract Documents. Finished grades and subgrades for stones will be determined from the height of each stone used.
- K. The stones shall be carefully selected and arranged so that adjacent rock surfaces match within 0.1 foot in top elevation and 2 inches along the vertical exposed face or channel side of rock.
- L. Stones shall be placed such that upstream stones are wedged up against downstream stones, to prevent downstream movement of stones.

- M. Smaller rocks shall be “chinked in” to fill all voids between the stones. Placement shall be approved by GCDWR. Grout voids between the stones as directed by GCDWR and in accordance with Section 03 62 00 - Non-shrink Grouting.
- N. Crest stones shall be installed in accordance with the Contract Documents to tolerances of 0.1 feet from established final grade.
- O. Place crest and footer stones on woven filter fabric without puncturing or damaging geotextile. If accidentally damaged, repair geotextile prior to proceeding.
- P. Contractor shall, if deemed necessary, support the stones from falling over before and during the placement of rip rap, backfill, and compaction work on either side of the stone.

### 3.2 Placing Backfill

- A. Place backfill upstream of the installed rock structure stones. Work backfill as necessary to distribute it, prevent future settling, and to eliminate detrimental voids. Backfill shall be applied as needed to fill the excavation limits and match the established grade. The use of backfill is limited to locations shown on the Contract Documents or locations approved by GCDWR.
- B. Backfill behind stones shall be compacted with excavator bucket or approved equivalent. Care shall be taken during compaction to avoid disturbing and/or damaging integrity of the cross-vane structure.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, equipment, materials, tools, and appliances as required for the installation of J-Hook Vane and/or Boulder Vane as herein specified, shown or ordered.

### 1.2 Definitions

A. Structures

1. J-Hook Vane: An in-stream “J” shaped rock structure with an outside rock arm, inside rock arm, rock center (hook), and two rock sill features, one located on each side, that deflects flow away from the adjacent bank, thus limiting erosion. The structure also concentrates flow toward the thalweg of the channel and enhances habitat. Includes all earthwork, rock, and geotextiles as required in accordance with the Contract Documents.
2. Boulder Vane: Rock structure used along the outside banks of meander bends with an outside arm, rock center, and rock sill features that deflects flow away from the adjacent bank, thus limiting erosion. Includes all earthwork, rock, and geotextiles as required in accordance with the Contract Documents.

B. Structure Components

1. Structure Center (Hook): The portion of structure that is in the center of the channel, at the thalweg elevation.
2. Structure Face: The downstream edge of the top of the center boulders located in the thalweg of the stream (at the Run “N” station in the stream bed profile).
3. Structure Arm: The portion of the structure that connects the structure center (at the thalweg elevation) to the structure sill (at the bankfull elevation).
4. Structure Sill: The portion of the structure that that intercepts the channel bank at 90 degrees and is embedded into the bank, preventing flow bypass and bank failure.
5. Structure Shoulder: The point of intersection of the structure arm and structure sill.

C. Structure Materials

1. Crest and Footer Stones are large stones used for the construction of J-Hook Vane and Boulder Vane. Stone shall consist of the required size and shape shown on the Contract Documents. The stones shall be clean, non-acid forming, sound, dense, resistant to the natural elements, and suitable for the

purposes intended.

2. Type 1 and Type 3 rip rap shall be in accordance with Section 31 37 00 – Rip Rap.
  3. No. 3 and No. 57 stone shall be in accordance with GDOT Standard Specifications Section 800.
- D. Over Excavation: Any excavation required for the installation of J-Hook Vane and Boulder Vane outside the limits of excavation for the proposed channels. Over excavation shall be limited as described on the Contract Documents. The upstream and bottom limits of over excavation shall be dependent on the size of the crest and footer stones used in the structure, the size of the equipment necessary to install the material, and subject to approval of GCDWR.
- E. Geotextiles: The term geotextile may also be referred to as woven filter fabric on the Drawings.

### 1.3 Submittals

- A. If requested by GCDWR, submit:
1. Description and location of proposed sources of rock and rock backfill material.
  2. Samples, which shall be delivered to site at location designated by GCDWR. Incorporate Samples into Work after material placement is nearly complete. Samples that may be requested include:
    - a. Rock
      - i. Crest and Footer Stones meeting minimum shape and size requirements shown on the Contract Documents.
      - ii. Type 1 Rip Rap.
      - iii. Type 3 Rip Rap.
      - iv. No. 3 Stone.
      - v. No. 57 Stone.
      - vi. Each sample shall meet gradation requirements specified for corresponding rock type. Include at least one piece of maximum size which is representative of material to be furnished for incorporation into Work.
  3. Certified Test Results: All Rock Types described in Part 2 of this section, including gradation, abrasion resistance and bulk density.
  4. Truck tickets showing source, type, and weight of each load of material

delivered to Site.

5. The size of equipment to be used to install the structures. Include bucket dimensions and the minimum trench width required to maneuver.
6. Photograph(s) clearly documenting installation before backfill is placed over top of structure.

## 1.4 Quality Assurance

- A. Rock Source: Quarries shall have produced rock and have performed satisfactorily on other projects and be a GDOT approved quarry. Native, on-site rocks may be used pending approval of GCDWR.
- B. Any rock for use in J-Hook Vane and/or Boulder Vane is subject to being approved individually on-site by GCDWR prior to placement and/or acceptance of the work.

## 1.5 Scheduling and Sequencing

- A. Complete proposed channel excavation and rough grading as specified in Section 31 23 00 - Excavation and Fill and in accordance with the Contract Documents, typical sections and details.
- B. Complete any over excavation in accordance with the Contract Documents and installation of geotextiles as specified in Section 31 32 19.16 - Geotextiles, prior to placing of rocks.
- C. After installation of structure proceed with installation of backfill as shown on the Contract Documents.

## Part 2 Products

### 2.1 Crest Stones and Footer Stones

- A. Stones shall be as specified in Section 31 80 02 - In-Stream and Stormwater Conveyance Structure Materials.

### 2.2 Other Rocks

- A. Stones shall be as specified in Section 31 80 02 - In-Stream and Stormwater Conveyance Structure Materials.
- B. Type 1 Rip Rap shall be as specified in Section 31 37 00 – Rip Rap.
- C. Type 3 Rip Rap shall be as specified in Section 31 37 00 – Rip Rap.
- D. Rocks and stones shall be free of roots and other organic or deleterious matter.
- E. On-site material from clearing, excavations, or designated borrow sources that meets

or is processed to meet requirements specified above may be used as rock backfill in lieu of importing material.

## 2.3 Geotextiles

- A. Geotextiles shall be as specified in Section 31 32 19.16 - Geotextiles.

## Part 3 Execution

### 3.1 Constructing Structures

- A. Notify GCDWR at least one week prior to construction of J-Hook Vane and/or Boulder Vane structure. GCDWR must be present on-site before Contractor may proceed with construction of J-Hook Vane and/or Boulder Vane structure.
- B. Structure Center (Hook) of the J-Hook Vane shall be constructed first, followed by the inside stone arm, then the outside vane arm. The bankfull sills shall be constructed last.
- C. Structure Center of the Boulder Vane shall be constructed first, followed by the outside arm. The bankfull sill shall be constructed last.
- D. Excavate the stream bed to a depth equal to the depth of the crest and footer stones.
- E. Place footer stones as shown in the Contract Documents. There shall be no gaps between stones.
- F. Install geotextile as shown in the Contract Documents.
- G. Place the backfill behind the footer stones as shown in the Contract Documents.
- H. Install crest stones on top of and set slightly back from the footer stones as shown in the Contract Documents. Crest stones shall span the seams of the footer stones. There shall be no voids larger than 4 inches between the stones.
- I. Place backfill behind crest stones making sure any voids between the stones are filled.
- J. If the subgrade to receive each stone is unstable or contains otherwise unsuitable material, the unsuitable material shall be excavated and removed. Approved material shall be placed in a maximum of 12-inch lifts and compacted with excavator bucket or approved equivalent to reestablish the subgrade of each stone. Unsuitable material shall be removed from the Project site and disposed of by Contractor. Removal and replacement of unstable material shall only be performed at the direction of GCDWR and shall be eligible for Additional Excavation and Spoil Removal in accordance with Specification Section 31 23 00 – Excavation and Fill.
- K. The top of all stone elevations shall be as indicated on the Contract Documents.

Finished grades and subgrades for stones will be determined from the height of each stone used.

- L. The stones shall be carefully selected and arranged so that adjacent rock surfaces match within 0.1 foot in top elevation and 2 inches along the vertical exposed face or channel side of rock.
- M. Stones shall be placed such that upstream stones are wedged up against downstream stones, to prevent downstream movement of stones.
- N. Smaller rocks shall be "chinked in" to fill all voids between the stones. Placement shall be approved by GCDWR. Grout voids between the stones as directed by GCDWR and in accordance with Section 03 62 00 - Non-shrink Grouting.
- O. Crest stones shall be installed in accordance with the Contract Documents to tolerances of 0.1 feet from established final grade.
- P. Place crest and footer stones on geotextile without puncturing or damaging geotextile. If accidentally damaged, repair geotextile prior to proceeding.
- Q. Contractor shall, if deemed necessary, support the stones from falling over before and during the placement of rip rap, backfill, and compaction Work on either side of the stone.

### 3.2 Placing Backfill

- A. Place backfill upstream of the installed rock structure stones and vanes. Work backfill as necessary to distribute it, prevent future settling, and to eliminate detrimental voids. Backfill shall be applied as needed to fill the excavation limits and match the established grade. The use of backfill is limited to locations shown on the Contract Documents or locations approved by GCDWR.
- B. Backfill behind stones shall be compacted with excavator bucket or approved equivalent. Care shall be taken during compaction to avoid disturbing and/or damaging integrity of the J-Hook Vane and/or Boulder Vane.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, equipment, materials, tools, and appliances as required for the installation of J-Hook Log Vane and/or Log Vane as herein specified, shown or ordered.

### 1.2 Definitions

#### A. Structures

1. J-Hook Log Vane: An in-stream “J” shaped log structure with an outside log arm, inside rock arm, rock center (hook), footer log, and two rock sills features that deflects flow away from the adjacent bank, thus limiting erosion. The structure also concentrates flow toward the thalweg of the channel and enhances habitat. Includes all earthwork, rock, hardware, and geotextiles as required in accordance with the Contract Documents.
2. Log Vane: Log structure used along the outside banks of meander bends with an outside arm and rock/log sill features that deflects flow away from the adjacent bank, thus preventing erosion. Includes all earthwork, rock, and geotextiles as required in accordance with the Contract Documents.

#### B. Structure Components

1. Structure Center (Hook): The portion of the structure that is in the center of the channel, at the thalweg elevation.
2. Structure Face: The downstream edge of the top of the center boulders located in the thalweg of the stream (at the Run “N” station in the stream bed profile).
3. Log Structure Arm: The portion of the structure that connects the structure center (at the thalweg elevation) to the structure sill (at the full elevation).
4. Structure Sill: The portion of the structure that that intercepts the channel bank at 90 degrees and is embedded into the bank, preventing flow bypass and bank failure.
5. Structure Shoulder: The point of intersection of the structure arm and structure sill.

#### C. Structure Materials

1. Crest and Footer Stones are large stones used for the construction of Log J-Hook Vane and Log Vane. Stone shall consist of the required size and shape shown on the Contract Documents. The stones shall be clean, non-acid forming, sound, dense, resistant to the natural elements, and suitable for the



purposes intended.

2. Type 1 and Type 3 rip rap shall be in accordance with Section 31 37 00 – Rip Rap.
  3. Logs shall be a straight portion of trees, imported or felled on-site. Limbs shall be removed and log shall not be in a state of decay or show signs of rot or mold infestation. Root ball to be included as shown on Contract Documents.
- D. Over Excavation: Any excavation required for the installation of J-Hook Log Vane and Log Vane outside the limits of excavation for the proposed channels. Over excavation shall be limited as described on the Contract Documents. The upstream and bottom limits of over excavation shall be dependent on the size of the crest and footer stones used in the structure, the size of the equipment necessary to install the material, and subject to approval of GCDWR.
- E. Geotextiles: The term geotextile may also be referred to as woven filter fabric on the Drawings.

### 1.3 Submittals

- A. If requested by GCDWR, submit:
1. Description and location of proposed sources of rock and rock backfill material.
  2. Samples, which shall be delivered to site at location designated by GCDWR. Incorporate Samples into Work after material placement is nearly complete. Samples that may be requested include:
    - a. Rock:
      - i. Crest and Footer Stones meeting minimum shape and size requirements shown on Contract Documents.
      - ii. Type 1 Rip Rap.
      - iii. Type 3 Rip Rap.
      - iv. Each Sample shall meet gradation requirements specified for corresponding rock type. Include at least one piece of maximum size which is representative of material to be furnished for incorporation into Work.
    - b. Logs: Logs meeting minimum size requirements shown on Documents.
  3. Certified Test Results: All Rock Types described in Part 2 of this section, including gradation, abrasion resistance and bulk density.
  4. Truck tickets showing source, type, and weight of each load of material delivered to Site.

5. The size of equipment to be used to install the structures. Include bucket dimensions and the minimum trench width required to maneuver.
6. Photograph(s) clearly documenting installation before backfill is placed over top of structure.

## 1.4 Quality Assurance

- A. Rock Source: Quarries shall have produced rock and have performed satisfactorily on other projects and be a GDOT approved quarry. Native, on-site rocks may be used pending approval of GCDWR.
- B. Any rock for use in a J-Hook Log Vane and/or Log Vane is subject to being approved individually on-site by GCDWR prior to placement and/or acceptance of the work.
- C. Any log for use in a J-Hook Log Vane and/or Log Vane will be approved individually on-site by GCDWR prior to placement and/or acceptance of the work.

## 1.5 Scheduling and Sequencing

- A. Complete proposed channel excavation and rough grading as specified in Section 31 23 00 - Excavation and Fill and in accordance with the Contract Documents, typical sections and details.
- B. Complete any over excavation in accordance with Contract Documents and installation of geotextiles as specified in Section 31 32 19.16 - Geotextiles, prior to placing of rocks or logs.
- C. After installation of structure proceed with installation of backfill as shown on the Contract Documents.

## Part 2 Products

### 2.1 Crest Stones and Footer Stones

- A. Stones shall be as specified in Section 31 80 02 - In-Stream and Stormwater Conveyance Structure Materials.

### 2.2 Other Rocks

- A. Stones shall be as specified in Section 31 80 02 - In-Stream and Stormwater Conveyance Structure Materials.
- B. Type 1 Rip Rap shall be as specified in Section 31 37 00 - Rip Rap.
- C. Type 3 Rip Rap shall be as specified in Section 31 37 00 - Rip Rap.
- D. Rocks and stones shall be free of roots and other organic or deleterious matter.

- E. On-site material from clearing, excavations, or designated borrow sources that meets or is processed to meet requirements specified above may be used as rock backfill in lieu of importing material.

## 2.3 Logs

- A. Logs shall be as specified in Section 31 80 02 - In-Stream and Stormwater Conveyance Structure Materials.
- B. On-site material from clearing, excavations, or designated borrow sources that meets or is processed to meet requirements specified above may be used as rock backfill in lieu of importing material. Root balls to be included as shown on the Contract Documents.

## 2.4 Geotextiles

- A. Geotextiles shall be as specified in Section 31 32 19.16 - Geotextiles.

# Part 3 Execution

## 3.1 Constructing Structures

- A. Notify GCDWR at least one week prior to construction of J-Hook Log Vane and/or Log Vane structure. GCDWR must be present on-site before Contractor may proceed with construction of J-Hook Log Vane and/or Log Vane structure.
- B. Structure Center (Hook) of the J-Hook Log Vane shall be constructed first, followed by the inside stone arm, then the footer log and log vane arm. The bankfull sills shall be constructed last.
- C. Footer log of the Log Vane shall be constructed first, followed by the log vane arm. The bankfull sills shall be constructed last.
- D. Excavate the stream bed to a depth equal to the depth of the log, crest and footer stones.
- E. Place footer stones as shown in the Contract Documents. There shall be no gaps between stones and as well as between the log and stones.
- F. Install geotextile as shown in the Contract Documents.
- G. Place the backfill behind the footer stones as shown in the Contract Documents.
- H. Install crest stones on top of and set slightly back from the footer stones as shown in the Contract Documents. Crest stones shall span the seams of the footer stones. There shall be no voids larger than 4" between the stones.
- I. Install footer log into the stream as shown in the Contract Documents, followed by the log vane arm.

- J. The log vane arm shall be flush with the crest stone and sill crest stone as shown in the Contract Documents.
- K. Place backfill behind crest stones and log arm making sure any voids between the stones and log are filled.
- L. If the subgrade to receive each stone is unstable or contains otherwise unsuitable material, the unsuitable material shall be excavated and removed. Approved material shall be placed in a maximum of 12-inch lifts and compacted with excavator bucket or approved equivalent to reestablish the subgrade of each stone. Unsuitable material shall be removed from the Project site and disposed of by Contractor. Removal and replacement of unstable material shall only be performed at the direction of GCDWR and shall be eligible for Additional Excavation and Spoil Removal in accordance with Specification Section 31 23 00 – Excavation and Fill.
- M. The top of all stone elevations shall be as indicated on the Contract Documents. Finished grades and subgrades for stones will be determined from the height of each stone used.
- N. The stones shall be carefully picked and arranged so that adjacent rock surfaces match within 0.1 foot in top elevation and 2 inches along the vertical exposed face or channel side of rock.
- O. Stones shall be placed such that upstream stones are wedged up against downstream stones, to prevent downstream movement of stones.
- P. Smaller rocks shall be “chinked in” to fill all voids between the stones. Placement shall be approved by GCDWR. Grout voids between the stones as directed by GCDWR and in accordance with Section 03 62 00 - Non-shrink Grouting.
- Q. Crest stones and logs shall be installed in accordance with the Contract Documents to tolerances of 0.1 feet from established final grade.
- R. Place crest and footer stones on geotextile without puncturing or damaging geotextile. Nail geotextile to logs as shown in the Contract Documents. If accidentally damaged, repair geotextile prior to proceeding.
- S. Contractor shall, if deemed necessary, support the stones and logs from falling over before and during the placement of rip rap, backfill, and compaction Work on either side of the stone.

### 3.2 Placing Backfill

- A. Place backfill upstream of the installed rock structure stones and log vanes. Work backfill as necessary to distribute it, prevent future settling, and to eliminate detrimental voids. Backfill shall be applied as needed to fill the excavation limits and match the established grade. The use of backfill is limited to locations shown on the Contract Documents or locations approved by GCDWR.

- B. Backfill behind stones shall be compacted with excavator bucket or approved equivalent. Care shall be taken during compaction to avoid disturbing and/or damaging integrity of the J-Hook Log Vane and/or Log Vane structure.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, equipment, materials, tools, and appliances as required for the installation of step pool series as herein specified, shown or ordered.

### 1.2 Definitions

- A. Step Pool Series: An in-stream rock structure used to transition steep elevation streams into stream systems with flatter grades. Each structure in the design series has two arms, a center, and sill features and can also be used for grade control, bank stability and bedform diversity. Includes all earthwork, rock, grout, and geotextiles as required in accordance with the Contract Documents and includes material and labor associated with placement of Rock-Soil Mix and angular stone in downstream pool as specified in the Contract Documents.
- B. Structure Components
  1. Structure Center: The portion of the Step Pool Series structure that is in the center of the channel, at the thalweg elevation.
  2. Structure Face: The downstream edge of the top of the center Step Pool Series boulders located in the thalweg of the stream (at the Run "N" station in the stream bed profile).
  3. Structure Arm: The portion of the Step Pool Series structure that connects the structure center (at the thalweg elevation) to the structure sill (at the bankfull elevation).
  4. Structure Sill: The portion of the Step Pool Series structure that that intercepts the channel bank at 90 degrees and is embedded into the bank, preventing flow bypass and bank failure.
  5. Structure Shoulder: The point of intersection of the structure arm and structure sill.
  6. Stream Bed Transition Area: The channel bed transition area between step pool structures, includes larger angular stones for glides and stone bedding in pools. Glides are the armored area along the downstream third of pool length.
- C. Structure Materials
  1. Crest and Footer Stones are large stones used for the construction of Step Pool Series. Rocks shall consist of the required size and shape shown on the Contract Documents. The rock shall be clean, non-acid forming, sound, dense, resistant to the natural elements, and suitable for the purposes intended.

2. Type 3 rip rap shall be in accordance with Section 31 37 00 – Rip Rap.
  3. No. 3, No. 4 and No. 57 stone or other coarse aggregate stone shall be in accordance with GDOT Standard Specifications Section 800.
  4. River Cobble shall be a mixture of angular and rounded stones ranging from 8 to 12 inches in diameter with a mean diameter of 10 inches. River Cobble shall be sound, dense, resistant to the natural elements, and suitable for the purposes intended. River Cobble may be harvested from the coarse stream substrate available within the project limits of disturbance pending GCDWR approval.
  5. Riffle Rock shall be a mixture of angular and rounded stones ranging in size from 3 to 8 inches in diameter with a mean diameter of 6 inches. Riffle Rock shall be sound, dense, resistant to the natural elements, and suitable for the purposes intended. Riffle Rock may be harvested from the coarse stream substrate available within the project limits of disturbance pending GCDWR approval.
  6. Angular Stone shall be large stones having 12-inch median axis length. Angular Stone shall be sound, dense, resistant to the natural elements, and suitable for the purposes intended.
- D. Over Excavation: Any excavation required for the installation of Step Pool Series outside the limits of excavation for the proposed channels. Over excavation shall be limited as described on the Contract Documents. The upstream and bottom limits of over excavation shall be dependent on the size of the crest and footer stones used in the structure, the size of the equipment necessary to install the material, and subject to approval of GCDWR.
- E. Geotextiles: The term geotextile may also be referred to as woven filter fabric on the Drawings.

### 1.3 Submittals

- A. If requested by GCDWR, submit:
1. Description and location of proposed sources of rock and rock backfill material.
  2. Samples which shall be delivered to site at location designated by GCDWR. Incorporate Samples into Work after material placement is nearly complete. Samples that may be requested include:
    - a. Rock
      - i. Quarry Stone, Crest and Footer Stones meeting minimum shape and size requirements shown on the Contract Documents.
      - ii. Type 3 Rip Rap.

- iii. River Cobble.
  - iv. Riffle Rock.
  - v. Coarse Aggregate Stone, including No. 3, No. 4, and No. 57 Stone or other coarse aggregate stone.
  - vi. Each Sample shall meet gradation requirements specified for corresponding rock type. Include at least one piece of maximum size which is representative of material to be furnished for incorporation into Work.
3. Certified Test Results: All Rock Types described in Part 2 of this section, including gradation, abrasion resistance and bulk density.
  4. Truck tickets showing source, type, and weight of each load of material delivered to Site.
  5. The size of equipment to be used to install the structures. Include bucket dimensions and the minimum trench width required to maneuver.
  6. Photograph(s) clearly documenting installation before backfill is placed over top of structure.

#### 1.4 Quality Assurance

- A. Rock Source: Quarries shall have produced rock and have performed satisfactorily on other projects and be a GDOT approved quarry. Native, on-site rocks may be used pending approval of GCDWR.
- B. Any rock for use in a step pool series is subject to being approved individually on-site by GCDWR prior to placement and/or acceptance of the work.

#### 1.5 Scheduling and Sequencing

- A. Complete proposed channel excavation and rough grading as specified in Section 31 23 00 - Excavation and Fill and in accordance with the Contract Documents, typical sections and details.
- B. Complete any over excavation in accordance with the Contract Documents and installation of geotextiles as specified in Section 31 32 19.16 – Geotextiles, prior to placing of rocks.
- C. After installation of structure proceed with installation of backfill as shown on the Contract Documents.



## Part 2 Products

### 2.1 Crest Stones and Footer Stones

- A. Stones shall be as specified in Section 31 80 02 - In-Stream and Stormwater Conveyance Structure Materials.

### 2.2 Other Rocks

- A. Stones shall be as specified in Section 31 80 02 - In-Stream and Stormwater Conveyance Structure Materials.
- B. Type 3 Rip Rap shall be as specified in Section 31 37 00 – Rip Rap.
- C. Coarse Aggregate Stone, including No. 3, No.4, and No. 57 stone, shall be as specified in Section 31 05 16 – Aggregates for Earthwork.
- D. Rocks and stones shall be free of roots and other organic or deleterious matter.
- E. On-site material from clearing, excavations, or designated borrow sources that meets or is processed to meet requirements specified above may be used as rock backfill in lieu of importing material.

### 2.3 Geotextiles

- A. Geotextiles shall be as specified in Section 31 32 19.16 - Geotextiles.

## Part 3 Execution

### 3.1 Constructing Step Pool Series

- A. Notify GCDWR at least one week prior to construction of Step Pool Series structure. GCDWR must be present on-site before Contractor may proceed with construction of Step Pool Series structure.
- B. The invert (center) of the Step Pool Series shall be constructed first, followed by one series arm and then the second series arm. The bank-full sills shall be constructed last.
- C. Excavate the stream bed to a depth equal to the depth of the footer and crest stones.
- D. Place footer stones as shown in the Contract Documents. There shall be no gaps between stones.
- E. Install geotextile as shown in the Contract Documents.
- F. Place the backfill behind the footer stones as shown in the Contract Documents.

- G. Install crest stones on top of and set slightly back from the footer stones as shown in the Contract Documents. Crest stones shall span the seams of the footer stones. There shall be no voids larger than 4 inches between the stones.
- H. Place backfill behind crest stones making sure any voids between the stones are filled.
- I. If the subgrade to receive each stone is unstable or contains otherwise unsuitable material, the unsuitable material shall be excavated and removed. Approved material shall be placed in a maximum of 12-inch lifts and compacted with excavator bucket or approved equivalent to reestablish the subgrade of each stone. Unsuitable material shall be removed from the Project site and disposed of by Contractor. Removal and replacement of unsuitable material shall only be performed at the direction of GCDWR and shall be eligible for Additional Excavation and Spoil Removal in accordance with Specification Section 31 23 00 – Excavation and Fill.
- J. The stones shall be carefully picked and arranged so that adjacent rock surfaces match within 0.1 foot in top elevation and 2 inches along the vertical exposed face or channel side of rock.
- K. Stones shall be placed such that upstream stones are wedges up against downstream stones, to prevent downstream movement of stones.
- L. Smaller rocks shall be “chinked in” to fill all voids between the stones. Placement shall be approved by GCDWR. Grout voids between the stones as directed by GCDWR and in accordance with Section 03 62 00 - Non-Shrink Grouting.
- M. Crest stones shall be installed in accordance with the Contract Documents to tolerances of 0.1 feet from established final grade.
- N. Place crest and footer stones on or against geotextile, as applicable without puncturing or damaging geotextile. If accidentally damaged, repair geotextile prior to proceeding.
- O. Contractor shall, if deemed necessary, support the stones from falling over before and during the placement of rip rap, backfill, and compaction Work on either side of the stone.

### 3.2 Placing Backfill

- A. Place backfill upstream of the installed rock structure stones. Work backfill as necessary to distribute it, prevent future settling, and to eliminate detrimental voids. Backfill shall be applied as needed to fill the excavation limits and match the established grade. The use of backfill is limited to locations shown on the Contract Documents or locations approved by GCDWR.
- B. Contractor shall bring the channel bed downstream of in-stream structure crest stones to final grade using a Rock-Soil mix composed of 35% River Cobble and 35% Riffle Rock by volume with 30% of approved soil by volume prior to placement as shown in

the Contract Documents. Where specified in the Contract Documents, or as directed by DWR, Contractor shall substitute River Cobble with Type 3 Rip Rap and Riffle Rock with No. 3 or No. 4 aggregate stone.

- C. Contractor shall armor downstream 1/3 of pool length with angular fieldstone having 12-inch median axis length and embedded into the substrate surface as shown in the Contract Documents.
- D. Intermix different sizes of pieces to eliminate segregation and to fill voids between larger pieces with smaller pieces and work surface free from irregularities.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, equipment, materials, tools, and appliances as required for the installation of log sills as herein specified, shown or ordered.

### 1.2 Definitions

- A. Log Sill: In-stream Log structure with two rock arms and a log sill feature that deflects flow away from the adjacent banks and provides grade control to the channel bed (thalweg). Includes all earthwork, rock, log, and geotextiles as required in accordance with the Documents.

- B. Structure Components

1. Structure Face: The downstream edge of the top of the center log located in the thalweg of the stream (at the Run "N" station in the stream bed profile).
2. Structure Arm: The portion of the Log Sill structure that connects the structure center (at the thalweg elevation) to the structure sill (at the bankfull elevation).
3. Structure Sill: The portion of the Log Sill structure that intercepts the channel bank at 90 degrees and is embedded into the bank, preventing flow bypass and bank failure.
4. Structure Shoulder: The point of intersection of the structure arm and structure sill.

- C. Structure Materials

1. Crest and Footer Stones are large stones used for the construction of Log Sill. Rocks shall consist of the required size and shape shown on the Documents. The rock shall be clean, non-acid forming, sound, dense, resistant to the natural elements, and suitable for the purposes intended.
2. Type 1 and Type 3 rip rap shall be in accordance with Section 31 37 00 – Rip Rap.
3. Logs shall be a generally straight portion of the tree, imported or felled on-site. Limbs shall be removed, and log shall not be in a state of decay or show signs of rot or mold infestation.
  - a. Felled, on-site trees during site clearing activities are preferred for use as construction material for this line item if product meets specifications within the Contract Documents and approved by GCDWR.
  - b. Logs may be imported only when no suitable felled, on-site trees remain

or the remaining felled, on-site trees are not approved for use as construction material for this line item. Imported logs must meet product specifications within the Contract Documents and must be approved by GCDWR.

- D. Over Excavation: Any excavation required for the installation of Cross-Vane structure outside the limits of excavation for the proposed channels. Over excavation shall be limited as described on the Contract Documents. The upstream and bottom limits of over excavation shall be dependent on the size of the crest and footer stones used in the structure, the size of the equipment necessary to install the material, and subject to approval of GCDWR.
- E. Geotextiles: The term geotextile may also be referred to as woven filter fabric on the Drawings.

### 1.3 Submittals

- A. If requested by GCDWR, submit:
  - 1. Description and location of proposed sources of rock and rock backfill material.
  - 2. Samples which shall be delivered to site at location designated by GCDWR. Incorporate Samples into Work after material placement is nearly complete. Samples that may be requested include:
    - a. Rock:
      - i. Quarry Stone, Crest and Footer Stones meeting minimum shape and size requirements shown on Drawings.
      - ii. Type 1 Rip Rap.
      - iii. Type 3 Rip Rap.
      - iv. Each Sample shall meet gradation requirements specified for corresponding rock type. Include at least one piece of maximum size which is representative of material to be furnished for incorporation into Work.
    - b. Log: Logs meeting shape and minimum size requirements shown on Documents.
  - 3. Certified Test Results: All Rock Types described in Part 2 of this section, including gradation, abrasion resistance and bulk density.
  - 4. Truck tickets showing source, type, and weight of each load of material delivered to Site.
  - 5. The size of equipment to be used to install the structures. Include bucket dimensions and the minimum trench width required to maneuver.

6. Photograph(s) clearly documenting installation before backfill is placed over top of structure.

## 1.4 Quality Assurance

- A. Rock Source: Quarry that has produced rock and has performed satisfactorily on other projects and be a GDOT approved quarry. Native, on-site rocks may be used pending approval of GCDWR.
- B. Any rock or log for use in a Log Sill is subject to being approved individually on-site by GCDWR prior to placement and/or acceptance of the work.

## 1.5 Scheduling and Sequencing

- A. Complete proposed channel excavation and rough grading as specified in Section 31 23 00 - Excavation and Fill and in accordance with the Contract Documents, typical sections and details.
- B. Complete any over excavation in accordance with Contract Documents and installation of geotextiles as specified in Section 31 32 19.16 - Geotextiles, prior to placing of rocks or logs.
- C. After installation of structure proceed with installation of backfill as shown on the Documents.

## Part 2 Products

### 2.1 Crest Stones and Footer Stones

- A. Stones shall be as specified in Section 31 80 02 - In-Stream and Stormwater Conveyance Structure Materials.

### 2.2 Other Rocks

- A. Stones shall be as specified in Section 31 80 02 - In-Stream and Stormwater Conveyance Structure Materials.
- B. Type 1 Rip Rap as specified in Section 31 37 00 – Rip Rap.
- C. Type 3 Rip Rap shall be as specified in Section 31 37 00 – Rip Rap.
- D. Rocks and stones shall be free of roots and other organic or deleterious matter.
- E. On-site material from clearing, excavations, or designated borrow sources that meets or is processed to meet requirements specified above may be used as rock backfill in lieu of importing material.

## 2.3 Logs

- A. Logs shall be as specified in Section 31 80 02 - In-Stream and Stormwater Conveyance Structure Materials.
- B. On-site or imported material from clearing, excavations, or designated borrow sources that meets or is processed to meet requirements specified above may be used as rock backfill in lieu of importing material.

## 2.4 Geotextiles

- A. Geotextiles shall be as specified in Section 31 32 19.16 - Geotextiles.

# Part 3 Execution

## 3.1 Constructing Log Sill

- A. Notify GCDWR at least one week prior to construction of Log Sill structure. GCDWR must be present on-site before Contractor may proceed with construction of Log Sill structure.
- B. Structure Center (Log sill) of the structure shall be constructed first, followed by the bankfull sills.
- C. Excavate the stream bed to a depth equal to the depth of the log, crest and footer stones.
- D. Install geotextile wrapped Type 3 rip rap in trench as shown in the Contract Documents.
- E. Place log and footer stones on top of the geotextile wrapped Type 3 rip rap as shown in the Contract Documents. There shall be no gaps between the log and stones.
- F. Place crest and footer stones on geotextile without puncturing or damaging geotextile. Nail geotextile to logs as shown in the Contract Documents. If accidentally damaged, repair geotextile prior to proceeding
- G. Place the backfill behind the log and footer stones as shown in the Contract Documents.
- H. Install crest stones on top of and set slightly back from the footer stones as shown in the Contract Documents. Crest stones shall span the seams of the footer stones. There shall be no voids larger than 4 inches between the stones.
- I. Install anchor stones on top of log at the point where the log intersects both sides of the streambank, as shown in the Contract Documents.
- J. Place backfill behind crest stones and log making sure any voids between the stones and log are filled.

- K. If the subgrade to receive each stone is unstable or contains otherwise unsuitable material, the unsuitable material shall be excavated and removed. Approved material shall be placed in a maximum of 12-inch lifts and compacted with excavator bucket or approved equivalent to reestablish the subgrade of each stone. Unsuitable material shall be removed from the Project site and disposed of by Contractor. Removal and replacement of unstable material shall only be performed at the direction of GCDWR and shall be eligible for Additional Excavation and Spoil Removal in accordance with Specification Section 31 23 00 – Excavation and Fill.
- L. The top of all stone elevation shall be as indicated on the Contract Documents. Finished grades and subgrades for stones will be determined from the height of each stone used.
- M. The stones shall be carefully picked and arranged so that adjacent rock surfaces match within 0.1 foot in top elevation and 2 inches along the vertical exposed face or channel side of rock.
- N. Stones shall be placed such that upstream stones are wedged up against downstream stones, to prevent downstream movement of stones.
- O. Smaller rocks shall be “chinked in” to fill all voids between the stones. Placement shall be approved by GCDWR. Grout voids between the stones as directed by GCDWR and in accordance with Section 03 62 00 - Non-shrink Grouting.
- P. Crest stones and logs shall be installed in accordance with the Contract Documents to tolerances of 0.1 feet from established final grade.
- Q. Contractor shall, if deemed necessary, support the stones and logs from falling over before and during the placement of rip rap, backfill, and compaction Work on either side of the stone.

### 3.2 Placing Backfill

- A. Place backfill upstream of the installed Log Sill. Work backfill as necessary to distribute it, prevent future settling, and to eliminate detrimental voids. Backfill shall be applied as needed to fill the excavation limits and match the established grade. The use of backfill is limited to locations shown on the Contract Documents or locations approved by GCDWR.
- B. Backfill behind stones shall be compacted with excavator bucket or approved equivalent. Care shall be taken during compaction to avoid disturbing and/or damaging integrity of the Log Sill structure.

END OF SECTION



## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, equipment, materials, tools, and appliances as required for the installation of constructed riffle as herein specified, shown or ordered.
- B. The Contractor shall furnish all labor, equipment, materials, tools, and appliances as required for the installation of Constructed Riffle and/or Constructed Riffle with Sills as herein specified, shown or ordered.

### 1.2 Definitions

- A. Structures
  - 1. Constructed Riffle: Cobble and gravel rock grade control structure armoring the channel bed upstream of an in-stream structure crest stone and extending continuously to the next riffle station, as located in the Contract Documents. Includes all earthwork, rock, materials, and labor as required in accordance with the Contract Documents.
  - 2. Constructed Riffle with Sills: Cobble and gravel rock grade control structure encompassing the part of the preceding pool, riffle, run, and part of downstream pool. Includes all earthwork, rock, materials, and labor as required in accordance with the Contract Documents.
- B. Riffle Rock Matrix: Mix of River Cobble, Riffle Rock, and River Pebble as specified in the Contract Documents that compromise the Constructed Riffle Structure.
- C. Structure Materials
  - 1. River Cobble shall be a mixture of angular and rounded stones ranging from 8 to 12 inches in diameter with a mean diameter of 10 inches. River Cobble shall be clean, non-acid forming, sound, dense, resistant to the natural elements, and suitable for the purposes intended. River Cobble excavated from the existing channel and temporarily stockpiled may be used pending GCDWR approval.
  - 2. Riffle Rock shall be a mixture of angular and rounded stones ranging in size from 3 to 8 inches in diameter with a mean diameter of 6 inches. Riffle Rock shall be clean, non-acid forming, sound, dense, resistant to the natural elements, and suitable for the purposes intended. Riffle Rock excavated from the existing channel and temporarily stockpiled may be used pending GCDWR approval.
  - 3. River Pebble shall be a mixture of angular and rounded stones ranging in size from 0.5 to 2 inches in diameter with a mean diameter of 1 inch. River Pebble shall be clean, non-acid forming, sound, dense, resistant to the natural elements, and suitable for the purposes intended. River Pebble excavated from

the existing channel and temporarily stockpiled may be used pending GCDWR approval.

- D. Over Excavation: Any excavation required for the installation of Constructed Riffle outside the limits of excavation for the proposed channels. Over excavation shall be limited as described on the Contract Documents. The upstream and bottom limits of over excavation shall be dependent on the size of the stones used in the structure, the size of the equipment necessary to install the material, and subject to approval of GCDWR.

### 1.3 Submittals

- A. If requested by GCDWR, submit:

1. Description and location of proposed sources of rock and rock backfill material.
2. Samples which shall be delivered to site at location designated by GCDWR. Incorporate Samples into Work after material placement is nearly complete. Samples that may be requested include:
  - a. Rock:
    - i. River Cobble.
    - ii. Riffle Rock.
    - iii. River Pebble.
    - iv. Each Sample shall meet gradation requirements specified for corresponding rock type. Include at least one piece of maximum size which is representative of material to be furnished for incorporation into Work.
3. Certified Test Results: All Rock Types described in Part 2 of this section, including gradation, abrasion resistance and bulk density.
4. Truck tickets showing source, type, and weight of each load of material delivered to Site.
5. The size of equipment to be used to install the structures. Include bucket dimensions and the minimum trench width required to maneuver.
6. Photograph(s) clearly documenting installation before backfill is placed over top of structure.

### 1.4 Quality Assurance

- A. Rock Source: Quarries shall have produced rock and have performed satisfactorily on other projects and be a GDOT approved quarry. Native, on-site rocks may be used pending approval of GCDWR.

- B. Any rock for use in a Constructed Riffle is subject to being approved individually or, for riprap and aggregate per truckload or other lot, on-site by GCDWR prior to placement and/or acceptance of the work.

## 1.5 Scheduling and Sequencing

- A. Complete proposed channel excavation and rough grading as specified in Section 31 23 00 - Excavation and Fill and in accordance with the Contract Documents, typical sections and details.
- B. Complete any over excavation in accordance with the Contract Documents prior to placing of rocks.
- C. After installation of structure proceed with installation of backfill as shown on the Contract Documents.

## Part 2 Products

### 2.1 Stones

- A. Stones shall be as specified in Section 31 80 02 - In-Stream and Stormwater Conveyance Structure Materials.
- B. Type 1 Rip Rap shall be as specified in Section 31 37 00 – Rip Rap.
- C. Type 3 Rip Rap shall be as specified in Section 31 37 00 – Rip Rap.
- D. Rocks and stones shall be free of roots and other organic or deleterious matter.
- E. On-site material from clearing, excavations, or designated borrow sources that meets or is processed to meet requirements specified above may be used as rock backfill in lieu of importing material.

## Part 3 Execution

### 3.1 General

- A. Notify GCDWR at least one week prior to construction of practice. GCDWR must be present on-site before Contractor may proceed with construction of practice.
- B. Excavate proposed channel sections as shown in the Contract Documents.
- C. If the subgrade to receive each stone is unstable or contains otherwise unsuitable material, the unsuitable material shall be excavated and removed. Approved material shall be placed in a maximum of 12-inch lifts and compacted with excavator bucket or approved equivalent to reestablish the subgrade of each stone. Unsuitable material shall be removed from the Project site and disposed of by Contractor. Removal and replacement of unstable material shall only

be performed at the direction of GCDWR and shall be eligible for Additional Excavation and Spoil Removal in accordance with Specification Section 31 23 00 – Excavation and Fill.

- D. The top elevation of the constructed riffle shall be as indicated on the Contract Documents. Finished grades and subgrades for constructed riffle will be determined from the height of each stone used.
- E. Structure shall be installed in accordance with the Contract Documents to tolerances of 0.1 feet from established final grade.

### 3.2 Constructed Riffle

- A. Contractor shall place riffle matrix beginning 5 to 10 feet upstream of riffle station continuously until upstream of the pool station, as located in the Contract Documents.

### 3.3 Constructed Riffle with Sill

- A. Constructed riffle with sill includes an expanded riffle sill section upstream of the riffle station point as shown in the Contract Documents.
- B. Contractor shall transition the sill width from the inside bankfull bench to the back of bankfull bench, beginning 5 to 10 feet upstream of riffle station point as shown in the Contract Documents.

### 3.4 Placing Backfill

- A. Place backfill upstream of the installed Constructed Riffle. Work backfill as necessary to distribute it, prevent future settling, and to eliminate detrimental voids. Backfill shall be applied as needed to fill the excavation limits and match the established grade. The use of backfill is limited to locations shown on the Contract Documents or locations approved by GCDWR.
- B. Backfill behind riffle matrix shall be compacted with excavator bucket or approved equivalent. Care shall be taken during compaction to avoid disturbing and/or damaging integrity of the constructed riffle.
- C. Intermix different sizes of pieces to eliminate segregation and to fill voids between larger pieces with smaller pieces and work surface free from irregularities.
- D. Use placement and intermixing methods that avoid disturbing the constructed riffle structure or damaging existing facilities, completed Work, or adjacent property.

## Part 4 Measurement and Payment

### 4.1 Measurement

- A. Constructed Riffle and Constructed Riffle with Sills shall be measured for payment as

described in Section 31 05 16 – Aggregates for Earthwork, Section 31 37 00 – Rip Rap, and Section 31 80 02 – In-Stream and Stormwater Conveyance Structure Materials and paid for under the pertinent Unit Price Item. The length of the constructed riffle area will be measured from the beginning of the upstream glide to the downstream run station, or the downstream in-stream structure as specified in the Contract Documents.

- B. Removal and replacement of unstable or otherwise unsuitable material, beyond the depths and widths indicated in the Contract Documents, where necessary to provide firm foundations or tie-ins, and as directed and approved by GCDWR, shall be eligible for measurement in accordance with Specification Section 31 23 00 – Excavation and Fill. Excavation beyond the depths and widths needed to place structural components, as indicated in the Contract Documents, will not be eligible for additional measurement for payment, without direction or approval from GCDWR.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, equipment, materials, tools, and appliances as required for the installation of toe wood protection as herein specified, shown or ordered.

### 1.2 Definitions

- A. Toe Wood Protection: A streambank structure consisting of natural materials designed to stabilize the channel bank along an outside meander bend. The structure includes the layering of coarse woody debris, small woody debris, and topsoil to create a stable interlocking matrix. Includes all earthwork, materials, and labor as required in accordance with the Contract Documents.
- B. Structure Components
  - 1. Wood Toe Base: The portion of the wood toe protection consisting of coarse woody debris and small woody debris beginning below the stream bed and rising up to an elevation equal to one half bankfull elevation.
  - 2. Sill Log with Root Wad: A large hardwood log with the root ball attached, placed at the upstream and downstream end of the toe wood protection structure, perpendicular to flow with the root wad extending into the proposed channel, and buried flush with top of bankfull bench.
  - 3. Soil Encapsulated Lift: A streambank stabilization technique used to construct a streambank with successive lifts of soil wrapped or encapsulated within erosion control fabric. Includes all earthwork, rock, and geotextiles as required in accordance with the Contract Documents and measured and paid for separately.
- C. Structure Materials
  - 1. Coarse Woody Debris: Woody material composed of logs and large branches, 12 inches to 18 inches in diameter. Woody material shall be gathered from on-site trees and woody plants felled/taken during the clearing and grubbing process. Woody material shall be native and non-invasive species. If woody material is needed to be imported from off-site, approval from GCDWR is required.
  - 2. Small Woody Debris: Woody material composed of limbs and branches 6 inches to 12 inches in diameter. Woody material shall be gathered from on-site trees and woody plants felled/taken during the clearing and grubbing process. Woody material shall be native and non-invasive species. If woody material is needed to be imported from off-site, approval from GCDWR is required.

- D. Over Excavation: Any excavation required for the installation of toe wood protection outside the limits of excavation for the proposed channels. Over excavation shall be limited as described on the Contract Documents. The upstream and bottom limits of over excavation shall be dependent on the size of materials used in the structure, the size of the equipment necessary to install the material, and subject to approval of GCDWR.

### 1.3 Submittals

- A. If requested by GCDWR, submit:
  - 1. Description and location of proposed sources of coarse woody debris and small woody debris material.
  - 2. The size of equipment to be used to install the structures. Include bucket dimensions and the minimum trench width required to maneuver.
  - 3. Photograph(s) clearly documenting installation before backfill is placed over top of structure.

### 1.4 Scheduling and Sequencing

- A. Complete proposed channel excavation and rough grading as specified in Section 31 23 00 - Excavation and Fill and in accordance with the Contract Documents, typical sections and details.
- B. Complete any over excavation in accordance with Contract Documents and installation of geotextiles as specified in Section 31 32 19.16 - Geotextiles, prior to placing of rocks or logs.
- C. After installation of structure proceed with installation of backfill as shown on the Contract Documents.

## Part 2 Products

### 2.1 Wood Material

- A. Coarse woody debris and small woody debris shall be harvested from live specimens. Decaying, rotting woody material will not be accepted.
- B. Coarse woody debris and small woody debris shall be native and non-invasive species.
- C. Coarse woody material shall consist of logs, root wads, and large branches not suitable for construction of log structures 12 inches to 18 inches in diameter. All materials are to be approved by GCDWR.
- D. Small woody material shall consist of medium to small limbs, branches, bushes, and/or logs 6 inches to 12 inches in diameter. All materials are to be approved by

GCDWR.

- E. On-site material from clearing, excavations, or designated borrow sources that meets or is processed to meet requirements specified above may be used as Wood Material in lieu of importing material. Invasive species will not be accepted.
- F. Imported wood material shall meet size specifications outlined in 2.1 C and shall be free from disease and insect infestation and other potentially deleterious material. Native wood material from the site is preferred to imported wood material.
- G. Sill log with root wad shall be a larger hardwood log with rootball still attached harvested from on-site. Logs shall be free of rot or voids and shall have 100% bark cover. Logs shall be a minimum 18 inches in diameter.

## 2.2 Soil

- A. Soil backfill used for lifts and topsoil used for layering with the live branches shall be free of any large roots or woody debris and shall generally be free from any gravel or cobble material.
- B. Soil backfill shall be compacted such that future settling will be kept to a minimum; yet, not such that the underlying brush is displaced or damaged.

## 2.3 Rip Rap

- A. Rip Rap shall be as specified in Section 31 37 00 - Rip Rap.

# Part 3 Execution

## 3.1 Constructing Toe Wood Protection

- A. Notify GCDWR at least one week prior to construction of Toe Wood Protection. GCDWR must be present on-site before Contractor may proceed with construction of Toe Wood Protection.
- B. GCDWR will assist with layout and identify field-adjusted work limits.
- C. Excavate for proposed structure area as shown on Contract Documents.
- D. Sill log with root wad shall be placed at the upstream and downstream ends of the structure.
- E. Rip Rap Type 1 or equivalent shall be placed between sill log and the upstream and downstream ends of structure.
- F. The bottom most layer of toe wood shall consist of coarse woody debris composed of logs and large branches, 12-inch to 18-inch diameter, placed in a herringbone pattern with coarse woody debris pointing in alternating upstream and downstream direction.



- G. Coarse woody debris shall be installed in 1-foot lifts beginning 1 foot below maximum pool depth to a height of approximately one quarter bankfull elevation.
- H. Small woody debris, 6-inch to 12-inch diameter, shall be placed above final lift of coarse woody debris.
- I. Small woody debris shall be installed in 1-foot lifts pointing in alternating upstream and downstream direction to a height of approximately one-half bankfull elevation.
- J. The ends of woody debris shall be pushed into trench slope during each lift.
- K. All woody material shall be compacted with the excavator bucket to reduce the presence of voids in the small/fine woody debris layer.
- L. Wood toe width shall be a minimum one-half bankfull width.
- M. Small and coarse woody debris shall have broken ends rather than clean, straight cuts.
- N. Final lift of small woody debris shall be covered with a 6-inch lift of soil.
- O. Soil encapsulated lifts to be constructed in accordance with Standard Detail 2952 to bankfull elevation or otherwise directed by GCDWR.
- P. The slope created by the coarse and small woody debris layering shall match the proposed cross section shape for the typical pool cross section for each reach as shown in the contract drawings.
- Q. Fill voids with soil and classified stone mix during installation of woody debris mix.

### 3.2 Soil Encapsulated Lifts

- A. Complete soil encapsulated lifts specified in Section 31 80 17 - Soil Encapsulated Lifts and in accordance with the Drawings, typical sections and details.

### 3.3 Finished Surface

- A. The surface of the structure shall be finished to a smooth and compact surface in accordance with the lines, grades, and cross-sections or elevations shown on the Contract Drawings. The degree of finish for elevations shall be within 0.1 foot of the grades and elevations indicated or approved by GCDWR.

END OF SECTION

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## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, equipment, materials, tools, and appliances as required for the installation of live fascines as herein specified, shown, or ordered.

### 1.2 Definitions

- A. Dormant Season: The time of year when plant materials are not actively growing, as shown in the Contract Documents.
- B. Live fascine structure is comprised of live stakes, poles, and/or whips bundled together and placed along the streambank for stabilization. Includes all earthwork, vegetation, and dead stout stakes as required in accordance with the Contract Documents.
- C. Live fascine components consist of 4-foot to 6-foot dormant cuttings of vegetation as listed as live stakes, whip, and/or poles under Sections 32 97 00 - Landscaping.
- D. Structure Materials
  - 1. Live Fascine: 4-foot to 6-foot dormant cuttings of vegetation as listed as live stakes, whip, and/or poles under Sections 32 97 00 - Landscaping.
  - 2. Binder Twine: Rope/string made of natural materials that are 100 percent biodegradable.
  - 3. Dead stout stakes shall be in accordance with Section 31 32 01 - Woven Fabric Stabilization Products.

### 1.3 Scheduling and Sequencing

- A. Complete proposed channel excavation and rough grading as specified in Section 31 23 00 - Excavation and Fill and in accordance with the Contract Documents, typical sections and details.
- B. After installation of structure proceed with installation of backfill as shown on the Contract Documents.

## Part 2 Products

### 2.1 Live Cuttings, Live Poles, And Live Whips

- A. Prior to leaving the harvest site (including commercial source), all live branch cuttings are subject to being inspected for acceptability by GCDWR, as described hereinafter.

1. They shall be healthy, freshly cut, living material.
  2. No invasive vines or plant materials will be permitted to be mixed in with the cuttings.
  3. The cuttings shall be free from insect infestation and disease.
- B. Materials shall meet the requirements of Section 32 97 00 - Landscaping.

## Part 3 Execution

### 3.1 Constructing Live Fascine

- A. Notify GCDWR at least one week prior to construction of live fascine. GCDWR must be present on-site before Contractor may proceed with construction of Live Fascine.
- B. Contractor shall perform any slope repairs, prior to live fascine installation.
- C. Stems shall be placed alternatively (randomly) in each live fascine so that approximately one- half the butt ends are at each end of the live fascine.
- D. Live fascines shall be tied on 9- to 12-inch centers with two wraps of binder twine or heavier tying material with a non-slippage knot.
- E. Live fascines shall be prepared not more than two days in advance of placement except that if kept covered and wet, they may be prepared up to seven days in advance of placement.
- F. Live fascines shall be laid in trenches dug to approximately one-half the diameter of the live fascine, with ends of live fascines overlapping at least 12 inches. The overlap shall be as long as necessary to permit staking.
- G. Live fascines shall be staked firmly in place with dead stout stakes on the downhill side of the live fascine, not more than 18 inches on center and diagonal stakes through the live fascine of not more than 36 inches on center.
- H. Work shall progress from the bottom of the cut or fill toward the top. Each row shall be covered with soil and packed firmly behind and on the uphill side of the live fascine by tamping or by walking on the live fascine as the work progresses or by a combination of these methods.
- I. Place moist soil along the sides of the bundles. The tops of the live fascine shall be slightly visible when the installation is completed.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, equipment, materials, tools, and appliances as required for the installation of stone cascade as herein specified, shown, or ordered. Stone Cascade may also be designated as Cascade elsewhere in the Contract Documents.

### 1.2 Definitions

- A. Stone cascade structure is a shaped rock structure that protects the channel bed and streambank toe from high velocity flows, typically used in systems with steep longitudinal slopes. Includes all earthwork, rock, and geotextiles as required in accordance with the Contract Documents.
- B. Structure Components
  1. Structure Center: The portion of the structure that spans across the channel bed comprised of crest and footer stones.
  2. Rip Rap Footer: Rip rap stone matrix which the footer stones rest on.
  3. Structure Sill: The portion of stone cascade structure at the upstream and downstream end of the cascade which are keyed into rip rap footer matrix.
- C. Structure Materials
  1. Crest and footer stones are large stones used for the construction of stone cascade. Rocks shall consist of the required size and shape shown in the Contract Documents. The rock shall be clean, non-acid forming, sound, dense, resistant to the natural elements, and suitable for the purposes intended.
  2. Type 1 and Type 3 Rip Rap shall be in accordance with Section 31 37 00 – Rip Rap.
- D. Over excavation: any excavation required for the installation of stone cascade outside the limits of excavation for the proposed channels. Over excavation shall be limited as described in the Contract Documents. The upstream and bottom limits of over excavation shall be dependent on the size of the crest and footer stones used in the structure, the size of the equipment necessary to install the material, and subject to approval of GCDWR.

### 1.3 Submittals

- A. If requested by GCDWR, submit:
  1. Description and location of proposed sources of rock and rock backfill material.

2. Samples which shall be delivered to site at location designated by GCDWR. Incorporate Samples into Work after material placement is nearly complete. Samples that may be requested include.
  - a. Rock:
    - i. Crest and Footer Stones meeting minimum shape and size requirements shown on the Contract Drawings.
    - ii. Type 1 Rip Rap
    - iii. Type 3 Rip Rap.
    - iv. Each sample shall meet gradation requirements specified for corresponding rock type. Include at least one piece of maximum size which is representative of material to be furnished for incorporation into Work.
3. Certified Test Results: All Rock Types described in Part 2 of this section, including gradation, abrasion resistance, and bulk density.
4. Truck tickets showing source, type, and weight of each load of material delivered to Site.
5. The size of equipment to be used to install the structures. Include bucket dimensions and the minimum trench width required to maneuver.

## 1.4 Quality Assurance

- A. Rock Source: Quarries shall have produced rock and have performed satisfactorily on other projects and be a GDOT approved quarry. Native, on-site rocks may be used pending approval of GCDWR.
- B. Any rock for use in a stone cascade will be approved individually on-site by GCDWR prior to placement and/or acceptance of the work.

## 1.5 Scheduling and Sequencing

- A. Complete proposed channel excavation and rough grading as specified in Section 31 23 00 – Excavation and Fill and in accordance with the Contract Documents, typical sections and details.
- B. Complete any over excavation in accordance with the Contract Documents.
- C. Install geotextiles as specified in Section 31 32 19.16 - Geotextiles, prior to placing of rocks.
- D. Install rocks as shown on plans.
- E. After installation of structure proceed with installation of backfill as shown on the

Contract Documents.

- F. Install any other stones and rocks in the Stone Cascade, as described in the Contract Documents.

## Part 2 Products

### 2.1 Crest Stones and Footer Stones

- A. Stones shall be as specified in Section 31 80 02 - In-Stream and Stormwater Conveyance Structure Materials.

### 2.2 Other Rocks

- A. Stones shall be as specified in Section 31 80 02 - In-Stream and Stormwater Conveyance Structure Materials.
- B. Type 3 Rip Rap as specified in Section 31 37 00 – Rip Rap.
- C. Rock and stones shall be free of roots and other organic or deleterious matter.
- D. On-site material from clearing, excavations, or designated borrow sources that meets or is processed to meet requirements specified above may be used as rock backfill in lieu of importing material.

### 2.3 Geotextiles

- A. Geotextiles shall be as specified in Section 31 32 19.16 - Geotextiles.

## Part 3 Execution

### 3.1 Constructing Stone Cascade

- A. Notify GCDWR at least one week prior to construction of Stone Cascade. GCDWR must be present on-site before Contractor may proceed with construction of Stone Cascade.
- B. Excavate proposed channel reach as shown in the Contract Documents.
- C. Finished grades and subgrades for stones will be determined from the height of each stone used.
- D. If the subgrade to receive each stone is unstable or contains otherwise unsuitable material, the unsuitable material shall be excavated and removed. Approved material shall be placed in a maximum of 12-inch lifts and compacted with excavator bucket or approved equivalent to reestablish the subgrade of each stone. Unsuitable material shall be removed from the Project site and disposed of by Contractor. Removal and replacement of unstable material shall only

be performed at the direction of GCDWR and shall be eligible for Additional Excavation and Spoil Removal in accordance with Specification Section 31 23 00 – Excavation and Fill.

- E. Place Rip Rap footer to the depth as shown in the Contract Documents. Install cascade footer stones at beginning and end station of stone cascade, ensuring the proper depth as shown in the Contract Documents.
- F. Crest stones shall be installed in accordance with the Contract Documents to tolerances of 0.1 foot from established final grade. The top of all stone elevations shall be as indicated in the Contract Documents. The stones shall be carefully picked and arranged so that adjacent rock surface elevations match within 0.1 foot in top elevation and 2 inches along the vertical exposed face or channel side of rock. Stones shall be placed such that adjacent stones “touch” each other and voids do not exceed 4 inches. It is the intent of construction to minimize voids between stones. Stones shall be placed such that upstream stones are wedged up against downstream stones, to prevent downstream movement of stones.
- G. Grout voids between the stones as directed by GCDWR and in accordance with Section 03 62 00, Non-shrink Grouting.
- H. Contractor shall install coir fabric, as shown in the Contract Documents, along both sides of the cascade where it intersects the streambank.

### 3.2 Placing Backfill

- A. Place backfill upstream of the installed rock structure stones. Work backfill as necessary to distribute it, prevent future settling, and to eliminate detrimental voids. Backfill shall be applied as needed to fill the excavation limits and match the established grade. The use of backfill is limited to locations shown in the Contract Documents or locations approved by GCDWR.
- B. Backfill behind stones shall be compacted with excavator bucket or approved equivalent. Care shall be taken during compaction to avoid disturbing and/or damaging integrity of the Cascade.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, equipment, materials, tools, and appliances as required for the installation of soil encapsulated lifts (SEL) as herein specified, shown, or ordered.

### 1.2 Definitions

- A. Soil encapsulated lift structure is a streambank stabilization technique used to construct a streambank with successive lifts of soil wrapped or encapsulated within erosion control fabric. Includes all earthwork, rock, and geotextiles as required in accordance with the Contract Documents.
- B. Structure Components
  1. Stone Base: The lowest portion of the structure, comprised of Type 3 Rip Rap, installed as shown in the Contract Documents.
  2. Coir Fiber Block: Structural portion of a lift, typical used along the face of a lift to provide structural integrity for the lower soil lifts.
  3. Soil Lift: Soil layer, typically in 12-inch lifts, wrapped in single layer of coir fabric.
  4. Tail: The length of coir fabric along the bottom and top of each soil lift, measured from behind the coir fiber block (or from the face of the lift for SELs constructed without Coir Fiber Blocks).
- C. Structure Materials
  1. Type 3 rip rap shall be in accordance with per Section 31 37 00 – Rip Rap
  2. Live Stakes shall be 2-foot to 3-foot dormant cuttings of vegetation as listed as live stakes under Sections 32 97 00 - Landscaping. Diameter shall be 0.5 to 1 inch.
  3. Dead Stout Stakes shall be in accordance with Section 31 32 01 - Woven Fabric Stabilization Products.
  4. Coir Fabric shall be in accordance with Section 31 32 01 - Woven Fabric Stabilization Products.
  5. Over excavation shall be excavation required for the installation of soil encapsulated lifts outside the limits of excavation for the proposed channels. Over excavation shall be limited as described on the Contract Documents.



### 1.3 Submittals

- A. If requested by GCDWR, submit:
1. Description and location of proposed sources of rock material.
  2. Samples which shall be delivered to site at location designated by GCDWR. Incorporate Samples into Work after material placement is nearly complete. Samples that may be requested include:
    - a. Rock:
      - i. Type 3 Rip Rap.
      - ii. Each sample shall meet gradation requirements specified for corresponding rock type. Include at least one piece of maximum size which is representative of material to be furnished for incorporation into Work.
  3. Certified Test Results: All Rock Types described in Part 2 of this section, including gradation, abrasion resistance, and bulk density.
  4. Truck tickets showing source, type, and weight of each load of material delivered to Site.
  5. The size of equipment to be used to install the structures. Include bucket dimensions and the minimum trench width required to maneuver.
  6. Description of soil encapsulated in coir fabric, including USCS classification and maximum dry density and optimum moisture content, as determined by ASTM D 698.

### 1.4 Quality Assurance

- A. Rock Source: Quarries shall have produced rock and have performed satisfactorily on other projects and be a GDOT approved quarry. Native, on-site rocks may be used pending approval of GCDWR.
- B. Rock for use in a SEL Structure will be approved on-site by GCDWR prior to placement and/or acceptance of the work.
- C. Soil for use in a SEL Structure will be approved on-site by GCDWR, prior to placement and/or acceptance of the work.

### 1.5 Scheduling and Sequencing

- A. Complete proposed channel excavation and rough grading as specified in Section 31 23 00 - Excavation and Fill and in accordance with the Contract Documents, typical sections and details.

- B. Complete any over excavation in accordance with the Contract Documents and installation of geotextiles as specified in Section 31 32 19.16 - Geotextiles, prior to placing of rocks.
- C. Install stone base as shown on plans.
- D. Install successive soil encapsulated lifts as shown on plans.
- E. After installation of the structure, place live stakes in Soil Encapsulated Lifts as shown on plans.

## Part 2 Products

### 2.1 Rocks

- A. Type 3 Rip Rap shall be in accordance with Section 31 37 00 – Rip Rap
- B. Rocks and stones shall be free of roots and other organic or deleterious matter.
- C. On-site material from clearing, excavations, or designated borrow sources that meets or is processed to meet requirements specified above may be used as rock backfill in lieu of importing material.

### 2.2 Coir Fiber Block

- A. Coir fiber block shall be composed of 100 percent natural, spun mattress coir yarn interlaced to form woven mat with uniform weave pattern.
- B. Coir fiber block shall be calendared or finished so yarns will retain their relative position with respect to each other.
- C. Unseamed Sheet Width: Minimum 8 feet.
- D. Physical Properties: Conform to requirements in Table 1.
- E. Equivalent substitute products to those listed in Table 1 will be acceptable only with approval from GCDWR.

**Table-1**  
**Physical Property Requirements for Coir Woven Geotextile**

Property	Test Method	Coir Fiber Block (for SELs)
Weight (lb/ft)		4.2 Min
Weight (oz./sq. yd)	ASTM D5261	-
Weight (grams/sw.m)	ASTM D5261	-
Dry Tensile Strength (lbs/ft)	ASTM D4595	1,176 Min.

**Table-1  
Physical Property Requirements for Coir Woven Geotextile**

Property	Test Method	Coir Fiber Block (for SELs)
Wet Tensile Strength (lbs/ft)	ASTM D4595	1,032 Min.
Ultimate Tensile Strength (MDxCD) (lbs/ft.)	ASTM D5035	-
Tensile elongation (ultimate) CD (lbs/ft.)	ASTM D5035	-
% Open area	Calculated	-
Thickness (inch)	ASTM D1777	12
Recommended slope	-	>1:1
Recommended flow velocity (fps)	-	12
Recommended shear stress (lbs/sq. ft)	-	4.5
Ground Cover	Light Projection	-
"C" Factor	-	.002

## 2.3 Geotextiles

- A. Geotextiles, which is designated as filter fabric on the Detail Drawing, as specified in Section 31 32 19.16 - Geotextiles.

## Part 3 Execution

### 3.1 Constructing Soil Encapsulated Lifts

- A. Notify GCDWR at least one week prior to construction of Soil Encapsulated Lifts. GCDWR must be present on-site before Contractor may proceed with construction of Soil Encapsulated Lifts.
- B. Excavate a trench for the rip rap base.
- C. Install Type 3 Rip Rap base.
- D. Place a layer(s) of coir fabric over the rip rap base and leave enough length to wrap over the compacted soil of the lift. Top and bottom edges of fabric shall be embedded a minimum of three feet.
- E. Place the soil and coir fiber block, on the fabric and compact, as indicated in the Contract Documents or as directed by GCDWR.

- F. Seed the compacted soil where it will be exposed to sunlight.
- G. Wrap the fabric tightly over the compacted soil and stake the fabric at the back of the lift. Make sure that the upstream and downstream ends of the lift transition smoothly and are secure keyed into the existing streambank.
- H. Soil Encapsulated Lifts shall be completed until the bank height is reached as shown on the Contract Documents.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, equipment, materials, tools, and appliances as required for the installation of stormwater outfall steps as herein specified, shown, or ordered.

### 1.2 Definitions

- A. Stormwater Outfall Steps: Shaped rock structure, located at a stormwater outfall, that protects the channel bed elevation and streambank toe from high velocity flows. Includes all earthwork, rock, and geotextiles as required in accordance with the Contract Drawings.
- B. Structure Components
  1. Step Stone: The center portion of the structure that spans across the outfall comprised of crest and footer stones.
  2. Side Stone: The portion of Stormwater Outfall Steps structure that lay on both sides of the step stone comprised of crest and footer stone.
  3. Rock Landing: If specified by the Contract Documents, a flat or depressed landing area between Step Stones, consisting of rip rap or other classified stone, installed to dissipate energy.
- C. Structure materials
  1. Crest and footer stones are large stones used for the construction of stormwater outfall steps. The rock shall consist of the required size and shape shown on the Contract Drawings. The rock shall be sound, dense, resistant to the natural elements, and suitable for the purposes intended.
  2. Type 3 rip rap shall be in accordance with Section 31 37 00 – Rip Rap.
  3. No. 3, No. 4, and No. 57 stone or other coarse aggregate shall be in accordance with GDOT Standard Specifications Section 800.
  4. River Rock and Riffle Cobble shall be in accordance with Section 31 80 02 – In-Stream and Stormwater Conveyance Structure Materials.
- D. Over Excavation: Any excavation required for the installation of Cross-Vane structure outside the limits of excavation for the proposed channels. Over excavation shall be limited as described on the Contract Documents. The upstream and bottom limits of over excavation shall be dependent on the size of the crest and footer stones used in the structure, the size of the equipment necessary to install the material, and subject to approval of GCDWR.

### 1.3 Submittals

- A. If requested by GCDWR, submit:
1. Description and location of proposed sources of rock and rock backfill material.
  2. Samples which shall be delivered to site at location designated by GCDWR. Incorporate Samples into Work after material placement is nearly complete. Samples that may be requested include:
    - a. Rock:
      - i. Crest and Footer Stones meeting minimum shape and size requirements shown on the Contract Drawings.
      - ii. Type 3 Rip Rap.
      - iii. Coarse Aggregate Stone, include No. 3, No. 4 and No. 57 Stone or other coarse aggregate material.
      - iv. River Cobble
      - v. Riffle Rock
      - vi. Each sample shall meet gradation requirements specified for corresponding rock type. Include at least one piece of maximum size which is representative of material to be furnished for incorporation into Work.
  3. Certified Test Results: All Rock Types described in Part 2 of this section, including gradation, abrasion resistance, and bulk density.
  4. Truck tickets showing source, type, and weight of each load of material delivered to Site.
  5. The size of equipment to be used to install the structures. Include bucket dimensions and the minimum trench width required to maneuver.

### 1.4 Quality Assurance

- A. Rock Source: Quarries shall have produced rock and have performed satisfactorily on other projects for at least 5 years. Native, on-site rocks may be used pending approval of GCDWR.
- B. Any rock for use in a Stormwater Outfall Steps is subject to being approved individually on-site by GCDWR prior to placement and/or acceptance of the work.

## 1.5 Scheduling and Sequencing

- A. Complete proposed channel excavation and rough grading as specified in Section 31 23 00 - Excavation and Fill and in accordance with the Contract Drawings, typical sections and details.
- B. Complete any excavation in accordance with the Contract Drawings and installation of geotextiles as specified in Section 31 32 19.16 - Geotextiles, prior to placing of rocks.
- C. After installation of structure proceed with installation of backfill as shown on the Contract Drawings.

## Part 2 Products

### 2.1 Crest Stones and Footer Stones

- A. Stones shall be as specified in Section 31 80 02 - In-Stream and Stormwater Conveyance Structure Materials.
- B. On-site material from clearing, excavations, or designated borrow sources that meets or is processed to meet requirements specified above may be used as rock backfill in lieu of importing material.

### 2.2 Other Rocks

- A. Riffle Rock and River Cobble shall be as specified in Section 31 80 02 - In-Stream and Stormwater Conveyance Structure Materials.
- B. Type 3 Rip Rap shall be as specified in Section 31 37 00 – Rip Rap.
- C. Coarse Aggregate Stone, including No. 3, No.4, and No. 57 stone, shall be as specified in Section 31 05 16 – Aggregates for Earthwork.
- D. Rocks and stones shall be free of roots and other organic or deleterious matter.
- E. On-site material from clearing, excavations, or designated borrow sources that meets or is processed to meet requirements specified above may be used as rock backfill in lieu of importing material.

### 2.3 Geotextiles

- A. Geotextiles shall be as specified in Section 31 32 19.16 - Geotextiles.

## Part 3 Execution

### 3.1 Constructing Stormwater Outfall Steps

- A. Notify GCDWR at least one week prior to construction of Stormwater Outfall Steps. GCDWR must be present on-site before Contractor may proceed with construction of Stormwater Outfall Steps.
- B. Excavate for proposed stormwater outfall steps as shown on the Drawings.
- C. If the subgrade to receive each stone is unstable or contains otherwise unsuitable material, the unsuitable material shall be excavated and removed. Approved material shall be placed in a maximum of 12-inch lifts and compacted with excavator bucket or approved equivalent to reestablish the subgrade of each stone. Unsuitable material shall be removed from the Project site and disposed of by Contractor. Removal and replacement of unsuitable material shall only be performed at the direction of GCDWR and shall be eligible for Additional Excavation and Spoil Removal in accordance with Specification Section 31 23 00 – Excavation and Fill.
- D. The top of all stone elevations shall be as indicated on the Contract Drawings. Finished grades and subgrades for stones will be determined from the height of each stone used.
- E. Install the geotextiles as shown on the Drawings and in accordance with Section 31 32 19.16 - Geotextile Soil Stabilization.
- F. Place crest and footer stones on geotextile without puncturing or damaging geotextile. If accidentally damaged, repair geotextile prior to proceeding. Crest stone structures shall be installed in accordance with the Contract Drawings to tolerances of 0.1 foot from established final grade.
- G. The stones shall be carefully selected and arranged so that adjacent rock surfaces match within 0.1 foot in top elevation and 2 inches along the vertical exposed face or channel side of rock. Stones shall be placed such that adjacent stones “touch” each other and voids do not exceed 4 inches. It is the intent of construction to minimize voids between stones. Stones shall be placed such that upstream stones are wedged up against downstream stones, to prevent downstream movement of stones.
- H. Smaller rocks shall be “chinked in” to fill all voids between the stones. Placement shall be approved by GCDWR. Fill voids between the stones with Size No. 57 stone or grout in accordance with Section 03 62 00 - Non-Shrink Grouting, as directed by GCDWR.
- I. Contractor shall, if deemed necessary, support the stones from falling over before and during the placement of rip rap, backfill, and compaction Work on either side of the stone.



### 3.2 Placing Backfill

- A. Place backfill upstream of the installed rock structure stones. Work backfill as necessary to distribute it, prevent future settling, and to eliminate detrimental voids. Backfill shall be placed as needed to fill the excavation limits and match the established grade. The use of backfill is limited to locations shown on the Drawings or locations approved by GCDWR.
- B. Backfill behind stones shall be compacted with excavator bucket or approved equivalent. Care shall be taken during compaction to avoid disturbing and/or damaging integrity of the Stormwater Outfall Steps.
- C. Install Rock Landing Stone as indicated in the Contract Documents, or as directed by GCDWR.
- D. Intermix different sizes of stone to eliminate segregation and to fill voids between larger pieces with smaller pieces and work surface free from irregularities.
- E. Use placement and intermixing methods that avoid disturbing the Stormwater Outfall Steps structure and the underlying geotextile or damaging existing facilities, completed Work, or adjacent property.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes the performance of labor not considered incidental to work described elsewhere in these Contract Documents for the following categories of labor: foreman, laborer, surveyor, and technical laborer.

### 1.2 Definition

- A. The work covered by this specification consists of the Contractor providing all labor for the identified categories:
  1. Foreman shall be defined as those employees of the Contractor or Subcontractor whose normal work duties include the supervision of daily operations of laborers, equipment operators, and equipment and are paid by the Contractor or Subcontractor at the rate of Foreman.
  2. Laborer shall be defined as those employees of the Contractor or Subcontractor whose normal work duties include manual labor and operation of hand equipment and are paid by the Contractor or subcontractor at the rate of laborer.
  3. Surveyor shall be defined as those employees of the Contractor or subcontractor whose normal work duties include activities outlined in Section 01 71 23.16 – Construction Surveying, Article 3.3 Construction Survey and are paid by the Contractor or subcontractor at the rate of Surveyor. All survey work eligible for payment under this category must be performed under the responsible charge of Professional Land Surveyor (PLS) licensed in the State of Georgia.
  4. Technical Laborer shall be defined as those employees of the Contractor or subcontractor whose normal work duties include technical labor and may require certifications including Landscape Industry Certified Manager as recognized by a Certified Arborist as recognized by the International Society of Arboriculture (ISA), or Certified Professional Horticulturist as recognized by the American Society for Horticultural Science (ASHS).

### 1.3 Submittals

- A. Labor Estimate: An estimate of labor usage shall be submitted to GCDWR for approval prior to commencing Work.
- B. Payroll Report: Upon request from GCDWR, Contractor shall furnish a weekly statement with respect to the wages paid each employee during the preceding week, in accordance with labor category defined herein and submitted to GCDWR for approval for payment. Weekly statements shall include Contractor or Subcontractor name, address, payroll number, date, project, location, worker's full name, labor category, daily hours, total hours, and extension of each Laborer, Foreman, and

Surveyor in accordance with Unit Price Schedule.

## Part 2 Products

(Not Used)

## Part 3 Execution

(Not Used)

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, fuel, equipment, maintenance, transportation methods, and materials necessary to operate heavy equipment as recorded in field log and verified by GCDWR. The Work included in this section shall be used for all heavy equipment used on-site, not considered incidental elsewhere and specifically requested by GCDWR. All heavy equipment used as incidental to other items of the Work shall meet the requirements of this section.

### 1.2 Definitions

- A. Heavy Equipment shall be defined as those types listed under Article 1.4 of this section or other equipment utilized on the project as directed by GCDWR. Heavy Equipment must be in sound workable condition, owned or controlled by the Contractor, or obtained from a commercial rental or lease source, and furnished for use under the Contract.

### 1.3 Submittals

- A. Heavy Equipment Estimate: An estimate of extended equipment usage shall be submitted to GCDWR for approval prior to commencing work.
- B. Field Logs: Upon request from GCDWR, Contractor shall furnish a weekly statement with respect to equipment usage during the preceding week, per equipment category defined herein and submitted to GCDWR for approval for payment. Field Logs shall be logged daily and include Contractor or Subcontractor name, address, field log number, date, project, location, operator name, equipment name and hours of use.

### 1.4 Heavy Equipment

- A. Tracked Excavator w/Hydraulic Thumb (30,000 – 50,000 lbs.)
- B. Mini Excavator (6,000 – 20,000 lbs.)
- C. Rubber Tire Loader
- D. Four-Wheel Drive (4WD) Rubber Tire Loader
- E. Skid Steer Loader (3,500 lbs.)
- F. Dump Truck (Single-Axle)
- G. Dump Truck (Dual-Axle)
- H. Dump Truck (Tri-/Quad- Axle)

- I. Tracked Dump Truck
- J. Off-Highway Dump Truck
- K. Regenerative Air Street Sweeper

## Part 2 Products

(Not Used)

## Part 3 Execution

### 3.1 Operation

- A. All heavy equipment shall be operated by qualified personnel within the working tolerance of each piece of equipment and in a manner consistent with OSHA Heavy Equipment and Powered Industrial Truck Use.
- B. All equipment shall be cleaned and the surface (wheels, tracks, arms, etc.) shall be free of soil, petroleum products, vegetation, miscellaneous debris, etc., in order to prevent the transportation, introduction, and spread of invasive plant species and/or chemical contamination from one project site to another.
- C. Equipment shall be in good operating condition and well maintained with emphasis on preventing oil, fuel, and other fluid leaks. Equipment observed to be leaking fluids shall be removed immediately from areas adjacent (within 50 feet) to any water body (wetland, stream, pond, etc.) and repaired or removed from the site.
- D. Equipment maintenance operations are considered incidental to the project work. There will be no separate measurement and/or payment for maintenance work.

## Part 4 Measurement and Payment

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, equipment, and materials necessary to install asphalt paving as indicated on the Drawings, or as directed by GCDWR.
- B. This section provides general requirements for asphalt paving work. However, it is the Contractor's responsibility to ensure all asphalt paving work meets the requirements of the prevailing Georgia Department of Transportation Standard Specifications Construction of Transportation Systems (GDOT Standard Specifications).

### 1.2 Submittals

- A. If required by GCDWR, submit for approval all schedules of materials, methods and mix parameters proposed to be followed in the execution of the Work under this item. Submittals shall be as required by and in accordance with the GDOT Standard Specifications.
- B. Preconstruction Conditions: Submit photographs or videotape, sufficiently detailed, of existing conditions of project site that might be misconstrued as damage, caused by debris, or construction material removal.

## Part 2 Products

### 2.1 Products

- A. All products shall be in accordance with the GDOT Standard Specifications.

## Part 3 Execution

### 3.1 Preparation

- A. Preparation shall be in accordance with the GDOT Standard Specifications.

### 3.2 Construction

- A. Provide GCDWR at least 24 hours' notice prior to beginning construction or prior to resuming production if operations have been temporarily suspended.
- B. All paving operations shall be in accordance with the GDOT Standard Specifications.

### 3.3 Quality Acceptance

- A. Quality Acceptance shall be in accordance with the GDOT Standard Specifications.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, equipment, and materials necessary to construct the concrete unit paving as indicated on the Drawings and as specified herein.
- B. This section provides general requirements for providing labor, materials, and equipment for the installation of sidewalks, walking trails, and parking facilities using concrete unit pavers.

### 1.2 Submittals

- A. If requested by GCDWR, submit for approval all working drawings and schedules of materials and methods proposed to be followed in the execution of the Work under this item.
- B. Submittals shall show in detail the size, location, dimensions, and accessories to be used in construction. Include information for unit paver and edge restraint product data, unit paver and edge restraint product test reports, and sieve analysis for aggregate base and/or setting-bed materials indicating compliance with standards and requirements specified herein. The Contractor shall receive approval from GCDWR before any materials may be delivered at the jobsite.

### 1.3 Quality Control

- A. Source Limitations: Obtain each type of unit paver, joint material, and setting material from single source with resources to provide materials and products of consistent quality in appearance and physical properties.
- B. Mockups: When requested by GCDWR, build mockups to verify selections made under product data submittals for color, size, shape, joint pattern, etc., to demonstrate aesthetic effects and to set quality standards for materials and execution.

### 1.4 Delivery, Storage, and Handling

- A. Store pavers on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.
- B. Store aggregates where grading and other required characteristics can be maintained, and contamination avoided.

### 1.5 Field Conditions

- A. Cold Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace



unit paver work damaged by frost or freezing.

## Part 2 Products

### 2.1 Standard Concrete Pavers

- A. Solid interlocking paving units complying with ASTM C 936, made from normal-weight aggregates.
- B. Thickness: Minimum 3-1/8 inches unless otherwise shown or indicated.
- C. Face Size and Shape: Manufacturer's standard within the specified pattern designation.
- D. Color: As selected by GCDWR.

### 2.2 Permeable Interlocking Concrete Pavers

- A. Permeable interlocking concrete pavers shall meet the requirements of Paragraph 2.1.

### 2.3 Concrete Grid Paver Units

- A. Concrete Grid Units shall comply with the material standards set forth in ASTM C 1319.
- B. Thickness: Minimum 3-1/8 inches unless otherwise shown or indicated.
- C. Infill material shall meet the requirements of Paragraph 2.1 of Specification Section 31 05 16 – Aggregates for Earthwork or Paragraph 2.1 of Specification Section 32 91 13 – Soil Preparation, unless otherwise specified in the Contract Documents or directed by GCDWR.

### 2.4 Curbs and Edge Restraints

- A. Class AA1 concrete as specified in 03 30 00 Cast-In-Place Concrete.

### 2.5 Aggregate Subbase, Base and Setting-Bed Materials

- A. General:
  - 1. Aggregates for Permeable Interlocking Concrete Pavers and Concrete Grid Paver Units shall be washed clean and free of deleterious materials and meet the gradation and other aggregate requirements of the Contract Documents.
  - 2. Where no gradation is specified, aggregates shall meet the gradation requirements herein or as otherwise approved by GCDWR.

- B. Aggregate for Subbase: Sound, crushed stone or gravel complying with ASTM D 448.
  - 1. Standard Concrete Unit Pavers: Size No. 57 Stone
  - 2. Permeable Interlocking Concrete Unit Pavers: Size No. 3 Stone.
- C. Aggregate for Base: Sound, crushed stone or gravel complying with ASTM D 448.
  - 1. Standard Concrete Unit Pavers: Size No. 8 Stone
  - 2. Permeable Interlocking Concrete Unit Pavers: Size No. 57 Stone.
  - 3. Concrete Grid Paver Units: Size No. 57 Stone
- D. Aggregate for Bedding/Leveling Course:
  - 1. Standard Concrete Unit Pavers: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C 33 for fine aggregate.
  - 2. Permeable Interlocking Concrete Unit Pavers: Sound, crushed stone or gravel complying with ASTM D 448 for Size No. 89 Stone.
  - 3. Concrete Grid Paver Units: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C 33 for fine aggregate or sound, crushed stone or gravel complying with ASTM D 448 for Size No. 89 Stone.
- E. Aggregate for Joint Opening/Filler
  - 1. Standard Concrete Unit Pavers: Fine, sharp, washed, natural sand or crushed stone with 100 percent passing No. 16 sieve and no more than 10 percent passing No. 200 sieve.
  - 2. Permeable Interlocking Unit Pavers: Sound, crushed stone or gravel complying with ASTM D 448 for Size No. 89 Stone or as recommended by manufacturer.

## 2.6 Geotextile

- A. Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; complying with AASHTO M 288 Survivability Class 2 and the following, measured according to test methods referenced:
  - 1. Apparent Opening Size: No. 40 (0.425-mm) sieve, maximum; ASTM D 4751.
  - 2. Permittivity: 0.5 per second, minimum; ASTM D 4491.
  - 3. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

## 2.7 Underdrain piping

- A. Underdrain piping for permeable interlocking concrete pavers shall meet the requirements of Paragraph 2.2 of Specification Section 33 42 11 – Stormwater Gravity Piping, unless otherwise specified in the Contract Documents or approved by GCDWR.

## Part 3 Execution

### 3.1 Examination

- A. Examine surfaces indicated to receive unit paving, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Confirm that subgrade on which permeable pavers are to be installed has not been compacted, unless compaction is specified in the Contract Documents or directed by GCDWR. Where the infiltrative capacity of the subgrade has been reduced during construction or implementation of the work as a result of undue compaction, Contractor shall correct such areas of subgrade in accordance with the requirements of Specification Section 31 23 13 – Subgrade Preparation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 Preparation

- A. Remove substances from concrete substrates that could impair mortar bond, including curing and sealing compounds, form oil, and laitance.
- B. Sweep concrete substrates to remove dirt, dust, debris, and loose particles.
- C. Prepare subgrade in accordance with Section 31 23 13 – Subgrade Preparation and as specified in the Contract Documents. Identify and correct soft pockets, areas of excess yielding, and any other areas of deficient or otherwise unsuitable subgrade. Proceed with unit paver installation only after deficient subgrades have been corrected and are ready to receive subbase and base course for unit pavers.

### 3.3 Installation, General

- A. Do not use unit pavers with chips, cracks, voids, discolorations, or other defects that might be visible or cause staining in finished work.
- B. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.
- C. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not

acceptable. For concrete pavers, a block splitter may be used.

- D. Joint Pattern: As indicated.
- E. Tolerances:
  - 1. Standard Concrete Unit Pavers: Do not exceed 1/32-inch unit-to-unit offset from flush (lippage) nor 1/8 inch in 10 feet from level, or indicated slope, for finished surface of paving.
  - 2. Permeable Interlocking Concrete Pavers and Concrete Grid Paver Units: Do not exceed 1/8-inch unit-to-unit offset from flush (lippage) nor 3/8 inch in 10 feet from level, or indicated slope, for finished surface of paving.
- F. Provide edge restraints as indicated. Install edge restraints before placing unit pavers.
- G. Install job-built concrete edge restraints to comply with requirements in Section 03 30 00 - Cast-in-Place Concrete.
- H. Use aggregate sizes specified in the Contract Documents. If none are specified use the aggregate sizes indicated in Paragraphs 3.4, 3.5, and 3.6, for the appropriate paver type, meeting the requirements of Paragraph 2.5.

### 3.4 Concrete Unit Pavers

- A. Compact soil subgrade uniformly to at least 98 percent of ASTM D 698 laboratory density.
- B. Place aggregate subbase and base, in maximum 6-inch lifts. For each lift make at least two passes in the vibratory mode and at least two passes in the static mode with a minimum 10-ton vibratory roller until there is no visible movement of the aggregate stone. Do not crush the aggregate with the roller. Where subbase dimensions preclude the use of a 10-ton vibratory roller, alternative compaction methods may be used as approved by GCDWR.
- C. Place leveling course and screed to a thickness of 1 inch or greater if required by unit paver manufacturer, taking care that moisture content remains constant at specified percent and density is loose and uniform until pavers are set and compacted.
- D. Treat leveling course with herbicide to inhibit growth of grass and weeds, unless otherwise indicated in the Contract Documents or where prohibited by regulations.
- E. Set pavers with a minimum joint width of 1/16 inch and a maximum of 1/8 inch, being careful not to disturb leveling base. If pavers have spacer bars, place pavers hand tight against spacer bars. Use string lines to keep straight lines. Fill gaps between units that exceed 3/8 inch with pieces cut to fit from full-size unit pavers. When installation is performed with mechanical equipment, use only unit pavers with spacer bars on sides of each unit.
- F. Vibrate pavers into leveling course with a low-amplitude plate compactor capable of

a 3,500 to 5,000 pound-force (lbf) compaction force at 80 to 90 Hz. Use compactor with neoprene mat on face of plate or other means as needed to prevent cracking and chipping of pavers. Perform at least three passes across paving with compactor.

1. Compact pavers when there is sufficient surface to accommodate operation of vibrator, leaving at least 36 inches of uncompacted pavers adjacent to temporary edges.
  2. Before ending each day's work, compact installed concrete pavers except for 36-inch width of uncompacted pavers adjacent to temporary edges (laying faces).
  3. As work progresses to perimeter of installation, compact installed pavers that are adjacent to permanent edges unless they are within 36 inches of laying face.
  4. Before ending each day's work and when rain interrupts work, cover pavers that have not been compacted and cover leveling course on which pavers have not been placed with non-staining plastic sheets to protect them from rain.
- G. Spread dry sand and fill joints immediately after vibrating pavers into leveling course. Vibrate pavers and add sand until joints are completely filled, then remove excess sand. Leave a slight surplus of sand on the surface for joint filling.
- H. Do not allow traffic on installed pavers until sand has been vibrated into joints.
- I. Repeat joint-filling process 30 days later.

### 3.5 Permeable Interlocking Concrete Pavers

- A. Areas to be paved will be compacted and brought to subgrade elevation in accordance with the Contract Documents and Specification Section 31 23 13 – Subgrade Preparation before work of this section is performed.
- B. Place geotextile on bottom and sides of soil sub-grade, unless otherwise specified in the Contract Documents, and secure in place to prevent wrinkling. Overlap geotextile a minimum of 24 inches in the direction of drainage.
- C. Place and spread No. 3 aggregate subbase in 6-inch lifts. For each lift make at least two passes in the vibratory mode and at least two passes in the static mode with a minimum 10-ton vibratory roller until there is no visible movement of the No. 3 stone. Do not crush the aggregate with the roller. The surface tolerance of the No. 3 subbase shall be  $\pm 3/4$  inch over a 10-foot straight edge. Where subbase dimensions preclude the use of a 10-ton vibratory roller, alternative compaction methods may be used as approved by GCDWR.
- D. Do not compact directly over underdrain pipe. Material over underdrain pipe shall be tamped in place only when a minimum of 6 inches of cover is provided over underdrain pipe.

- E. Place and spread No. 57 aggregate base in one 4-inch-thick lift. On this layer make as least two passes in the vibratory mode and at least two passes in the static mode with a minimum 10-ton vibratory roller until there is no visible movement of the No. 57 stone. Do not crush the aggregate with the roller. The surface tolerance of the No. 57 base shall be  $\pm 3/4$  inch over a 10-foot straight edge. Where subbase dimensions preclude the use of a 10-ton vibratory roller, alternative compaction methods may be used as approved by GCDWR.
- F. Place and spread No. 89 aggregate leveling course in a 2-inch-thick lift, screeding and leveling the material for paver placement. The surface tolerance of the No. 89 leveling course shall be  $\pm 3/8$  inch over a 10-foot straight edge.
- G. Lay paving units in the pattern(s) and joint widths as shown on the Contract Documents. Maintain straight pattern lines.
- H. Fill gaps at the edges of the paved area with cut units. Cut pavers subject to tire traffic shall be no smaller than  $1/3$  of a whole unit.
- I. Fill the openings and joints with No. 89 stone. Remove excess aggregate by sweeping pavers clean.
- J. Seat pavers into leveling course with a low-amplitude plate compactor capable of a 3,500 to 5,000 pound-force (lbf) compaction force at 80 to 90 Hz. Use compactor with neoprene mat on face of plate or other means as needed to prevent cracking and chipping of pavers. Perform at least two passes across paving with compactor.
  - 1. Compact pavers when there is sufficient surface to accommodate operation of vibrator, leaving at least 36 inches of uncompacted pavers adjacent to temporary edges.
  - 2. Before ending each day's work, compact installed concrete pavers except for 36-inch width of uncompacted pavers adjacent to temporary edges (laying faces).
  - 3. As work progresses to perimeter of installation, compact installed pavers that are adjacent to permanent edges unless they are within 36 inches of laying face.
  - 4. Before ending each day's work and when rain interrupts work, cover pavers that have not been compacted and cover leveling course on which pavers have not been placed with non-staining plastic sheets to protect them from rain.
- K. Apply additional aggregate to the openings and joints if needed, filling them completely. Remove excess aggregate by sweeping then compact the pavers, performing at least two passes with the plate compactor.
- L. Do not allow traffic on installed pavers until joints have been filled and compacted.
- M. Repeat joint-filling process 30 days later.

### 3.6 Concrete Grid Paver Units

- A. Areas to be paved will be compacted and brought to subgrade elevation in accordance with the Contract Documents and Specification Section 31 23 13 – Subgrade Preparation before work of this section is performed.
- B. Place and spread No. 57 aggregate base in one 4-inch-thick lift. On this layer make as least two passes in the vibratory mode and at least two passes in the static mode with a minimum 10-ton vibratory roller until there is no visible movement of the No. 57 stone. Do not crush the aggregate with the roller. The surface tolerance of the No. 57 base shall be  $\pm 3/8$  inch over a 10-foot straight edge. Where subbase dimensions preclude the use of a 10-ton vibratory roller, alternative compaction methods may be used as approved by GCDWR.
- C. Place sand or No. 89 stone bedding layer over the base course and screed uniformly to 1/2 to 1 inch. Place sufficient bedding to stay ahead of the laid grids.
- D. Ensure the grid units are free from foreign materials before installation.
- E. Lay the grid units on the bedding course in the patterns shown on the Contract Documents. Maintain straight joint lines.
- F. Joints between grids shall not exceed 3/16-inch.
- G. Fill gaps at the edges of the paved area with cut grids or edge units.
- H. Sweep infill material, as specified in the Contract Documents, into the joints and openings until fill.
- I. Sweep the grid surface clear prior to compacting.
- J. Seat grids into bedding course with a low-amplitude plate compactor capable of a 3,500 to 5,000 pound-force (lbf) compaction force at 80 to 90 Hz. Use compactor with neoprene mat on face of plate or other means as needed to prevent cracking and chipping of pavers. Perform at least two passes across paving with compactor.
  - 1. Compact grids when there is sufficient surface to accommodate operation of vibrator, leaving at least 36 inches of uncompacted grids adjacent to temporary edges.
  - 2. Before ending each day's work, compact installed concrete pavers except for 36-inch width of uncompacted grids adjacent to temporary edges (laying faces).
  - 3. As work progresses to perimeter of installation, compact installed pavers that are adjacent to permanent edges unless they are within 36 inches of laying face.
  - 4. Before ending each day's work and when rain interrupts work, cover grids that have not been compacted and cover leveling course on which grids have not been placed with non-staining plastic sheets to protect them from rain.

- K. For vegetated infill, seed or place sod plugs as specified in the Contract Documents or directed by GCDWR.
  - 1. Where infill is seeded, broadcast grass seed at the rate recommended by the seed source and add topsoil to the surface to cover the seeds. Distribute straw covering to protect germinating grass seed.
- L. Clean grid surface of excess infill material when the job is complete.
- M. Water the entire area where vegetated infill material is used. Do not traffic pavement for 30 days, if seeded.

### 3.7 Repairing, Pointing, and Cleaning

- A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

END OF SECTION



## Part 1 General

### 1.1 Summary

- A. Section includes furnishing of all labor, materials, and equipment necessary for construction of pervious concrete pavement for streets, parking, and pedestrian areas in conformance with the plans and specifications.
- B. This section provides general requirements for providing labor, materials, and equipment for the installation of sidewalks, walking trails, parking facilities, and other areas using pervious concrete pavement.

### 1.2 Submittals

- A. If requested by GCDWR, submit:
  - 1. Ready-mix pervious concrete:
    - a. Proposed concrete mix design with proportions of materials and density and void content of freshly mixed pervious concrete per the methods of ASTM C1688 "Standard Test Method for Density and Void Content of Freshly Mixed Pervious Concrete".
    - b. Manufacturers product data for form release agent, joint filler, and sealants.
    - c. List of similar pervious concrete application project experience, documenting installation size, end use of installation, and installation date.
    - d. When hot weather is anticipated submit procedures for the production, transportation, placement, protection, curing and temperature monitoring, of concrete during hot weather.
    - e. In cold weather, submit detailed procedures for the production, transportation, placement, protection, curing, and temperature monitoring of concrete.
  - 2. Modular prefabricated pervious concrete panels:
    - a. Specifications of concrete material void ratio, density, permeability, thickness, and loading allowances with given or recommended subbase and base preparation.
    - b. Description of proposed method of product installation.
    - c. Manufacturer recommendations for installation, handling, and field cutting of panels.

- d. Manufacturer specifications for subgrade and subbase preparation, jointing, and edge restraints.
  - e. Manufacturer operation and maintenance guidance
3. Crew list for pervious concrete installation attesting to experience and qualifications as specified in Section 1.3.A or 1.3.B.

## 1.3 Quality Control

### A. Ready-mix Pervious Concrete:

1. Contractor Qualifications: Contractor or its specialty subcontractor shall meet one of the following criteria for the minimum certification for each placement crew and submit verification of certification requirements.
  - a. Contractor shall employ no less than one (National Ready Mix Concrete Association) NRMCA Certified Pervious Concrete Craftsman who must be on-site, actively guiding and working with each placement crew during all pervious concrete placement.
  - b. Contractor shall employ no less than three NRMCA Certified Pervious Concrete Installers who must be on-site, actively guiding and working with pervious concrete for projects.
  - c. Contractor shall employ no less than two crew members who are certified in the application of pervious concrete who shall be on-site, actively guiding and working with each placement crew during all pervious concrete placement. Certification shall be provided by the Ready-Mix Concrete supplier or the pervious product manufacturer.
2. Test Panel: Contractor is to place, joint and cure two test panels, each to be a minimum of 225 sq. ft. at the required project thickness to demonstrate to GCDWR's satisfaction that in-place unit weights can be achieved, and a satisfactory pavement can be installed at the site location.
  - a. Test panels shall be placed on a subgrade and subbase prepared as specified in the Contract Documents, consistent with the pervious materials and procedures approved for the pervious concrete installation.
  - b. Test panels may be placed at the locations indicated in the Contract Documents for pervious concrete installation. If test panel is deemed satisfactory, the panel can be left in place and included in the completed work, otherwise the test panel shall be removed at the contractor's expense and disposed of at a recycling facility which accepts and processes concrete or in an approved landfill.
  - c. The pervious concrete mixture used for the test panels shall be measured for fresh density and void content in accordance with ASTM C1688.

- d. After seven days test panels shall be cored in accordance with ASTM C42 “Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete” and measured for hardened density and void content in accordance with ASTM C1754 “Standard Test Method for Density and Void Content of Hardened Pervious Concrete” and length in accordance with ASTM C174 “Standard Test Method for Measuring Thickness of Concrete Elements Using Drilled Concrete Cores”.
  - e. Satisfactory performance of the test panels will be determined by:
    - 1) Average compacted thickness of three cores no greater than 3/8” less than specified thickness.
    - 2) Compacted thickness of an individual core no greater than 3/4” less than specified thickness.
    - 3) Void Structure
      - a) 20% ± 5% for low porosity, high strength
      - b) 30% ± 5% for high porosity, low strength
    - 4) Unit weight plus or minus 5 pcf of the design unit weight
    - 5) Adequate drainage and no evidence of edge raveling.
  3. Source of Materials: Utilize the same source, stock, or brand of concrete materials for each class or mix of concrete which is to be exposed. Do not interchange materials or mixes until an additional mock-up shows that uniformity in finish texture and color, as compared to original mock-up will be maintained. If necessary, obtain and stockpile materials in sufficient quantity to ensure continuity and uniformity.
- B. Modular Prefabricated Pervious Concrete Panels:
1. Contractor Qualifications: Contractor or its specialty subcontractor shall employ no less than two crew members that have receive training from the manufacturer in the installation of prefabricated pervious concrete panels.

## 1.4 Testing and Inspection

- A. GCDWR reserves the right to retain an independent testing laboratory to perform inspection and testing of paving and associated work in accordance with Section 01 45 29 - Testing Laboratory Services.
- B. The testing laboratory shall conform to the applicable requirements of ASTM E329 “Standard Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction” and ASTM C1077 “Standard Practice for Testing Concrete and Concrete Aggregates for use in Construction, and Criteria for Laboratory Evaluation” and shall be inspected and

accredited by the Construction Materials Engineering Council, Inc. or by an equivalent recognized national authority.

- C. Field tests of concrete shall be performed by an individual certified as an ACI Concrete Field Testing Technician—Grade 1 or by a recognized state or national authority for an equivalent or higher level of competence.
- D. Testing responsibilities of the Contractor: Advise GCDWR at least 48 hours before concrete placement.
- E. Ready Mix Pervious Concrete Testing
  - 1. Obtain a minimum 1 ft<sup>3</sup> sample for acceptance tests in accordance with ASTM C172 “Standard Practice for Sampling Freshly Mixed Concrete”. Measure a minimum of one density test during each day’s placement in accordance with ASTM C1688. Fresh density shall be within  $\pm 5$  lb/ft<sup>3</sup> of the specified fresh density or, where authorized by GCDWR, within  $\pm 5$  lb/ft<sup>3</sup> of the average fresh density measured on the pervious concrete test panels.
  - 2. Remove three cores from each lot of 5,000 ft<sup>2</sup>, in accordance with ASTM C42, not less than 7 days after placement of the pervious concrete. Cores shall be a minimum nominal 4 in. diameter. Select three locations in accordance with ASTM D3665 “Standard Practice for Random Sampling of Construction Materials”. Measure the cores for thickness (ASTM C174). After thickness determination, trim and measure the cores for density in accordance with ASTM 1754.
  - 3. Tolerance for thickness and density reported as the average of three cores of each lot shall be as follows:
    - a. The compacted average thickness shall not be more than 3/8 inch less than the specified thickness, with no single core exceeding 3/4 inch less than the specified thickness; nor shall the average compacted thickness be more than 1-1/2 inch more than the specified thickness.
    - b. Hardened density shall be within  $\pm 5\%$  of the approved hardened density from the test panels that have been approved by GCDWR.
    - c. When a lot is outside one or more of the limits above, the lot shall be subject to rejection, removed, and replaced at the Contractor’s expense unless accepted by GCDWR.
    - d. Core holes shall be filled with concrete or pre-blended grout.
- F. Modular Prefabricated Pervious Concrete Panels:
  - 1. Panels shall be inspected prior to and after installation to ensure panels are free from damage or cracking. Any slabs cracked or damaged during shipping or installation shall be replaced with new ones at no cost to GCDWR.

2. Panel surfaces shall not deviate by more than 1/8" vertically from one to the next and to adjacent surfaces, unless such adjacent surfaces (such as curb) differ by more according to the Contract Documents.

## 1.5 Field Conditions

### A. Protection of Existing Improvements

1. Protect adjacent work from splashing of paving materials. Remove all stains from exposed surfaces of paving, structures, and grounds. Remove all waste and spillage.
2. Do not damage or disturb existing improvements or vegetation. Provide suitable Protection where required before starting Work and maintain protection throughout the course of the Work.
3. Restore damaged improvements, including existing paving on or adjacent to the site that has been damaged as a result of construction work, to their original condition or repair as directed to the satisfaction of GCDWR, and authority having jurisdiction, at no additional cost to GCDWR.

### B. Safety and Traffic Control

1. Notify and cooperate with local authorities and other organizations having Jurisdiction when construction work will interfere with existing roads and traffic.
2. Provide temporary barriers, signs, warning lights, flagmen, and other protections as required to assure the safety of persons and vehicles around the construction area and to organize the smooth flow of traffic.

- C. Weather Limitations: Do not place pervious concrete pavement mixtures when the ambient temperature is 40 degrees Fahrenheit or lower, unless otherwise permitted in writing by GCDWR.

## Part 2 Products

### 2.1 Materials

- A. Cement: Portland Cement Type I or II conforming to ASTM C150 or Portland Cement Type IP or IS conforming to ASTM C595, or ASTM C1157
- B. Aggregates: Coarse aggregate (3/8" to No. 16) per ASTM C33 or No. 89 coarse aggregate (3/8" to No. 50) per ASTM D448. If other gradation of aggregate is to be used, submit data on proposed material to GCDWR for approval.
- C. Air Entraining Agent: Air entraining agents shall be in accordance with ASTM C260.
- D. Admixtures: The following admixtures may be used as needed:

1. Type A Water Reducing Admixtures – ASTM C494.
  2. Type B Retarding – ASTM C494.
  3. Type D Water Reducing/Retarding – ASTM C494.
- E. Water: Potable water in accordance with ASTM C1602.
- F. Isolation joint material shall comply with the requirements of Specification Section 32 16 00 Curbs, Gutters, and Sidewalks.

## 2.2 Mixture Proportions

- A. The composition of the proposed concrete mixtures shall comply with the following provisions unless an alternative composition is demonstrated to comply with the project requirements.
- B. Cementitious Content: For pavements subjected to vehicular traffic loading, the total cementitious material shall not be less than 600 lbs. per cu. yd.
- C. Aggregate Content: The volume of aggregate per cu. yd. shall be a minimum 18 cu. ft. when calculated as a function of the unit weight determined in accordance with ASTM C29 “Standard Test for Bulk Density (“Unit Weight”) and Voids in Aggregate”. Fine aggregate, if used, should not exceed 3 cu. ft. and shall be included in the total aggregate volume.
- D. Admixtures: Shall be used in accordance with the manufacturer’s instructions and recommendations.
- E. Mix Water: As appropriate for approved mix design. Mix water shall be such that the cement paste displays a wet metallic sheen without causing the paste to flow from the aggregate. (Mix water yielding a cement paste with a dull-dry appearance has insufficient water for hydration).

## Part 3 Execution

### 3.1 Preparation

- A. Areas to be paved will be compacted and brought to subgrade elevation in accordance with the Contract Documents and Specification Section 31 23 13 – Subgrade Preparation before work of this section is performed.
- B. If fill material (embankment) is required to bring the subgrade to final elevation, it shall be clean and free of deleterious materials, and of such soil classification and properties that fill material does not negatively affect the infiltration capacity of the pervious pavement system. It shall be placed in 8-inch maximum layers, and compacted by a mechanical vibratory compactor to a density specified in the Contract Documents or as directed by GCDWR. Subgrade compaction shall extend for distance of at least 1 foot beyond pavement edge.

- C. Subbase, where specified shall be prepared in accordance with the Contract Documents.
- D. Construct subbase to  $\pm 3/4$ " of the specified elevation.
- E. Place forms to exact elevation and location required. Visually check forms and adjust where necessary to ensure smooth curves and transitions in grade. Provide close spacing on curves to maintain a smooth curve.
- F. Apply form release agent to the form face, which will be in contact with concrete, immediately before placing concrete.

### 3.2 Installation, Ready-Mix Pervious Concrete

- A. GCDWR shall be notified of concrete placement sufficiently in advance of start of operation to allow his representative to complete preliminary inspection of the work, including subgrade and forms, but no later than 24 hours before placement of concrete.
- B. Concrete shall be deposited as close to its final position as practicable and such that fresh concrete enters the mass of previously placed concrete. The practice of discharging onto subgrade and pulling or shoveling to final placement is not allowed.
- C. Adjacent work shall be protected from stain and damage during entire operation. Damaged and stained areas shall be replaced or repaired to equal their original conditions at no additional cost to GCDWR.
- D. Existing concrete, earth, and other water-permeable material against which new concrete is to be placed shall thoroughly damp when concrete is placed. There shall be no free water on surface.
- E. Concrete which has set or partially set before placing shall not be employed. Re-tempering of concrete will not be permitted.
- F. Concrete shall be spaded and tamped to secure a solid and homogeneous mass, thoroughly worked around reinforcement and into corners of forms taking care not to overwork concrete and reduce voids.

### 3.3 Curing, Ready-Mix Pervious Concrete

- A. Curing procedures shall begin within 20 minutes after the final placement operations. The pavement surface shall be covered with a minimum six-mil thick polyethylene sheet or other approved covering material. Prior to covering, a fog or light mist shall be sprayed above the surface when required due to ambient conditions (temperature, wind and humidity). The cover shall overlap all exposed edges and shall be secured (without using soil or stone) to prevent dislocation due to winds or adjacent traffic conditions.
- B. Cure pavement for a minimum of 7 uninterrupted days, unless otherwise specified.



- C. No truck traffic shall be allowed for 10 days; no passenger car/light truck for 7 days; no pedestrian traffic for 24 hours.

### 3.4 Jointing, Ready-Mix Pervious Concrete

- A. Control (contraction) joints:
  - 1. Shall be installed at 40-foot intervals for pavements designed for vehicular traffic.
  - 2. Shall be installed at a depth of  $\frac{1}{4}$  the thickness of the pavement. These joints can be installed in the plastic concrete or saw cut. If saw cut, the procedure should begin as soon as the pavement has hardened sufficiently to prevent raveling and uncontrolled cracking (normally after curing).
  - 3. Transverse construction joints shall be installed whenever placing is suspended a sufficient length of time that concrete may begin to harden. To assure aggregate bond at construction joints, a bonding agent suitable for bonding fresh concrete to existing concrete shall be brushed, rolled or sprayed on the existing pavement surface edge. Isolation (expansion) joints will not be used except when pavement is abutting slabs or other adjoining structures, unless otherwise specified in the Contract Documents.

### 3.5 Installation, Modular Prefabricated Pervious Concrete Panels

- A. Prior to placement of panels, ensure that subbase has been prepared in accordance to Manufacturer's specifications and the Contract Documents. Where required, ensure that a screeded leveling layer of material is placed between reservoir stone subbase and the pervious concrete panels, to ensure panels are set to proper elevation tolerances with no bridging or mounding present so that panels are fully and evenly supported when installed.
- B. Panels shall be lifted and placed using equipment and procedures in accordance with Manufacturer specifications.
- C. Guide units into place by hand, being careful not to pinch fingers. Horizontal adjustments may be made using wood wedges, levers, and rubber mallets as needed. If pry bars are required, they shall not come into direct contact with the top edge of the slab.
- D. Adjacent panels shall be separated from each other using spacers in accordance with manufacturer specifications. Adjacent panels should maintain consistent joint widths in accordance with manufacturer specifications. Joints between adjacent rows of panels shall be staggered where possible.
- E. Slabs shall be kept covered until all adjacent areas are stabilized to prevent dust and debris from reducing porosity of panels.
- F. Whenever possible, set panels with equipment positioned next to panel area and not



on previously installed panels. When it necessary to position equipment on installed slabs, Contractor shall take measures to protect installed panels from damage.

G. Cutting:

1. Where required cut panels with a diamond bladed masonry saw of sufficient plunge depth to fully cut through the panel, in accordance with Manufacturer's recommendations.
2. Where panels need to be field cut, Contractor shall ensure that trimmed panel can be lifted into final position and adjusted without damage.
3. Cutting shall be performed away from subbase material and other panels.
4. Cover adjacent areas of the panel being cut to prevent dust and debris from entering the pervious concrete.

H. Expansion joints shall be preformed material conforming to ASTM D1751.

- I. Panels damaged during installation or before acceptance of the project shall be replaced at no additional cost to GCDWR, unless GCDWR inspects and deems the damage as de minimis, not excessively negatively affecting the aesthetics of the installation, and not affecting the strength or performance of the installation.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, equipment, and materials necessary to install concrete sidewalks, curbs, and gutters, as required for the rehabilitation, replacement, and/or installation of storm drainage systems and related appurtenances.
- B. This section provides general requirements for providing labor, materials, and equipment for new or replacement concrete sidewalks, curbs, and gutters disturbed by construction. However, it is the Contractor's responsibility to ensure all work meets the requirements of the Georgia Department of Transportation (DOT) Standard Specifications Construction of Transportation Systems.

### 1.2 Submittals

- A. If required by GCDWR, the Contractor shall submit for approval to GCDWR, Gwinnett County DOT, and Georgia DOT when work is within a state road right-of-way, all working drawings and schedules of materials and methods proposed to follow in the execution of the Work under this item.

### 1.3 Quality Control

- A. Tolerances: Construct concrete surfaces within 1/2-inch of the indicated elevation and deviating not more than 1/4-inch from a ten-foot straightedge placed anywhere on the surface.
- B. Strictly conform to requirements for compaction of subgrade as specified in Specification Section 31 23 13 – Subgrade Preparation, and air entrainment and curing of concrete as specified in Section 03 30 00 – Cast-In-Place Concrete.

## Part 2 Products

### 2.1 Materials

- A. All concrete shall be Class "A" in accordance with GDOT Standard Specifications Section 500.03 and have a 28-day compressive strength of 3,000 psi unless otherwise specified in the Contract Documents or directed by GCDWR.
- B. Joint filler: Non-extruding joint material, furnished in a single piece for the full depth and width required for the joint, meeting the requirements of GDOT Standard Specifications Section 833.2.01, or otherwise approved by GCDWR.

## Part 3 Execution

### 3.1 Preparation

- A. Excavate and compact the subgrade as specified in Section 31 23 13 - Subgrade Preparation, true to the indicated grade and cross section.
- B. Place forms or extrusion machine guides to exact elevation and location required. Visually check forms and machine guides and adjust where necessary to ensure smooth curves and transitions in grade. Provide close spacing on curves to maintain a smooth curve.

### 3.2 Joints

- A. Expansion Joints:
  - 1. Install expansion joints at intervals as indicated, but not exceeding 40 feet for walks and curbs, and wherever new concrete abuts existing construction. Additional joints are to be placed at tangent points of circular curbs and other places where stresses may develop.
  - 2. Pre-molded expansion joint filler must be cut to full cross section of the proposed construction and shall extend the full depth, width, and length of the construction.
  - 3. Trim expansion joint material protruding after the concrete has been finished as directed by GCDWR. All longitudinal expansion joints shall be placed as indicated on the drawings.
  - 4. Where sealed expansion joints are specified on the Contract Documents or directed by GCDWR, prepared expansion joints shall be coated with a primer followed by installation of a self-leveling two-component polyurethane-based elastomeric sealant. Color of sealant shall be concrete gray. Asphalt cement will not be approved as a sealant. The Contractor shall apply the following sealant or equal as approved by GCDWR:
    - a. Sikaflex 429 primer with Sikaflex – 2C, SL Sealant
    - b. Sonneborn 733 primer with Sononlastic SL 2 Sealant
    - c. If bituminous fiber joint filler material is used, a bond breaker such as one-half inch (1/2") wide polyethylene tape or five-eighths inch (5/8") diameter expanded polyethylene foam backer rod shall be installed between the joint filler and the joint sealant, as recommended by the manufacturer. A bond breaker will not be required for a pre-molded foam joint.
- B. Contraction (Control) Joints
  - 1. Sidewalks: Tool or saw cut contraction joints in sidewalk. Contraction joints in

sidewalks shall be 3/4-inch deep and spaced at a distance equal to the width of the sidewalk.

2. Curb and Gutter: Cut contraction joints with a saw immediately after concrete reaches adequate hardness to allow sawing. Contraction joints in curb and gutters shall be 1-½ inch deep and spaced at 10-foot intervals. For formed work, metal division plates may be used to achieve joints.
3. Concrete flatwork: Tool or saw cut contraction joints in concrete flatwork. Contraction joint depth shall be one-quarter of the concrete thickness. Spacing and pattern shall be as shown on plans or determined by GCDWR.

### 3.3 Finishes

- A. Pedestrian and Wheelchair Ramps: Non-slip finish.
- B. All others: Broom finish.

### 3.4 Construction

- A. Place forms true to line, grade, and cross section. Forms shall be set to result in concrete features on accessible paths to meet ADA or PROWAG tolerances, as applicable.
- B. Brace forms adequately before placing the concrete. Place concrete in forms and thoroughly tamp, vibrate or work it into all corners, removing air pockets. Allow forms to remain in place until the concrete has set sufficiently to hold its shape.
- C. Begin each phase of screed, float, trowel, and finish work as soon as the concrete can be properly worked. Completely finish sidewalks and flat work with forms in place.
- D. Remove forms on the front face of curbs as soon as the concrete will hold its shape and finish the face. For gutters, a strike-off template of the form and shape of the gutter shall be used to shape the top surface of the gutter. Round top edges of curb and edges of gutter using a radius tool matching the radius shown on the Drawings. Finish the edges where templates have been removed or expansion joint material has been placed with an edging tool with a radius of not over 1/4-inch and then remove all lines or marks with a wet brush.
- E. Remove all tool marks with a wetted brush or wooden float, and the finished surface shall present a uniform appearance.

### 3.5 Curing

- A. Cure concrete as specified in Section 03 30 00 – Cast-in-Place Concrete.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section Includes furnish all tools, labor, equipment, and materials necessary for furnishing and installing fencing at the locations and to the limits indicated on the Contract Documents or as directed by GCDWR.

### 1.2 Submittals

- A. If requested by GCDWR, submit for approval the material to be used including post material, size and spacing.

## Part 2 Products

### 2.1 Split Rail Fence

- A. A 3-rail or 2-rail "American Style" split rail system shall be used.
- B. All timber materials shall comply with the following GDOT Standard Specifications:
  - 1. Section 860 - Lumber and Timber
  - 2. Section 861 - Piling and Round Timber
  - 3. Section 862 - Wood Posts and Bracing
  - 4. Section 863 - Preservative Treatment of Timber Products
- C. Posts: All posts shall be minimum 6-inches in diameter. 2-rail posts shall be approximately 64-inches in height. 3-rail posts shall be approximately 78-inches in height. Posts shall be anchored in concrete footings at least two times the diameter of the post. Terminal posts shall be buried 36 inches below grade. Line posts shall be set 27 inches below grade.
- D. Gates shall be replaced to match existing.

### 2.2 Chain Link Fence

- A. This specification applies only to chain link fences eight feet tall or less.
- B. Chain link fabric and required fittings and hardware shall conform to the requirements of AASHTO M181 for the kind of metal, sizes of wire and mesh specified in the Documents, or like kind of existing fence being replaced. Zinc coating for steel fabric shall conform to ASTM A392, Class I and aluminum coating for steel fabric to ASTM A491, Class I. Vinyl coated fabric shall conform to ASTM F668, Class 2.

- C. Posts: All posts shall be hot dip galvanized round pipe. Posts shall be anchored in concrete footings at least three times the diameter of the posts. Line posts may be set with a post driver. Posts damaged by power driving will not be accepted.
  - 1. Terminal posts shall be 2-3/8 inch x 16-gauge. Terminal posts shall be set 36 inches below grade.
  - 2. Line posts shall be 1-5/8 inch x 16-gauge. Line posts shall be set 27 inches below grade.
- D. Top Rail: Top rails 1-3/8 inch x 17-gauge are to be provided with couplings every twenty feet. The couplings are to be outside sleeve type at least six inches long. The top rail is to pass through the line post loop caps and form a continuous brace from end to end of each stretch of fence.
- E. Terminal Post Caps, Loop caps, top, intermediate and bottom rail ends shall be hot dip galvanized and weather tight.
- F. When PVC coating is specified for posts, braces, rails and post caps, PVC shall be thermally fused and bonded. The PVC thickness shall be 10 to 15 mil.
- G. Fence Fabric: Fence fabric shall be minimum 11.5 gauge galvanized wire, woven in a maximum 2-1/8-inch mesh and locked in a standard chain link form.
- H. Tension Bars: Fabric shall be securely fastened to all terminal posts using 3/16-inch x 5/8-inch galvanized tension bars and standard 3/4-inch X 14-gauge pressed steel edge bands.
- I. Brace and Tension Bands: Shall be 3/4-inch X 12-gauge pressed steel applied at one per linear foot of fence height.
- J. Tie Wires: All tie wires shall be 11 gauge aluminum wire. The top rail tie wires shall be spaced a maximum of fourteen inches apart. Tie wires on line posts shall be applied at a rate of one per linear foot of fence height with all twist wire ends to be located inside of fence. When PVC coated steel fabric is used, the tension wire shall have the same coating thickness and color as the fabric fence.
- K. Swing Gates: Gates shall be standard residential single or double swing type. All dimensions and material specifications shall meet the above requirements for "Chain Link Fence".
- L. Barbed Wire: Barbed wire shall be galvanized steel barbed wire conforming to ASTM A-121 with Class 3 coating. Barbed wire shall consist of 3 strands of 12-1/2-gauge wire, twisted with four-point round barbs at 5-inch spacing.

## 2.3 Wooden Privacy Fence

- A. All timber materials shall comply to following GDOT Standard Specifications:
  - 1. Section 860 - Lumber and Timber

2. Section 861 - Piling and Round Timber
  3. Section 862 - Wood Posts and Bracing
  4. Section 863 - Preservative Treatment of Timber Products
- B. Posts: All posts shall match existing dimension or at a minimum 4 inches by 4 inches. Finished post height shall be 6 feet or 8 feet to match existing fence height. Posts shall be anchored in concrete footings at least two times the diameter of the post. Terminal posts shall be buried 36 inches below grade, line posts shall be set 27 inches below grade.
- C. Fence board style and gates shall be replaced to match existing.

## 2.4 Decorative Fence

- A. Fence style and gates shall be replaced to match existing or as otherwise shown in the Contract documents.
- B. Posts: All posts shall match existing dimensions. Finished post height shall be 6 feet or 8 feet to match existing fence height or as otherwise specified in the Contract Documents. Posts shall be anchored in concrete footings at least two times the diameter of the post. Terminal posts shall be buried 36 inches below grade, line posts shall be set 27 inches below grade.

## 2.5 Welded Wire Fence

- A. Welded wire fabric shall be galvanized- or PVC-coated, whichever shown on the Contract Documents/Plan, one-ounce welded wire. The galvanizing shall be uniform and shall have no more than 5 percent of the joints deficient in coating as determined by ASTM A239. PVC coated welded wire fabric shall be in accordance with ASTM F2919. The welded wire fabric shall have the following specifications, unless otherwise specified in the Contract Documents.
1. Wire Size: Steel core wire is 11 gauge.
  2. Fabric: 48-inch, 60-inch height, or as otherwise specified in the Contract Documents with a mesh size of 2 inches by 4 inches.
- B. Posts: Posts for welded wire fence shall be wood of the dimensions and shapes shown on the Contract Documents.
- C. Accessories: Accessories, for galvanized fence, including but not limited to tension wire, tie wire, fittings, staples, and nails shall be galvanized in accordance with ASTM A153, except the minimum galvanizing shall be .60 ounce per square foot. For PVC-coated fabric, accessories shall be PVC coated.
- D. Ground Rods: Ground rods shall be 5/8-inch in diameter and shall be 8 feet in length. Ground rods shall be galvanized steel. Galvanizing shall have a minimum coating of

2 ounces per sf in accordance with the requirements of ASTM A153.

## 2.6 Chicken Wire Fence

- A. Chicken wire fabric shall be galvanized steel and galvanized prior to weaving, and have the following specifications, unless otherwise specified in the Contract Documents.
  - 1. Wire Size: Steel core wire is 20 gauge.
  - 2. Fabric: 48-inch height with 1-inch hexagonal mesh.
- B. Posts: Posts for chicken wire fence shall be metal T-posts or wooden posts of the dimensions and shapes shown in the Contract Documents.
- C. Bailing wire or heavy duty shall be used staples to attach chicken wire fabric to fence posts.

## 2.7 Bollards

- A. Bollards shall have a nominal diameter of 4 inches.
- B. Fabricate metal bollards from Schedule 40 steel pipe or Schedule 80 steel pipe, as specified in the Contract documents. Cap bollards with ¼-inch-thick steel plate.
- C. Bollards may be fabricated with 3/8-inch-thick steel baseplates for bolting to concrete slab or may be set directly into a concrete base.
  - 1. Drill baseplates at all four corners for ¾-inch anchor bolts.
  - 2. Where bollards are to be anchored to sloping concrete slabs, angle baseplates for plumb alignment of bollards.
- D. Fabricate internal sleeves for removable bollards from Schedule 40 steel pipe or ¼-inch wall thickness steel tubing with an OD approximately 1/16-inch less than ID of bollards. Match drill sleeve and bollard for ¾-inch steel machine bolt.
- E. Prime bollards with zinc-rich primer. If bollards are pre-painted, they shall be primed with a zinc-rich primer.

## Part 3 Execution

### 3.1 Construction or Replacement of Fence

- A. General
  - 1. Contractor shall perform such clearing, grubbing, and grading as may be necessary to construct or replace the fence to the required grade and alignment as shown on the Contract Documents.



2. At locations where breaks in a run of fencing are required, appropriate adjustments in fence alignment and/or post spacing shall be made to satisfy requirements or conditions encountered.
3. Fencing shall be at the height required for in-kind replacement unless otherwise specified in the Contract Documents, or to the height specified in the Contract Documents.

B. Posts and Rails

1. Posts shall be securely embedded into the ground to meet the proper alignment and elevations. Posts shall be embedded in concrete as shown on the Documents.
2. Posts and rails shall be held in proper positions by secure bracing until such time as the concrete has set sufficiently to hold the posts.
3. Materials shall not be installed on posts, or stress placed on bracing until the concrete has set sufficiently to withstand the stress.
4. The complete fence shall be plumb and in straight alignment as shown on the Documents or as directed GCDWR.

C. Gates

1. Ensure gate assemblies are the correct length, height, and type specified in the Documents. Install the gate to provide a 180-degree of swing, unless otherwise specified in the Contract Documents.
2. Stretch fabric that matches the fence fabric taut over the gate frame. For decorative fences, gate shall match fence style, material, and height.
3. Provide gate assemblies with a positive type latching device.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, materials, and equipment for the construction of segmental wall system of Concrete Block units and/or Fieldstone Boulders.

### 1.2 Definitions

- A. Borrow Material: Material from required excavations or from designated borrow areas on or near Site.
- B. Completed Course: A course or layer that is ready for next layer or next phase of Work.
- C. Concrete Segmental Block Units: Dry-stacked masonry units used as the retaining wall fascia.
- D. Drainage Aggregate: Material used within, between, and directly behind the segmental retaining wall system, typically placed to collect and direct surface and/or groundwater away from where it could negatively affect the wall or nearby structures.
- E. Earth Fill: Materials available on-site that GCDWR determines to be suitable for specific use.
- F. Field Stone: Angular natural stone of the specified size and shape shown on the Contract Documents and shall be sound, dense, resistant to the natural elements, and suitable for the purposes intended.
- G. Foundation Soil: Soil mass supporting the leveling pad and reinforced soil zone of the retaining wall system.
- H. Geosynthetic Reinforcement: Polymeric material designated specifically to reinforce the soil mass.
- I. Geotextile Filter: Material used for separation and filtration of dissimilar soil types or stone aggregate types or stone aggregates and soil.
- J. Handrail: Handrail with top plate, top rail, mid-rail, and kick plate where applicable as shown in the Contract Documents.
- K. Impervious Materials: Clay soil or low permeability geosynthetic used to prevent or reduce water percolation/infiltration into the drainage zone behind the wall.
- L. Imported Material: Materials obtained from sources off-site, suitable for specified use.
- M. Leveling Pad: Area of specific aggregate or other material specified on the plan installed beneath lowest course(s) of Concrete Segmental Block Units to provide firm

base of uniform elevation on which to install/construct the first/lowest course of the wall.

- N. Lift: Loose (un-compacted) layer of material.
- O. Prefabricated Drainage Composite: Three-dimensional geosynthetic drainage medium encapsulated in a geotextile filter, used to transport water and prevent soil migration into the water transportation space(s).
- P. Prepared Ground Surface: Ground surface after completion of required, clearing and grubbing, stripping of topsoil, excavation to grade, and subgrade preparation.
- Q. Reinforced Backfill: A zone of soil backfill material, incorporating layers of geosynthetic sheets, strips, or grids that creates a composite, solid reinforced mass behind and anchored to the segmental wall face to support load and earth pressure conditions.
- R. Segmental Retaining Wall: A modular block retaining wall used for vertical grade change application. The walls are designed and constructed as either gravity retaining walls or reinforced-soil retaining walls.
- S. Well Graded:
  - 1. A mixture of particle sizes with no specific concentration or lack thereof of one or more sizes.
  - 2. Does not define numerical value that must be placed on coefficient of uniformity, coefficient of curvature, or other specific grain size distribution parameters.
  - 3. Used to define material type that, when compacted, produces a strong and relatively incompressible soil mass free from detrimental voids.

### 1.3 Submittals

- A. Submit:
  - 1. Shop Drawings: Retaining wall system, including elevation views, geosynthetic reinforcement layout, pertinent details, drainage provisions, and handrails as required.
  - 2. Manufacturer's recommendations for backfill around each pre-manufactured structure.
  - 3. Product Data:
    - a. Material description and installation instructions for each manufactured product specified including Segmental Block Units and Geosynthetic Reinforcement.
    - b. Name and address of the production facility where the proposed

segmental block units will be manufactured.

4. Certification that the segmental block units are manufactured in accordance with relevant standards.
  5. Name and address of proposed source of fieldstone boulders.
  6. Certified Test Results
    - a. Abrasion resistance.
    - b. Bulk density.
- B. Segmental Block Samples
1. Furnish one unit demonstrating the color, face pattern, and texture of the Segmental Block Unit if specified.
  2. Furnish 12-inch square or larger piece of the geosynthetic reinforcement specified.
- C. Manufacturer's data sheets for compaction equipment.
- D. Certified test results from independent testing agency.
- E. If requested by GCDWR and required for the Work, Retaining Wall Installer Qualifications shall be verified by furnishing at least five project references of similar size and scope to the Work, including the wall(s) height and square footage.

## 1.4 Quality Assurance

- A. Installer Qualifications: Specialty Contractor or employee(s) with experience of at least five projects of similar construction and scope in the past five years. Submit brief description of each project, location, and name and phone number of Client.
- B. Boulder Source: Quarry that has produced boulders of specified size and has performed satisfactorily on other projects for at least five years. Native, on-site boulders may be used pending approval of GCDWR.

## 1.5 Sequencing and Scheduling

- A. Complete applicable Work specified in Specification Section 31 11 00 - Clearing and Grubbing, Specification Section 31 23 00 - Excavation and Fill, and Specification Section 31 23 13 - Subgrade Preparation, prior to installing the Segmental Wall System.

## 1.6 Delivery, Storage and Handling

- A. Segmental Wall Units, Fieldstone Boulders and Accessories: Deliver, store, and

handle materials in accordance with manufacturer's recommendations, in such a manner as to prevent damage. Check the materials upon delivery to assure that proper material has been received. Store above ground on wood pallets or blocking. Remove damaged or otherwise unsuitable material, when so determined, from the site.

1. Exposed faces of concrete wall units shall be free of chips, cracks, stains, and other imperfections detracting from their appearance, when viewed from a distance of 10 feet.
  2. Prevent mud, wet cement, adhesives and similar materials that may harm appearance of units, from coming in contact with system components.
- B. Geosynthetics (including geosynthetic reinforcement, geotextile filter, prefabricated drainage composite) shall be delivered, stored, and handled in accordance with ASTM D4873 and Specification Section 31 05 19.19 – Geogrid and Geocells for Earthwork and Specification Section 31 32 19.16 - Geotextiles.

## Part 2 Products

### 2.1 Segmental Block Units

- A. Compressive Strength and Absorption: Concrete block units shall be tested in accordance with ASTM C140. Concrete block units shall meet requirements of ASTM C1372, except the compressive strength requirements will be increased to a minimum of 3,500 psi and the maximum water absorption shall be limited to 7 percent, and unit height dimensions shall not vary more than plus or minus 1/16 inch from that specified in the ASTM reference, not including textured face.
- B. Freeze-Thaw Durability: Shall be tested in accordance with ASTM C1262 when required.
- C. Style: In accordance with Contract Documents.
- D. Color: In accordance with Contract Documents.
- E. Face Pattern Geometry: In accordance with Contract Documents.
- F. Texture: In accordance with Contract Documents.
- G. Batter: Include an integral batter control shear connector to provide a consistent setback for each wall course.
- H. Products and Manufacturers
  1. Standard Unit, VERSA-LOK Retaining Wall System.
  2. Mesa Retaining Wall System, Tensar International Corporation

3. Approved equal.

## 2.2 Geosynthetic Reinforcement

- A. Manufactured with high-tenacity polyester with polymer coating or high-density polyethylene (HDPE) resin in a grid or textile structure.
- B. Products and Manufacturers
  1. Miragrid 3XT, TenCate Geosynthetics.
  2. Uniaxial (UX) Geogrid, Tensar International Corporation.
  3. Approved equal.

## 2.3 Fieldstone Boulders

- A. Boulders should be hard and durable, free from fractures, bedding planes, pronounced weathering, and earth or other adherent coatings.
- B. Minimum Dimension of Individual Pieces: 12 inches x 18 inches x 24 inches.
- C. Abrasion Resistance: Maximum 35 percent wear as determined in accordance with ASTM C535.
- D. Bulk Density:
  1. Sandstone Boulders, minimum 145 pounds per dry cubic foot.
  2. Granite Boulders, minimum 165 pounds per dry cubic foot.

## 2.4 Leveling Pad

- A. Graded aggregate base meeting the gradation requirements of Group II Aggregate per GDOT Standard Specifications Section 815.

## 2.5 Granular Drain Aggregate

- A. Clean crushed stone meeting the gradation requirements of No. 57 stone per GDOT Standard Specifications Section 800, unless otherwise specified in the Contract Documents.

## 2.6 Reinforced Backfill

- A. Free from stones larger than 3 inches maximum dimension, clay balls, organic material or other constituents deleterious to the intended use.
- B. Material classified as GP, GW, SP, SW, SM, or SC type in accordance with ASTM D2487.

- C. Percent Fines (Passing U.S. No. 200 sieve): 15 percent maximum.
- D. Plasticity: The Plasticity Index, as determined by ASTM D4318, shall not exceed 6.

## 2.7 Drainage Pipe

- A. Perforated or slotted PVC or corrugated HDPE pipe manufactured in accordance with D3034 or ASTM F405.
- B. Pipe shall be covered with geotextile filter fabric to prevent fines migration into the pipe.

## 2.8 Prefabricated Drainage Composite

- A. Miradrain 5000, manufactured by Carlisle Coatings & Waterproofing (CCW), or approved equal, unless otherwise specified in the Contract Documents.

## 2.9 Geotextile Filter

- A. Meeting the guidelines set forth in AASHTO M288.

## 2.10 Construction Adhesive

- A. Exterior grade adhesive as recommended by the retaining wall unit manufacturer.

# Part 3 Execution

## 3.1 General

- A. The Contractor shall examine the areas and conditions under which the wall system is to be erected and notify GCDWR in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.
- B. Promptly notify GCDWR of site conditions that may affect wall performance, soil conditions observed other than those assumed or described in the Contract Documents, or other conditions that may require a reevaluation of the wall design.
- C. Verify the location of existing structures and utilities prior to excavation.

## 3.2 Preparation

- A. Ensure surrounding structures are protected from the effects of wall excavation.
- B. Excavation support, if required, is the responsibility of the Contractor, including the stability of the excavation and its influence on adjacent properties and structures.

### 3.3 Excavation

- A. Excavate to lines, grades, and dimensions shown and as necessary to accomplish Work. Excavate to within tolerance of plus or minus 0.1 foot, except where dimensions or grades are shown or specified as maximum or minimum. Allow for forms, working space, granular base, topsoil, and similar items, wherever applicable. Trim to neat lines where concrete is to be deposited against earth.
- B. Do not over excavate without written authorization of GCDWR.

### 3.4 Foundation Preparation

- A. Excavate foundation soil as required for footing or base dimension shown on the Contract Documents, or as directed by GCDWR.
- B. Prepare subgrade in accordance with Specification Section 31 23 13 - Subgrade Preparation.
- C. GCDWR's testing agency will examine foundation soil to ensure that the actual foundation soil strength meets or exceeds that indicated on the Contract Documents. Remove soil not meeting the required strength. Oversize resulting space sufficiently from the front of the block to the back of the reinforcement and backfill with suitable compacted backfill soils.
- D. GCDWR will determine if the foundation soils will require special treatment or correction to control total and differential settlement.
- E. Fill over-excavated areas with suitable compacted backfill, as indicated by GCDWR.

### 3.5 Leveling Base Course Preparation

- A. Place base materials to the depths and widths shown on the Contract Documents, upon undisturbed soils, or prepared foundation soils.
- B. Base Thickness: 6 inches (minimum compacted thickness), unless otherwise specified in the Contract Documents.
- C. Base Width: Must extend 6 inches from the toe and heel of the block or boulder.
- D. Compact aggregate base material to provide a level, hard surface on which to place the first course of units. Compaction shall be with mechanical plate compactors to achieve 95 percent of maximum standard Proctor density, in accordance with ASTM D 698.
- E. Prepare base materials to ensure complete contact with wall units.
- F. For stacked fieldstone boulders wall, provide a sloped or battered leveling base surface of 1 inch vertical for every 12-inch horizontal towards the retained soil side.



### 3.6 Segmental Block Units Erection

- A. General: Erect units in accordance with manufacturer's instructions and recommendations, and as specified herein, unless otherwise specified in the Contract Documents.
- B. Place first course of concrete wall units on the prepared base material. Check units for level and alignment. Maintain the same elevation at the top of each unit within each section of the base course.
- C. Ensure that foundation units are in full contact with natural or compacted soil base.
- D. Place concrete wall units side-by-side for full length of wall alignment. Alignment may be accomplished by using a string line measuring from the back of the block.
- E. Place 12 inches (minimum) of drainage aggregate directly behind the concrete wall units. Fill voids in and between retaining wall units with drainage aggregate. Provide a drainage zone behind the wall units to within 12 inches of the final grade. Cap the backfill and drainage aggregate zone with 6 inches of impervious material.
- F. Install drainage pipe at the lowest elevation possible, to maintain gravity flow of water to outside of the reinforced zone. Slope the main collection drainage pipe; located just behind the concrete retaining wall units, 2 percent (minimum) to provide gravity flow to the daylighted areas. Daylight the main collection drainage pipes to an appropriate location away from the wall system. The daylight drainage pipe shall be placed at the lowest point and at 10-foot (maximum) intervals along the wall.
- G. Remove excess fill from top of units and install next course. Ensure drainage aggregate and backfill are compacted before installation of next course.
- H. Check each course for level and alignment. Adjust units as necessary to maintain level and alignment prior to proceeding with each additional course. Install alignment devices (pins) if required.
- I. Install each succeeding course. Backfill as each course is completed. Pull the units forward until the locating surface of the unit contacts the locating surface/device of the units in the preceding course. Interlock wall segments that meet at corners by overlapping successive courses. Attach concrete retaining wall units at exterior corners with adhesive specified.
- J. Install geosynthetic reinforcement in accordance with geosynthetic manufacturer's recommendations and the shop drawings.
  - 1. Orient geosynthetic reinforcement with the highest strength axis perpendicular to the wall face.
  - 2. Prior to geosynthetic reinforcement placement, place the backfill and compact to the elevation of the top of the wall units at the elevation of the geosynthetic reinforcement.

3. Place geosynthetic reinforcement at the elevations and to the lengths shown on the Contract Documents.
  4. Lay geosynthetic reinforcement horizontally on top of the concrete retaining wall units and the compacted backfill soils. Place the geosynthetic reinforcement within one inch of the face of the concrete retaining wall units. Place the next course of concrete retaining wall units on top of the geosynthetic reinforcement.
  5. The geosynthetic reinforcement shall be in tension and free from wrinkles prior to placement of the backfill soils. Pull geosynthetic reinforcement hand-taut and secure in place with staples, stakes, or by hand tensioning until the geosynthetic reinforcement is covered by 6 inches of loose fill.
  6. The geosynthetic reinforcements shall be continuous throughout their embedment lengths. Splices in the geosynthetic reinforcement strength direction are not allowed.
  7. Do not operate tracked construction equipment directly on the geosynthetic reinforcement. At least 6 inches of compacted backfill soil is required prior to operation of tracked vehicles over the geosynthetic reinforcement. Keep turning of tracked construction equipment to a minimum.
  8. Rubber-tired equipment may pass over the geosynthetic reinforcement at speeds of less than 5 miles per hour. Turning of rubber-tired equipment is not allowed on the geosynthetic reinforcement.
  9. Any damaged geosynthetic reinforcement shall be removed and replaced at no additional cost to GCDWR.
- K. Furnish and install weep holes at locations and frequencies recommended by the wall manufacturer, or as shown on the Contract Documents.

### 3.7 Stacked Fieldstone Boulders Erection

- A. Place the fieldstone boulders at a battered orientation of 1 inch vertical to 12 inches horizontal.
- B. Place stones as close as possible from each other, staggering joints. Stones shall be placed such that adjacent stones "touch" each other and voids do not exceed 2 inches. It is the intent of construction to minimize voids between stones.
- C. Smaller rocks shall be "chinked in" to fill all voids between the stones. Placement shall be approved by GCDWR. Grout voids between the stones as directed by GCDWR and in accordance with Section 03 62 00 - Non-Shrink Grouting.

### 3.8 Backfill Placement

- A. Place reinforced backfill, spread and compact in a manner that will minimize slack in the reinforcement.

- B. Place and spread fill and backfill materials in horizontal lifts of uniform thickness, in a manner that avoids segregation, and compact each lift to specified densities prior to placing succeeding lifts. Slope lifts only where necessary to conform to final grades or as necessary to keep placement surfaces drained of water, or as shown on the Contract Documents.
- C. Do not place fill or backfill if fill or backfill material is frozen or if surface upon which fill or backfill is to be placed is frozen.
- D. Place fill within the reinforced zone and compact in lifts not exceeding 6 to 8 inches (loose thickness) where hand-operated compaction equipment is used, and not exceeding 12 inches (loose thickness) where heavy, self-propelled compaction equipment is used. Only lightweight hand-operated compaction equipment is allowed within 4 feet of the back of the retaining wall units. If the specified compaction cannot be achieved within 4 feet of the back of the retaining wall units, replace the reinforced soil in this zone with granular fill material meeting the requirements specified in Section 31 23 00 - Excavation and Fill.
- E. Compaction testing shall be performed in accordance with ASTM D1556 or ASTM D6938. Compact each lift of fill placed in the reinforced zone to minimum of 95 percent relative compaction as determined in accordance with ASTM D1557.

### 3.9 Cap Unit Installation

- A. Apply adhesive to the top surface of the unit below and place the cap unit into desired position.
- B. Cut cap units as necessary to obtain the proper fit.
- C. Backfill and compact to top of cap unit.

### 3.10 Site Construction Tolerances

- A. Site Construction Tolerances
  - 1. Final Lines and Grades: Within a tolerance of 0.1 foot unless dimensions or grades are shown or specified otherwise
  - 2. Vertical Alignment: Plus, or minus 1-1/2 inches over any 10-foot distance, with a maximum differential of 3 inches over the length of the wall.
  - 3. Horizontal Location Control from Grading Plan
    - a. Straight Lines: Plus, or minus 1-1/2 inches over any 10-foot distance.
    - b. Corner and Radius Locations: Plus, or minus 12 inches.
    - c. Curves and Serpentine Radii: Plus, or minus 2 feet.
  - 4. Immediate Post-construction Wall Batter: within 2 digress of the design batter.

5. Bulging: Plus, or minus 1-1/4 inches over any 10-foot distance.

### 3.11 Field Quality Control

- A. Installer is responsible for quality control of installation of system components.
- B. Installation is subject to GCDWR's testing contractor/agent representative. Cost of the testing laboratory, fieldwork, and analysis will not be paid for as a separate item. All cost associated with compaction testing will be paid for by GCDWR. The cost of additional testing due to the failure of initial compaction to meet the requirements of the Contract Documents shall be the responsibility of the Contractor.
- C. Installer shall correct work that does not meet these specifications or the requirements shown on the Contract Documents at the installer's expense.

### 3.12 Site Testing

- A. Gradation
  1. One sample for each 500 tons of finished product or more often as determined by GCDWR, if variation in gradation is occurring, or if material appears to depart from Specifications.
  2. If test results indicate material does not meet Specification requirements, terminate material placement until corrective measures are taken.
  3. Remove material placed in Work that does not meet Specification requirements.
- B. In-Place density tests shall be performed in accordance with ASTM D6938 during placement of materials, test as follows:
  1. Reinforced Zone Backfill: One test for every 2 feet (vertical) of fill placed and compacted, for every 50 lineal feet of retaining wall.
  2. Vary compaction test locations to cover the entire area of the reinforced soil zone, including the area compacted by the hand-operated compaction equipment.

### 3.13 Adjusting and Cleaning

- A. Replace damaged units with new units as the work progresses.
- B. Remove debris caused by wall construction.

END OF SECTION

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## Temporary Construction Mats

### Part 1 General

#### 1.1 Summary

- A. Section includes furnishing all labor, equipment, materials, tools, and appliances necessary for the installation of temporary construction mats as herein specified, shown, or ordered.

#### 1.2 Definitions

- A. Temporary construction mats (access mats): A portable platform used create a stable surface to support construction equipment on unpaved surfaces, such as dirt, rock, or wetlands.
- B. Timbers mats: Hardwood timbers linked together to create temporary roadways and platforms for heavy equipment.
- C. Composite mats: Access mats made from a blend of various materials, including fiberglass, rubber, and/or plastic, that improve the strength and durability of the mat.

#### 1.3 Submittals

- A. If requested by GCDWR, submit:
  - 1. Certification from the manufacturer showing the material and size of the access mat.
  - 2. A schedule for the placement and removal of the mats. Include the location, mat type, and placement and removal dates for each location. Describe the method of installing and removing the mats.

### Part 2 Products

#### 2.1 General

- A. Access mats shall be of sufficient size and load capacity to adequately support the access of equipment and materials to perform the Work.

### Part 3 Execution

#### 3.1 General

- A. The following factors shall be considered when choosing the appropriate access mat for a site:
  - 1. Site conditions

2. Equipment
3. Environmental restrictions

### 3.2 Installation of Access Mats

- A. Inspect that mats are free from soil, seeds, or other organic or hazardous materials before entering the work area.
- B. Install temporary access matting on existing ground surface, taking care to minimize soil disturbance.
- C. Where necessary, contractor shall affix access mats to ground surface in accordance with manufacturer's guidance.

### 3.3 Removal of Access Mats

- A. Contractor shall remove access mats in a manner that minimizes rutting and soil disturbance.
- B. Contractor shall restore the area disturbed by access mat traffic, access mat installation, and access mat removal to its original conditions or better, or as specified in the Contract Documents or determined by GCDWR, prior to acceptance of the Work.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, equipment, and materials necessary for and to properly reestablish to the satisfaction of GCDWR, all ground surfaces irrespective of the type, which may be disturbed in the progress of Work required under this Contract.

### 1.2 Submittals

- A. A. If requested by GCDWR, submit:
  - 1. Product labels/data sheets.
  - 2. Samples
    - a. Representative of stockpiled or imported topsoil.
    - b. Compost sample and a certification showing compost meets or exceeds requirements to GCDWR for approval prior to being used and must comply with all local, state and federal regulations.
  - 3. Certified Topsoil Analysis Reports
    - a. If topsoil does not meet textural/gradation requirements, indicate quantities of materials necessary to bring topsoil into compliance with textural/gradation requirements.
    - b. Indicate quantity of lime, and quantity and analysis/analyses of fertilizer required to be applied to amend the soil to required pH and fertility.

### 1.3 Sequencing and Scheduling

- A. Perform Work specified in Specification Section 31 10 00 - Site Clearing and Specification Section 31 23 00 - Excavation and Fill prior to performing Work specified under this Section and as shown on Drawings.

## Part 2 Products

### 2.1 Topsoil

- A. General: Topsoil from the site areas to be excavated, filled and or graded shall be stripped and stockpiled in accordance with Section 3.3 A of 31 23 00, Excavation and Fill, and stabilized in accordance with soil erosion and sedimentation control temporary stabilization requirements of the prevailing version of the Manual for Erosion and Sediment Control in Georgia. Stored topsoil shall be spread on areas be permanently revegetated after excavation, filling, and grading operations, and be

used for finished grading. Where indicated on the Construction Documents and/or as directed by GCDWR, in cases where there is insufficient topsoil volume or quality from stripping and storing on site, imported topsoil may be required to supplement on site topsoil.

- B. Imported topsoil shall be natural, friable, soil, obtained from well-drained areas, free from objects larger than 1 1/2 inches maximum dimension, and free of subsoil, roots, grass, other foreign matter, hazardous or toxic substances, and deleterious material that may be harmful to plant growth or may hinder grading, planting, or maintenance.
- C. The texture of imported topsoil shall be as close as practicable to the texture of the existing onsite topsoil and shall be in accordance with D, below.
- D. Composition of imported topsoil as determined by ASTM D6913:
  - 1. Gravel-Size Fraction – Maximum 5 percent by weight retained on a No. 10 sieve.
  - 2. Sand-Sized Fraction –Maximum 75 percent by weight passing a No. 10 sieve and retained on a No. 270 sieve.
  - 3. Silt-Sized Fraction – Maximum 50 percent by weight passing a No. 270 sieve and larger than 0.002 millimeter.
  - 4. Clay-Sized Fraction – Maximum 25 percent by weight smaller than 0.002 millimeter.
  - 5. Particle fractions above are in accordance with USDA descriptions.
- E. Organic Matter: Minimum 2.0 percent by dry weight and maximum of 8.0 percent by dry weight as determined in accordance with ASTM D2974.
- F. pH: Range 5.0 to 7.0 in accordance with ASTM D4972.
- G. Textural Amendments: Amend as necessary to conform to required composition by incorporating sand, other soil, peat, or manure.
- H. Topsoil Analysis/Testing: Shall be performed by County or State soil testing service or approved certified independent testing laboratory.
- I. Source: Stockpile material on site, in accordance with Section 31 10 00 - Site Clearing. Imported topsoil may be required if on-site material is insufficient in quantity or fails to meet specified requirements.

## 2.2 Lime

- A. Composition:
  - 1. Agricultural Lime: Ground limestone with not less than 85 percent calcium and magnesium carbonates, ASTM C602.



2. Dolomitic Lime: Ground limestone with not less than 10 percent magnesium oxide and not less than 85 percent calcium and magnesium carbonates.

B. Gradation:

1. Minimum 25 percent passing No. 100 sieve.
2. Minimum 50 percent passing No. 50 sieve.
3. Minimum 90 percent passing No. 10 sieve.
4. Coarser material acceptable provided rates of application are increased proportionately on basis of quantities passing No. 100 sieve.

## 2.3 Sawdust or Ground Bark

- A. Nontoxic, of uniform texture, and subject to slow decomposition when mixed with soil. Sawdust or ground bark shall be aged a minimum of 6 months, or if fresh sawdust or bark is used, mix material with minimum 0.15 pound of ammonium nitrate or 0.25 pound of ammonium sulfate per cubic foot of loose material prior to mixing with soil.

## 2.4 Peat

- A. Composition: Natural residue formed by decomposition of reeds, sedges, or mosses in a freshwater environment, free from lumps, roots, and stones.
1. Organic Matter: Not less than 90 percent on a dry weight basis as determined by ASTM D2974
  2. Moisture Content: Maximum 65 percent by weight at time of delivery.

## 2.5 Fertilizer

- A. Apply fertilizer based on recommendations from by County or State soil testing service or approved certified independent testing laboratory, or as directed in the Contract Documents.
- B. Fertilizers shall be single nutrient or mixed grade N-P-K fertilizers containing the nutrients – Nitrogen (N), phosphate (P<sub>2</sub>O<sub>5</sub>), and potash (K<sub>2</sub>O) in amounts recommended by the soil test. Fertilizers may contain additional ingredients based on soil test recommendations, as approved by GCDWR.

## 2.6 Sand

- A. Fine Aggregate: Clean, coarse, well-graded, ASTM C33.

## 2.7 Compost Mulch

- A. Compost shall be weed free and derived from a well-decomposed source of organic matter. The composted products shall be produced using an aerobic composting process meeting USEPA CFR 503 regulations, including time and temperature data indicating effective weed seed, pathogen, and insect larvae kill. The composted products shall be free of any refuse, contaminants, or other materials otherwise deleterious or toxic to plant growth. Non-composted products will not be accepted.
- B. Test methods for the items below shall follow United States Composting Council (USCC) Test Methods for the Examination of Composting & Compost (TMECC) guidelines for laboratory procedures.
  - 1. pH: 5.0 - 8.0 in accordance with TMECC 04.11-A, "Electrometric pH Determination for Compost."
  - 2. Moisture content of less than 60 percent in accordance with TMECC 03.09-A "Total Solids and Moisture at 70±5 degrees Centigrade."
  - 3. Particle Size: 99 percent passing a 1-inch sieve, maximum of 50 percent passing a 1/2-inch sieve, in accordance with TMECC 02.02-B, "Sample Sieving for Aggregate Size Classification".
  - 4. Material shall be relatively free (<1 percent by dry weight) of inert or foreign man-made materials.

## 2.8 Planting Soil Mixes

- A. Prepare soil mix as follows, unless otherwise shown in the Contract Documents. The following mix is for moderately slow draining soil for trees and shrub beds.
  - 1. Mix of Imported Topsoil, Coarse Sand, and Compost: The approximate mix ratio shall be, with mix component percent by moist volume:
    - a. Imported Topsoil, unscreened 45-50 percent.
    - b. Coarse sand 40-45 percent.
    - c. Compost 10 percent.
  - 2. Final tested organic matter between 2.75 and 4 percent (by dry weight).

## Part 3 Execution

### 3.1 Subgrade Preparation

- A. Apply lime at the rate as prescribed in the soil test results to subgrade before tilling.
- B. Subgrade soils shall be roughened with furrows 4 to 6 inches deep to allow for keying

in of the topsoil.

- C. Remove stones over 2-1/2 inches in any dimension, sticks, roots, rubbish, and other extraneous material.
- D. Limit preparation to areas which will receive topsoil within 2 days after preparation.
- E. Preparation shall be done with mechanized equipment and hand labor.

### 3.2 Topsoil Placement

- A. Do not place topsoil when subsoil or topsoil is frozen, excessively wet, compacted, smeared, or otherwise detrimental to the Work.
- B. Mix soil amendments, lime, and fertilizer with topsoil before placement or spread on topsoil surface and mix thoroughly into entire depth of topsoil before planting or seeding. Delay spreading and mixing of fertilizer if planting or seeding will not occur within 3 days.
- C. Place one half of topsoil to be installed and work into the subgrade furrows to create a transition layer. Place remainder of topsoil where seeding and planting are scheduled to create a topsoil layer, above the transition layer with a minimum thickness of 2-inches, or as otherwise specified in the Contract Documents or directed by GCDWR.
- D. Uniformly distribute topsoil and fine grade, eliminating rough or low areas and maintaining levels, profiles, and contours of subgrade to achieve final surface within 1/2 inch of final grades.
- E. Remove stones exceeding 1-1/2 inches, roots, sticks, debris, and foreign matter during and after topsoil placement. Break up clods exceeding 1-1/2 inches. Soil shall be rolled with a smooth roller without excessively compacting, to ensure a uniform surface, at the correct grade.
- F. Remove surplus subsoil and topsoil from site. Grade stockpile area as necessary and amend and till soil as necessary to and place in condition acceptable for planting or seeding.
- G. Preparation shall be done with mechanized equipment and hand labor.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, equipment, and materials necessary for and to properly establish to the satisfaction of GCDWR, all turf and grass irrespective of the type, required under this Contract. Examples of typical turf and seed mixtures are included in Detail 2975 - Typical Planting Schedule Detail. Seed mixtures included in detail are for Proposal purposes and may be adjusted on a project-by-project basis.

### 1.2 Submittals

- A. If requested by GCDWR, the Contractor shall submit for approval all working drawings and schedules of materials and methods proposed to follow in the execution of the Work under this item. Submittals shall include, but not be limited to soils analysis, product data for seed, fertilizer, agricultural limestone, vegetative mulch and sod.
- B. If requested by GCDWR, the Contractor shall submit plans showing in detail the type, location, lime and fertilizer ratios and rates for all seeding and sodding to be used in construction. Plans shall indicate the application rates for all seeding establishment.

### 1.3 Performance Requirements

#### A. General

1. The Contractor shall provide a warranty period of two years from the date of Substantial Completion for all native seeding and for all nonnative turf and grass material. Turf and grass which die during the warranty period shall be removed and replaced under the original Specifications, or renovated, if approved by GCDWR, no later than the following planting season, at the Contractor's expense. The Contractor shall be responsible for providing no more than the original turf and grass and one replacement under the warranty period. All replacement native seeding and nonnative turf and grass replacement shall be subject to a two-year warranty period from the time of their acceptance.
2. The end of the original warranty period does not release the Contractor from their responsibility to care for the replacement turf and grass.

#### B. Turf and Grass

1. Only living systems of the turf and grass areas (without open and/or dead areas) that are healthy and properly installed or have seed and mulch properly installed at the time of final inspection will be accepted.
2. The Contractor shall be responsible for the replacement of any nonliving systems before and immediately after the end of the first growing season.
3. Planting acceptance shall be as follows for turf and grass (in percent by area)

based on inspections after the first growing season (late Summer/early Fall) and at the beginning of the second growing season (late Spring/early Summer):

- a. 80 percent coverage.
- b. No bare spots larger than 3 square feet.
- c. Not more than 10 percent of total area with bare spots larger than 1 square foot.
- d. Not more than 15 percent of total area with bare spots larger than 6 square inches.

## 1.4 Delivery, Storage and Protection

### A. Seed

1. Furnish in standard containers with seed name, lot number, net weight, percentages of purity, germination, and hard seed and maximum weed seed content, clearly marked for each container of seed, including the date of germination test.
2. Keep dry during storage.

### B. Sod

1. Do not harvest if sod is excessively dry or wet to the extent survival may be adversely affected.
2. Harvest and deliver sod only after laying bed is prepared for sodding.
3. Roll or stack to prevent yellowing.
4. Deliver and lay within 24 hours of harvesting.
5. Keep moist and covered to protect from drying from time of harvesting until laid.

### C. Hydroseeding Mulch: Mark package of wood fiber mulch to show air dry weight.

## 1.5 Weather Restrictions

- A. Perform Work under favorable weather and soil moisture conditions as determined by accepted local practice, and with approval by GCDWR.

## 1.6 Sequencing and Scheduling

- A. Complete Work specified in Specification Section 32 97 00 - Landscaping, and prepare topsoil as specified in Specification Section 32 91 13 - Soil Preparation, before starting Work of this section.

- B. Complete Work under this section within 3 days following completion of soil preparation.
- C. Notify GCDWR at least 3 days in advance of:
  - 1. Each material delivery.
  - 2. Start of planting activity.
- D. Planting Season: The planting season in Gwinnett County Georgia is generally October 15 through March 15 for most species. See Section 700.3.05 of the GDOT Standard Specifications for more specific information.

## 1.7 Maintenance Service

- A. Perform maintenance operations during warranty period to include:
  - 1. Watering: Keep surface moist.
  - 2. Washouts: Repair by filling with topsoil, liming, fertilizing, seeding, and mulching.
  - 3. Mulch: Replace wherever and whenever washed or blown away.

## Part 2 Products

### 2.1 Seed

- A. Seed shall be labeled in accordance with U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act. All seeds shall be furnished in sealed standard containers. The minimum percentage by weight of pure live seed in each lot of seed shall be stated such as the following example:

<u>Seed Type</u>	<u>Percent</u>
Grass seed (specified variety)	95
Material other than grass seed	5
Total	100

- B. The Contractor shall furnish seeds according to the types and descriptions included below, as in the Contractor Documents, or as approved by GCDWR. A given seeding mix shall be applied to the appropriate location given its type, specification, and by request of GCDWR.
  - 1. Native Upland – typically a mix of short grasses, sedges, rushes, and forbs designed to establish in upland areas with low inundation frequency.
  - 2. Native Wetland – typically a mix of short grasses, sedges, rushes, and forbs designed to establish in riparian and low-lying areas with high inundation frequency.

3. Ornamental – typically a mix of specialty short grasses, sedges, rushes, and forbs designed to establish in multiple terrains, given the specific application.
  4. Custom – GCDWR chosen seed mix of various short grasses, sedges, rushes, and forbs designed to establish in multiple terrains, given the application.
  5. Turf Grass, Standard Varieties – standard seed mix which includes, but is not limited to Bermuda grass, Centipede grass, and Tall Fescue.
  6. Turf Grass, Premium Varieties – premium seed mix which includes, but is not limited to Zoysia grass, St. Augustine, and other less commonly available species.
- C. The aggregate percent of material other than grass seed shall include all non-viable seed, chaff, bulbs, live seed of crop plants other than those specified above, harmless inert matter, and weed seed not exceeding 1.0 percent by weight of pure live seed and other material in the mixture. No noxious weed seed is permitted.

## 2.2 Fertilizer

- A. Commercial fertilizer shall conform to applicable Georgia fertilizer laws. Fertilizer shall conform to soil test results under Specification Section 32 91 13 - Soil Preparation.
- B. Fertilizer shall be uniform in composition, dry (unless designed to be delivered as a liquid or in solution), and free flowing and shall be delivered to the site in the original unopened containers, each bearing the manufacturer's guaranteed analysis.
- C. Any fertilizer, which becomes caked or otherwise damaged making it unsuitable for use, shall not be accepted.
- D. The following fertilizer shall be used for vegetated stormwater BMPs utilizing Engineering Soil Media in accordance with Paragraph 3.3, unless otherwise specified in the Contract Documents.
  1. 14-14-14 (Nitrogen [N] – Phosphorus [P] – Potassium [K]), polymer-coated or granular.

## 2.3 Limestone

- A. Agricultural limestone shall be an acceptable grade of ground limestone, ground dolomite, or a mixture of limestone and dolomite meeting the following physical requirements:
  1. Gradation

<u>Standard Sieve Size</u>	<u>Maximum Percent Retained</u>
No 10	10
No 50	50
No 100	75

- B. Fast-acting lime spread by hydraulic seeding equipment shall be finely ground limestone spanning from the 180-micron size to the 5-micron size. Finely ground limestone shall be an acceptable grade of calcitic or dolomitic limestone, ground so that 95 percent of the material will pass through a No. 100 mesh sieve.

## 2.4 Vegetative Mulch

- A. The vegetative mulch shall be the cereal straw from stalks of oats, rye, wheat, or barley.
- B. The straw shall be free of prohibited weed seeds and shall be relatively free of all other noxious and undesirable seeds.
- C. The straw shall be clean and bright, relatively free of foreign material and be dry enough to spread properly.
- D. If the above straw specifications cannot be met practicably, the foliage of the following plants may, with GCDWR approval, be substituted: Smooth Brome, Timothy, Orchard Grass, Red Canary Grass, Tall Fescue, Red Top, Millet, Blue Stem, Indian Grass, Red Clover, White Clover, Alfalfa, Crimson Clover, Birds Foot Trefoils, and Vetch. The foliage shall be taken relatively free of noxious and undesirable seeds and foreign material.
- E. Vegetative mulch spread with special blower-type equipment shall be anchored. Tackifiers, binders, hydraulic mulch with tackifier specifically designed for tacking straw, and asphalt emulsion may be used. The asphalt emulsion shall be SS-1, SS-1h, CSS-1 or CSS-1h conforming to the requirements of AASHTO M140.

## 2.5 Sod

- A. Turf grass Sod: Complying with "Specifications for Turfgrass Sod Materials" in Turfgrass Producers International (TPI)'s "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.
- B. Standard Turf Grass Species: Sod of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed: Bermuda grass, Centipede grass, St. Augustine grass, and Tall Fescue.
- C. Premium Turf Grass Species: Sod of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed: Bent grass, Kentucky bluegrass, Zoysia grass, and all sand grown sod grass.
- D. Refer to Contract Documents for type of sod, Standard or Premium, to be used.
- E. Meshed or netted sod is not acceptable.



## 2.6 Hydroseeding Mulch

- A. Hydroseeding Mulch shall be wood cellulose fiber mulch and shall be:
  - 1. Specially processed wood fiber containing no growth or germination inhibiting factors.
  - 2. Dyed a suitable color to facilitate inspection of material placement.
  - 3. Manufactured such that after addition and agitation in slurry tanks with water, the material fibers will become uniformly suspended to form homogenous slurry.
  - 4. When hydraulically sprayed on ground, material will allow absorption and percolation of moisture.

## Part 3 Execution

### 3.1 Preparation of Seeded or Sodded Areas

- A. The subgrade for the areas to be seeded or sodded shall be brought to a uniform grade, free of large stones. Where topsoil is required by GCDWR, the topsoil shall be uniformly graded, trimmed, and raked free from unsuitable material, ridges, bumps, or depressions and prepared in accordance with Section 32 91 13 - Soil Preparation.
- B. Loosen the seedbed, including cut slopes, to a minimum depth of 3 inches before topsoil, compost, other acceptable soil amendments, agricultural lime, fertilizer, mulch, seed, or sod is applied. Areas compacted by access, staging, or construction traffic shall be loosened to a minimum depth of 6 inches. Where seeding is performed, prepare the seedbed in manner that ensures the seeding application remains on slopes and germinates.

### 3.2 Lime

- A. Agricultural lime shall be applied at a rate of one to two tons per acre (22.9 to 45.9 pounds per 1000 square feet) unless soil tests indicate otherwise. Contractor shall refer to the "Lime Requirement tables" University of Georgia College of Agricultural & Environmental Sciences.

<https://aesl.ces.uga.edu/LimeTables.pdf>

### 3.3 Fertilizer

- A. Apply evenly over area in accordance with manufacturer's instructions. Mix into top 2 inches of topsoil, when applied by broadcast method.
- B. Application Rate: Determined by soil test results in accordance with Specification Section 32 91 13 - Soil Preparation.

- C. Where Engineered Soil Media will be permanently vegetated with seeding or sodding applications, uniformly apply a one-time application of 14-14-14 fertilizer as specified in Paragraph 2.2. at a rate of 0.062 pounds per square yard or 275 pounds per acre, unless otherwise specified in the Contract Documents. Rake fertilizer over the surface of the Engineered soil media to a depth of 1/8 inch to 1/2 inch.

### 3.4 Seeding

- A. Start within 2 days of preparation completion.
- B. Hydroseed slopes 3H:1V and steeper. Flatter slopes may be mechanically seeded.
- C. Hydroseeding
  1. The terms hydraulically applied erosion control and hydroseeding are considered synonymous as it relates to technical requirements.
  2. Application Rate: as described in the Contract Documents. Note: On a per project basis, if approved by GCDWR, if the seed germination rate of the seed lot provided is lower than the specified rate, the seed application rate may be increased proportionally to provide the required live seed application rate.
  3. Apply on moist soil, only after free surface water has drained away.
  4. Prevent drift and displacement of mixture into other areas.
  5. Upon application, allow absorption and percolation of moisture into ground.
  6. Mixtures: On a per project basis, if approved by GCDWR, seed and fertilizer may be mixed together, and applied within 30 minutes of mixing to prevent fertilizer from burning seed.
- D. Cover Crop Seeding: Apply seed at rate as described in the Contract Documents to areas that are bare or incomplete as directed by GCDWR.
- E. Mulching: Apply uniform cover of straw mulch at a rate of 2 tons per acre.
- F. Water: Apply with fine spray after mulching to saturate top 4 inches of soil.

### 3.5 Sodding

- A. Do not plant dormant sod, or when ground is frozen.
- B. Lay sod to form solid mass with tightly fitted joints; butt ends and sides, do not overlap.
  1. Stagger strips to offset joints in adjacent courses.
  2. Work from boards to avoid damage to subgrade or sod.
  3. Tamp or roll lightly to ensure contact with subgrade; work sifted soil into minor

cracks between pieces of sod, remove excess to avoid smothering adjacent grass.

4. Complete sod surface true to finished grade, even, and firm.
- C. Fasten sod on slopes to prevent slippage with wooden pins 6 inches long driven through sod into subgrade, until flush with top of sod. Install at sufficiently close intervals to securely hold sod.
- D. Water sod with fine spray immediately after planting. During first week, water daily or more frequently to maintain moist soil to depth of 4 inches.
- E. Apply top dress fertilizer at 50-100 lbs./ac or specified in the Contract Documents.

### 3.6 Seeding and Sod Replacement

- A. Where directed by GCDWR, areas shall be seeded or sodded. Seeding shall be performed using a properly proportioned mixture of inoculated seed, as applicable, approved for use in The Piedmont Region "Zone One" as detailed in the Manual for Erosion and Sediment Control in Georgia. Seeding shall only be permitted during the planting season listed for the Piedmont Region. All seeded areas shall be uniformly mulched immediately after seeding.
- B. The Contractor shall be responsible for maintaining all areas, including watering and reseeding defective area until a satisfactory stand of grass is accomplished and Final Acceptance of the Work by GCDWR is obtained. Areas showing evidence of settlement or loss of topsoil shall be rebuilt and reseeded or resodded as required.
- C. In general, the Contractor shall replace existing maintained lawn areas with the same type of grass as was established prior to construction unless otherwise shown in Contract Documents or directed by GCDWR. Any deviations or alternatives proposed due to unavailability of seasonal grasses or inappropriateness of seeding or sod due to the time of year must be presented to and approved in writing by GCDWR, and in writing by the homeowner, if applicable.

### 3.7 Sod Removal / Replacement

- A. On all well-established "sod" type lawns and other improved well-established grass areas, the sod/grass shall be carefully removed, watered, kept alive, and replaced after backfilling has been properly completed. Sod replacement shall be performed using sod of type and grade of that which was disturbed. Sod shall be carefully placed and rolled to ensure good soil contact.

### 3.8 Hydroseeding

- A. 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

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mulching method is chosen. Apply wood fiber mulch at approximately 500 pounds/acres.

2. Prepare the ground for hydroseeding as for conventional seeding. Use specially designed equipment to mix and apply the slurry uniformly over the entire seeding area.
3. Agitate the slurry mixture during application.
4. Discharge slurry within one hour after being combined in the hydroseeder. Do not hydroseed when winds prevent an even application.
5. Closely follow the equipment manufacturer's directions unless Contract Documents specify otherwise.
6. Mulch the entire hydroseeded area according to the Contract Documents.
7. Native Restoration Areas, Multi-layered plant ecological system (e.g., ground cover, herb, scrub-shrub, tree), 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.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, equipment, and materials necessary for and to properly complete Landscaping according to the Contract Documents and to the satisfaction of GCDWR.

### 1.2 Definitions

- A. Amelioration: The addition of soil, soil conditioners, fertilizer, or other soil additives that may be necessary to meet the requirements for seeding and mulching. Intent is to ensure establishment of healthy growing medium for pioneer plant materials.
- B. Basal Cut Ends: Bottom ends of live branches that are intended to produce root development.
- C. Brushlayer (Composed of Live Cutting Whips): A live cutting from trees/shrubs no younger than two growing seasons and no older than five growing seasons.
- D. Dead Blow Hammer: Mallet that has sand or lead shot in the head.
- E. Dormant Season: Time of year when plant materials are not actively growing, as shown on the Contract Documents.
- F. Growing Tips: Top ends of live cut branches that are intended to produce leaf development.
- G. Harvesting Site: Source area of native, live cut plant material branches.
- H. Live Cutting: Branches or stems that have been cut and pruned from living plant material belonging to defined vegetative species. All side branches are trimmed. They are intended to take root and grow.
- I. Live Whip: Branches or stems from 1/2 to 1 inch in diameter and of a length shown on the Contract Documents and details that have been cut and pruned from living plant material belonging to defined vegetative species. All side branches are trimmed. They are intended to take root and grow.
- J. Live Stake: Live cutting from trees/shrubs no younger than two growing seasons and no older than five growing seasons.
- K. Live Pole: Live cutting with 2- to 3-inch diameter from trees/shrubs no younger than two growing seasons and no older than five growing seasons.
- L. Mulch: Refers to the layer of material applied to the surface of soils to conserve moisture, improve fertility of soil, reduce weed growth, and enhance visual appearance. Types of mulch include wheat straw, pine straw, hard wood and soft

wood.

- M. Property Owner: Entity owning identified property or possessing rights to sign written agreement allowing harvesting of live cuttings for Project.
- N. Soil Bioengineering: Use of live plant materials to provide erosion control, slope and stream bank stabilization, landscape restoration, and wildlife habitat.
- O. Grass and Seed Mixtures: Refer to Specification Section 32 92 00 - Turfs and Grasses.
- P. Water: Water, which may be required for storage of plant materials during the live construction, and which shall contain no toxic or deleterious elements or constituents that could be harmful to plant growth.
- Q. Woven Coir Fabric: Refer to Specification Section 31 32 01 - Woven Fabric Stabilization Products (Coir Fabric).
- R. Trees, shrubs, and non-woody plantings: Plants that are either containerized (1, 3, 5, 7, 15, or 30 gallons), bare rooted, balled and burlapped, plugs, or 2-inch caliper, as specified on the Contract Documents.
- S. Plant Protection: An apparatus to protect newly installed plants from becoming damaged by browsing animals.

### 1.3 Submittals

- A. If requested by GCDWR, submit
  - 1. Product data for pesticides.
  - 2. List of live cutting harvest sites, one week prior to beginning the Work.
  - 3. Contractor Planting Plan
    - a. Including a list of proposed plants to be used, including those listed and not listed in the Contract Documents.
    - b. Showing field location of all plant locations with flagging or paint prior to installation.
  - 4. Copy of signed written agreement and applicable correspondence between harvest site property owner and Contractor, one week prior to beginning the Work. At a minimum, the signed agreement shall:
    - a. Grant permission to harvest.
    - b. Specify the requirements of access/egress.
    - c. Specify the use and condition that the harvesting site is to be left in.

- d. Acknowledge that the Contractor shall be solely responsible for activities on the harvesting site and shall hold GCDWR harmless.
5. Copy of permits from regulatory agencies.
6. The Contractor may use a third-party supplier to provide harvest materials. Suppliers must provide all the written information required of the Contractor.
7. Copy of identification tags used to identify cuttings after harvest and during transport.
8. Documentation for proposed mulch and anchoring. Contractor shall receive approval by GCDWR for mulch anchoring method before installation.
9. Submit a written Establishment Phase Schedule after Installation Inspection of plantings to define monitoring and watering requirements during maintenance period.

## 1.4 Delivery, Storage and Handling

### A. Delivery

1. Transport live cuttings in enclosed trailer or covered with a tarpaulin during transportation from harvesting site to Project Site.
2. Place live cut branch bundles on transport vehicles in an orderly fashion, with growing tips toward cab of vehicle to prevent damage and to facilitate handling.
3. All cut plant material shall arrive on the jobsite within 8 hours of cutting or as approved by GCDWR if a commercial supplier is used. The Contractor shall schedule the cutting and delivery of the live cuttings to the site so that the materials can be installed a maximum of 2 days after they arrive.
4. Trees, shrubs, and non-woody plantings shall be kept moist. Plants shall be transported in a manner to prevent disturbance of potting soil.
5. Grass and seed mixtures shall be transported in an enclosed cool and dry trailer.

### B. Storage

1. Live Cuttings: Store and protect live cuttings not installed on day of arrival at Project Site.
  - a. Store in water or heeled-in in moist soil for a maximum of 2 days without refrigeration.
  - b. Outside storage locations shall be continually shaded and protected from wind.

- c. Protect from drying at all times.
  - d. When temperature reaches 50 degrees F and above on day material is harvested, live cuttings shall not be stored, but shall be installed on day of harvesting.
  - e. If live cuttings are not installed on the same day they are harvested, they shall be soaked in a root hormone solution appropriate to the plant type overnight for next-day installation. This includes live cuttings from commercial suppliers, if the live cuttings are not installed on the Project the same day they are harvested by the supplier.
2. Trees, Shrubs, and Non-Woody Plantings: Store and plants not installed on day of arrival at Project Site.
    - a. Outside storage locations shall be continually shaded and protected from wind.
    - b. Protect from drying at all times.
    - c. Keep containers sealed to keep moisture inside the package.
  3. Grass and Seed Mixtures: Refer to Section 32 92 00 - Turfs and Grasses.
  4. Plant Protection
    - a. Store and protect plant protection devices not installed.
    - b. Outside storage shall be out of direct sunlight and dry.
  5. Mulch: Store mulch in a manner as to prevent material from blowing away.
- C. Handling:
1. All plant material shall be handled with care to limit stress and damage.
  2. Damaged plants will be rejected.
  3. Damaged plant protection devices shall not be installed.
  4. Mulch may be installed by hand or mechanical equipment.
  5. Other landscape items shall be handled and installed per the manufacturer's or grower's recommendations.

## 1.5 Environmental Requirements

- A. All plants, grass, and seed mixtures shall be planted during their species-specific dormant seasons as directed in the planting schedule or as advised by a commercial plant supplier or in accordance with recommendations of the University of Georgia



(UGA). Prior to installation, the Contractor shall confirm planting dormant seasons with GCDWR to ensure the long-term success of the plantings. All plants shall be installed in accordance with the recommendations shown on the individual labels and as directed in the planting schedule or as advised by a commercial plant supplier or in accordance with recommendations of UGA.

- B. Grass and seed mixtures shall be applied in accordance with supplier tag and as directed in the planting schedule or as advised by a commercial plant supplier or in accordance with recommendations of UGA.
- C. After seeding, planting and/or installing, water all of the plantings. Plant installations shall continuously be watered as needed.
- D. Fertilize according to soil test results in accordance with Section 32 91 13, Soil Preparation, unless otherwise directed in the planting schedule or as advised by a commercial plant supplier or in accordance with recommendations of the University of Georgia (UGA).

## 1.6 Performance Requirements

### A. General

- 1. The Contractor shall provide a warranty period of two years from the date of Substantial Completion for all plant material under this section. Plants which die during the warranty period shall be removed and replaced under the original Specifications, no later than the following planting season, at the Contractor's expense. The Contractor shall be responsible for providing no more than the original plant and one replacement under the warranty period. All replacement plants shall be subject to a two-year warranty period from the time of their acceptance.
- 2. The end of the original warranty period does not release the Contractor from its responsibility to care for the replacement plants.

### B. Plantings

- 1. Only living systems of the planted areas (without open dead areas) that are healthy and properly installed or have plants and/or seed and mulch properly installed at the time of final inspection will be accepted. For this Project, the living systems include:
  - a. Trees (live cuttings, containerized, 2-inch caliper, bare root, plugs, balled and burlapped).
  - b. Shrubs (live cuttings, containerized, bare root, plugs, balled and burlapped).
  - c. Non-woody Plantings (containerized, bare root, plugs).
  - d. Grass Seeding and/or Sod.

2. The Contractor shall be responsible for the replacement of any nonliving systems before and immediately after the end of the first growing season.
3. Planting acceptance shall be as follows for branch rooting, sprouting, leaf growth, or ground cover (in percent) based on inspections after the first growing season (late Summer/early Fall) and at the beginning of the second growing season (late Spring/early Summer):
  - a. Live Cuttings: 80 percent cuttings rooting.
  - b. Trees: 80 percent survival (75 percent of the plant showing sprouting and/or leaf production).
  - c. Shrubs: 80 percent survival (75 percent of the plant showing sprouting and/or leaf production).
  - d. Non-woody Plantings: 80 percent survival (75 percent of the plant showing sprouting and/or leaf production).
  - e. Grass Seeding: See Specification Section 32 92 00 – Turfs and Grasses, Article 1.3, Paragraph B.3.

C. Plant Protection

1. Plant protection devices shall be made of materials to resist decay and deterioration resulting from exposure to the elements at least 3-years after installation.
2. Plant protection devices shall be installed to resist attempts from animals to feed on plants.
3. Plant protection devices shall be installed in a method to resist surface flow to a depth at least  $\frac{1}{2}$  the height of the device.

## 1.7 Maintenance

- A. Maintenance shall begin immediately after each method has been installed and continue throughout construction until at least two years after acceptance of the construction or until GCDWR accepts the work.
  1. Maintenance of new installations shall begin immediately after installation and consists of spraying for insects and diseases, weeding, watering, and inspecting to see that the live plant materials are healthy and performing adequately. The Contractor shall be responsible for any permits related to pesticides. Report concerns to GCDWR.
  2. Plant and seed installations shall be protected at all times against trespassing and damage of any kind for the duration of construction and until acceptance of the work by GCDWR.

3. The Contractor shall be responsible for keeping all installations and work incidental thereto in good condition by performing all other necessary operations during the construction period to care for promotion of healthy root and leaf growth and plant life so that all work is in satisfactory and acceptable condition to GCDWR.
  4. All drainage systems shall be kept in good working order by the Contractor so that they do not negatively impact installed plants and seeded areas.
  5. All installation and plant material required by this Contract shall be in a satisfactory and acceptable condition when the Contractor applies for payment.
  6. Maintenance for and in conjunction with the plants and seeded areas shall be incidental to the work. Consisting of work furnished, installed, and accepted (including all materials, i.e., labor, machinery, and maintenance care necessary to complete the work in a high-quality workmanship-like manner).
- B. Installation of plant protection devices does not relieve the Contractor to perform maintenance activities as listed above.
- C. Mulch shall be anchored to ensure proper placement and maintain the mulch in place. Anchoring practice shall not pose a threat to the natural environment, water quality, or wildlife.

## 1.8 Control of Existing Vegetation

- A. In the areas where new vegetation is to be planted and the project grading does not remove the existing vegetation, the Contractor shall remove the existing exotic and invasive vegetation from the Site in accordance with Specification Section 32 97 10 – Invasive Species Management. GCDWR and the Contractor shall walk the entire limits of the Project prior to vegetation clearing. Any vegetation to remain shall be identified and preserved.
- B. Proposals for herbicide use shall be reviewed by GCDWR. No herbicide shall be used without explicit approval of GCDWR, unless directed in the Contract Documents.

## Part 2 Products

### 2.1 General

- A. Live Cuttings, Live Poles, and Live Whips
1. Prior to leaving the harvest site (including commercial source), all live branch cuttings shall be inspected for parameters to meet the Contract Documents and acceptability by GCDWR, as described hereinafter.
    - a. They shall be healthy, freshly cut, living material.
    - b. No invasive vines or plant materials will be permitted to be mixed in with

the cuttings.

- c. The cuttings shall be free from insect infestation and disease.

B. Trees, Shrubs, and Non-Woody Plantings

1. Trees, shrubs, and non-woody plantings shall be either containerized, bare root, plugs or 2-inch caliper as specified on the Contract Documents.
2. All tree, shrub and/or non-woody plants sizes cannot be substituted for a different size unless pre-approved by GCDWR.
3. All trees, shrubs, and non-woody shall be inspected on-site prior to installation for parameters required to meet the Contract Documents and acceptability by GCDWR, as described hereinafter:
  - a. All trees, shrubs, and non-woody plantings shall be labeled.
  - b. All trees, shrubs, and non-woody plantings shall be free from insect infestation and disease.
  - c. All trees, shrubs, and non-woody plantings shall be healthy, freshly harvested, living material.

C. Grass and Seed Mixtures: The Contractor shall provide the bag identification tags to GCDWR for each bag of seed used on the site, prior to installation. Products shall meet requirements specified in Specification Section 32 92 00 – Turfs and Grasses.

D. Plant Protection: The Contractor shall provide plant protection measures for plant installed. Plant protection measures products shall be warranted for a period of three years, such warranty which shall be transferable to the GCDWR.

E. Mulch: The Contractor shall apply mulch to appropriate depth with a continuous cover of 90 percent or greater. Mulch shall meet the requirements of Section 32 92 00 – Turfs and Grasses.

## 2.2 Plants

A. Live Cuttings

1. The Contractor may use local harvest sites or a commercial supplier to supply live cuttings for the soil bioengineering items on the Project.
2. The Contractor is encouraged to locate local harvest sites for plant material sources. Suitable species found on the project site, are preferred if available.
3. The Contractor may use other plant species than those shown on the plant schedules in the plans, upon approval by GCDWR.
4. Fabrication:

- a. Live Stakes: Minimum diameter of 1/2 inch (0.5 inch) and a maximum diameter of 1 inch.
  - b. Cut to length shown on the Contract Documents.
  - c. Cut at a 45-degree angle at the basal end and cut flat on the other end.
5. Basal end is intended as the end to take root and shall be the end installed in ground.

B. Plantings

1. Trees, shrubs, and non-woody plantings shall be bare root, plug, containerized, or size caliper as shown in the Plant Schedules on the Contract Documents.
2. Plant species shall be those shown in the Plant Schedules on the Contract Documents. Alternate plant species may be used by the Contractor, at the request of a property owner and/or the Contractor upon approval by GCDWR.
3. Local suppliers of plants are preferred.
4. When indicated by the Contract Documents, install trees with stakes as follows:
  - a. Wood Stake: As shown on the Contract Documents, or if not shown, then 2 inches by 2 inches stake placed at 4 to 8 feet from the trunk.
  - b. Guy Wires protected with hosing around tree trunk or other guying method if authorized by GCDWR.
  - c. Protective hose: two-ply, reinforced rubber garden hose, not less than 1/2-inch diameter, new or used.

## 2.3 Plant Protection

- A. Plant protection devices shall be made of materials to resist decay and deterioration resulting from exposure to the elements for at least 3 years after installation.
- B. Plant protection devices shall have a top opening that prevents damage to the stems of the tree as it grows.
- C. After the 5th year, the device shall photodegrade enough to fall apart as the growing tree expands.
- D. The devices shall be 100 percent biodegradable and remain harmless to the environment as it decays.
- E. The plant protection devices shall be sized in accordance to the planting plan and detailed in the Contract Documents.
- F. Protection shall be manufactured by Tubex, SunFlex, Photosynth, Tree Pro, etc. or

an equivalent approved by GCDWR.

## 2.4 Mulch

- A. Straw Mulch: Long pine or wheat straw that is to be used as mulching material under the woven coir fabric, in between soil bioengineering systems, and on all construction disturbance areas. Long straw mulch shall consist of dry pine straw or wheat straw, free of noxious weeds. The mulch shall be reasonably bright in color and shall not be musty, moldy, caked, decayed, or dusty. This mulch shall be installed along with appropriate soil amelioration and seeding under the coir fabric, on all open seeded soil slope face areas, and seeded construction disturbance areas.
- B. Coarse Ground Mulch: A single ground wood product as a mulching material. Ground wood mulch shall consist of irregular-sized chipped and woody materials from 2 to 8 inches in length. Course ground mulch may be used in unimproved areas for weed suppression, dust control, water conservation or other uses. Course ground mulch may be accepted in either hard wood or soft wood varieties.
- C. Double Ground Mulch: A double ground wood product as a mulching material. Ground wood mulch shall consist of uniformly shaped woody materials from 1 to 3 inches in length. Double ground mulch may be used in landscaped areas for topdressing, plant protection and enhancement, water conservation or other uses. Double ground mulch may be accepted in either hardwood or soft wood varieties.

## 2.5 Wood Edging Barrier

- A. Provide wood headers and edging of sizes shown and of following wood species:
  - 1. Western red cedar, all heartwood or as approved by GCDWR.
  - 2. Wood Stake: Same species, 2 inches by 2 inches by 24 inches long.
  - 3. 5d Galvanized Nails: For anchoring headers and edging.

## 2.6 Metal Edging Barrier

- A. Commercial, size as shown, fabricated in sections with loops pressed from or welded to face of sections to receive stakes.
- B. Tapered Steel Stakes: 16 inches long or as directed by manufacturer.
- C. Coating: Finish edging sections and stakes with manufacturer's standard paint color as shown in the Contract Documents.

## 2.7 Plastic Edging Barrier

- A. Commercial, size as shown, with custom stakes as directed by the manufacturer.
- B. Material: HDPE plastic

## 2.8 Tree Bag

- A. Treegator Slow Release Watering Bag or equivalent approved by GCDWR.
- B. Single bag fits minimum 1 inch to maximum 4-inch caliper tree with branches at least 25 inches from the ground or higher.
- C. Double bag setup (two single bags zipped together back-to-back) used for 4-inch to 8-inch caliper trees.
- D. Material: Polyethylene with nylon webbing, black polypropylene straps and nylon zippers.
- E. Size: Full bag – 30-inch tall, 18-inch wide (at base).
- F. Two water release points per bag.
- G. Bag is empty in approximately 5 to 9 hours.
- H. UV stabilized to withstand exposure to sunlight.
- I. Fill opening fits up to 3-inch diameter hose.

## 2.9 Water

- A. Water, which may be required for storage of plant materials during the live construction, shall contain no toxic or otherwise deleterious elements or constituents that could be harmful to plant growth. A nearby shaded pond or other area approved by GCDWR may be utilized for storage purposes.

## 2.10 Landscape Stone

- A. Slate Chips: Slate chips shall be composed of angular slate pieces ranging from 1 to 3 inches across and be dark gray in color, unless otherwise specified in the Contract Documents
- B. Flagstone:
  - 1. Flagstone shall be flat, angular sandstone with a minimum width of 12 inches and thickness ranging from 3/4 to 2-1/2 inches. No more than 5 percent of the material furnished shall be less than the minimum width specified.
  - 2. Flagstone shall be hard and durable, free from fractures, bedding planes, pronounced weathering, and earth or other adherent coatings.

## Part 3 Execution

### 3.1 Plants

#### A. Harvesting (by Contractor or Commercial Supplier)

1. General: Plant materials may be harvested from sites located by the Contractor and approved by GCDWR. Only healthy, well-branched, and disease-free stock from species approved by GCDWR shall be acceptable. The Contractor is responsible for providing harvested material. GCDWR must approve harvest sites found by the Contractor one week prior to on-site work. The harvesting sites shall be left in a condition that meets the written satisfaction of the property owner. Larger log material shall be cut into 16-inch firewood lengths and neatly stacked where directed by the harvest site property owner. Alternatively, the property owner may want to have the unused material placed in brush piles for habitat enhancement or removed from the harvest site and disposed of in a lawful manner at the Contractor's cost.
2. Cutting: Equipment such as chain saws, bush axes, loppers, and pruners may be used for harvesting, provided that they are used in such a manner that they leave clean cuts. Live growing plant material at the harvesting site shall be handled with care to avoid bark stripping and splitting of stems. Cuts shall be made 6 inches to 12 inches from the ground or as required by the harvest site property owner. Cuts shall be made flat or at a slight or blunt angle to ensure that the source sites will regenerate rapidly.
3. Binding: Twine or hoisting belts shall be used to bind the live cuttings securely into bundles at the harvesting site for handling and for protection during transport. Live cuttings shall be grouped in such a manner that they stay together when handled. Side branches and brushy limbs shall be kept intact at this time and all growing tips shall be placed in the same direction.
4. Identification: Prior to leaving the harvesting site (including a commercial source), all live branch cuttings shall be properly labeled by the Contractor or commercial supplier. Labels shall be securely attached to the bundles of live cuttings and shall indicate the species of the cuttings, the collection date, the location of harvesting, and the ambient temperature at the time of harvest.

#### B. Fabrication: All live system preparation shall be performed on the Project site and may not be performed at the harvesting or other remote staging sites. Preparation includes cutting of live stakes and brush layer, trimming of branches, or other activities required in construction.

#### C. Live Stakes

1. Live stakes shall be tamped with a dead blow hammer into the ground through installed coir fabric (see Specification Section 31 32 01 - Woven Fabric Stabilization Products). The live stakes shall protrude from the finished ground elevation a length as shown on the Contract Documents. In cases where the



ground is hard, a pilot hole may be made to assist in inserting the live stake. The Contractor shall propose and use means acceptable to GCDWR for this purpose. The intent of this requirement is to maintain firm soil/stake contact after the live stake is installed. The rod must be removed carefully and may not be rotated to enlarge the hole.

2. Live stakes shall be installed on prepared areas at a rate designated on the Contract Documents in the Planting Schedule.
3. All species as well as final locations and configurations shall be approved by GCDWR. If the Contractor proposes alternative species, they shall be submitted for review to GCDWR for approval. GCDWR may require more than one species.

D. Live Pole

1. Live poles shall be pushed into a bioengineered bank, or if the ground is hard, a pilot hole may be made to assist in inserting the live pole. The live poles shall be laid angled on the landward slope of the bank and installed upright on both sides of the trench excavated for the stone toe protection keys, as shown in the Contract Documents. Prior to backfilling around live poles, a mud slurry will be used to backfill in the immediate 6 inches of each live pole as to eliminate air pockets around the buried end of the live pole. The live poles shall protrude from the finished ground elevation a length as shown on the Contract Documents.
2. Live poles shall be installed on prepared areas at a rate designated on the Contract Documents in the Planting Schedule.
3. All species as well as final locations and configurations, shall be as specified on the Contract Plans and Documents. If the Contractor proposes alternate species, they shall be submitted for review to GCDWR for approval. GCDWR may require more than one species.

E. Live Whip

1. Live whips shall be pushed into a bioengineered bank, or if the ground is hard, a pilot hole may be made to assist in inserting the live whip. The live whips shall be laid angled on the landward slope of the bank, as shown in the Contract Documents. Prior to backfilling around live whips, a mud slurry will be used to backfill in the immediate 6 inches of each live whip as to eliminate air pockets around the buried end of the live whip. The live whips shall protrude from the finished ground elevation a length as shown on the Contract Documents.
2. Live whips shall be installed on prepared areas at a rate designated on the Contract Documents in the Planting Schedule.
3. All species as well as final locations and configurations shall be approved by GCDWR. If the Contractor proposes alternate species, they shall be submitted for review to GCDWR for approval. GCDWR may require more than one

species.

F. Trees, Shrubs, and Non-Woody Plantings

1. The plants shall be installed at the spacing shown on the Contract Documents Planting Schedule or as advised by a commercial plant supplier (whichever is closer).
2. Installation instructions shall be in accordance with the detail(s) shown on the Contract Documents, or in accordance with plant labels, as advised by a commercial plant supplier, or as recommended by UGA, if one of these methods is at least as likely to favor successful plant establishment as the detail(s) on the plans.
3. Six inches of double ground wood mulch, weed control fabrics, or pre-emergent herbicide (which shall not interfere with the cultivated plant's growth) shall be used around the base of each installed plant to control competition from the herbaceous layer. The perimeter shall be no less than eighteen inches in diameter.
4. After planting, water all of the plantings. Plant installations shall be routinely watered as needed.
5. Staking and Guying Trees
  - a. Do not use staking and guying unless specified in the Contract Documents. Staking and guying specified in the Contract Documents shall be considered incidental to the Work and will not be paid as a separate item.
  - b. Stake trees using a system that will prevent trees from leaning or tilting and keep the root ball stable until the roots become anchored. The system shall allow the top some movement and flexibility without damaging the tree.
  - c. Stake and guy wires, where installed, shall be removed after one growing season.

G. Plant Protection Devices

1. Plant protection devices shall be installed in accordance of manufacturer's specifications.
2. Plant protection devices shall be installed so they resist wind and surface water flows up to half the height of the device.
3. In project locations where high flow events may be expected, extra anchoring may be installed at the discretion of GCDWR. Such anchoring shall be installed so that it will not girdle the plant in the future as the plant grows or it shall be removed by the Contractor once the plant is established sufficiently to resist the

high flows.

#### H. Mulching

##### 1. For Pit Plantings

- a. Apply mulch in a circular fashion around each plant, forming a ring as shown in the Contract Documentation the outside diameter.
- b. If plant pits are greater than 5 feet in diameter, ensure that the mulch extends out to cover the berm as shown in the planting details on the Plans.
- c. Apply mulch within 3 days of planting at least 4 inches in depth to obtain a compacted depth of at least 3 inches.
- d. Compaction occurs naturally. Check compaction at least two months after spreading and exposing the mulch to the elements.
- e. If the compacted depth is less than 3 inches, apply additional mulch to deficient areas within 1 month following observance or notification.
- f. Apply mulch to a uniform depth and remove lumps for a neat appearance. Tuck mulch neatly against all paving edges, drainage structures, and where planting beds meet grassed areas.
- g. Leave a 2-inch ring of non-mulched area directly around all tree trunks.
- h. Do not mulch with cypress mulch.

2. For native multi-layered plant ecological system (e.g., ground cover, herb, scrub-shrub, tree) or stream buffer restoration planting areas, wheat straw shall be the only type of mulch used.

3. Do not mulch wet swale or retention ponds where standing water is present.

4. Wheat straw and pine straw mulch shall be applied by hand to a thickness of 3 inches.

### 3.2 Wood Edging

- A. Anchor with wood stakes spaced up to 3 feet on center and driven at least 1 inch below top elevation of header or edging. Use two galvanized nails per stake to fasten headers and edging; length as needed to penetrate both members and provide 1/2-inch clinch at point. Pre-drill stakes to avoid splitting.

### 3.3 Metal Edging

- A. Anchor with steel stakes spaced up to 3 feet on center and driven at least 1 inch below top elevation of edging.

### 3.4 Plastic Edging

- A. Prior to installation, lay uncoiled edging flat in warm sunlight to improve flexibility.
- B. Anchor with custom plastic stakes spaced 3-4 feet on center and driven at least 1 inch below top elevation of edging.

### 3.5 Tree Bag

- A. Installation:
  1. Place around tree trunk, with the zippers on uphill side of tree.
  2. Wrap both sides around trunk until zippers meet.
  3. Zip together from bottom to top.
  4. Lift tag to expose fill opening at top of bag.
  5. Insert hose into fill opening and begin filling with water.
  6. Fill bag to 1/4 capacity.
  7. Gently lift up on straps at top of bag to expand bottom.
  8. Fill to desired level and let empty.
  9. Continuously waters for approximately 5 to 9 hours.
- B. Maintenance: Water tree bag according to the frequency listed in the table below:

**Water Capacity/Frequency Chart**

Bag Setup	Trunk Caliper (diameter)	Approximate Water Capacity	Fills per Week
Single Bag	1 to 2 inch	15 gallons	1 Fill per Week
	2 to 3 inch	14.75 to 14.25 gallons	2 Fills per Week
Double Bag	4 to 5 inch	23.50 gallons	1 Fill per Week
	5 to 8 inch	22.75 to 21.5 gallons	2 Fills per Week

- C. Removal: Remove tree bag after the tree has established its root system. On average, proper establishment of a new tree's root system requires one year for every one inch of trunk caliper.

### 3.6 Landscape Stone

- A. Prepare the ground surface where the landscape stone will be placed to conform with the correct grades and details shown in the Contract Documents before beginning the placement. Ground surface shall be smooth and free of obstructions, depressions, or debris. Ground surface shall be prepared in accordance with Drawings and Specifications.

- B. Place woven geotextile on the prepared ground surface under all landscape stone unless otherwise specified on the Construction Drawings or otherwise directed by GCDWR. Woven geotextiles shall be as specified in Specification Section 31 32 19.16 – Geotextiles.
- C. Place landscape stone to a uniform thickness as specified in the Contract Documents.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, equipment, and materials necessary for and to properly complete invasive species management to the satisfaction of GCDWR and according to the Contract Documents.

### 1.2 Definitions

- A. Clearing: See Section 31 10 00 - Site Clearing.
- B. Exotic Species: A species that is not indigenous or native to a region and generally introduced to an area by relatively recent human activities.
- C. Invasive Species: A type of species that is typically exotic in nature, with minimal-to-no predators or native biological systems to control its growth and the displacement of native herbaceous species.
- D. Mulch: Mulch is a wood chip covering placed around plants (or covering the ground in lieu of plants) to prevent the growth of unwanted species and to provide erosion control.
- E. Integrated Pest Management: An environmentally sensitive systems-based approach focusing on incorporating all management strategies (mechanical, biological, cultural, chemical) that aims to deliver effective pest control, while at the same time reducing the volume and toxicity of pesticides used.

### 1.3 Submittals

- A. If requested by GCDWR, submit:
  - 1. An exotic species management plan, prepared by the Contractor, that includes a description of the species to be managed, the procedures proposed to remove the exotics species, herbicide use, spill prevention procedures, and safe handling and disposal of herbicides. Contractor shall refer to the “exotic plant guidelines” North Carolina Department of Environment and Natural Resources Division of Parks and Recreation.  
  
[https://files.nc.gov/ncdeq/Water%20Quality/Surface%20Water%20Protection/401/Policies\\_Guides\\_Manuals/ExoticPlantGuidelines.pdf](https://files.nc.gov/ncdeq/Water%20Quality/Surface%20Water%20Protection/401/Policies_Guides_Manuals/ExoticPlantGuidelines.pdf)
  - 2. An integrated pest management (IPM) plan, prepared by the Contractor, that includes a description of the pests to be managed and the procedures proposed to identify, monitor, and remove the pests. Contractor shall refer to the “integrated pest management guidelines” University of Georgia Extension.

<https://ipm.uga.edu/>

3. Current permits for any chemical treatment activities.

## 1.4 Quality Assurance

- A. Contractor shall be able to identify the priority target invasive plant species (see Nonnative Invasive Plants of Southern Forest, a Field Guide for Identification and Control, United States Department of Agriculture, Forest Service Southern Research Stations General Technical Report SRS-62).

[https://www.srs.fs.usda.gov/pubs/gtr/gtr\\_srs062/](https://www.srs.fs.usda.gov/pubs/gtr/gtr_srs062/)

- B. The priority target species include Chinese privet (*Ligustrum sinense*), Japanese privet (*Ligustrum japonicum*), thorny olive (*Elaeagnus pungens*), autumn olive (*Elaeagnus umbellata*), Japanese honeysuckle (*Lonicera japonica*), and English Ivy (*Hedera helix*). Additional invasive species that may be of priority concern in the area will be identified by GCDWR.

## Part 2 Products

### 2.1 Material and Equipment

- A. Contractor shall furnish all material, tools, equipment, facilities and services as required for performing clearing and removal of exotic and invasive target species.
- B. Contractor shall furnish all material, tools, equipment, facilities and services as required for performing pesticide application.
- C. Plant material to be used for wood chip mulch and ground in place will be prepared using equipment for high production vegetation management such as Supertrak SK140 Rubber Track Mulcher or equivalent to produce suitable material that meets the definition of mulch. Mulching trackhoes, a tracked vehicle with a backhoe arm, configured with hydraulically driven mowers on the end of the arm or equivalent may be used for felling and mulching larger trees shown on the Contract Documents.

## Part 3 Execution

### 3.1 General

- A. Accepted methods of exotic and invasive management include:
  1. Hand pulling.
  2. Foliar herbicide application.
  3. Cut stump method.
  4. Clear, mulch, and spray with herbicide.

## 3.2 Minimize Soil Disturbance

- A. Due to the nature of invasive plants to rapidly colonize areas of disturbed soil, out-compete native species, and become firmly established very quickly, it is essential to minimize areas of soil disturbance during clearing.
- B. Some of the methods described herein require actual digging or pulling of plants from the soil. Each removal technique must be evaluated to determine if the proposed management method will destabilize soils to the point where erosion is threatened, or growth or expansion of the invasive species would be facilitated.

## 3.3 Mulch

- A. Invasive plants rapidly colonize any area of disturbed soil; thus, it is essential that all disturbed areas be seeded with non-invasive species plant material and mulched as soon as possible. If outside of the growing season for seed germination, disturbed sites shall still be mulched. Outside sources of mulch shall be free of invasive plant parts or seeds. Use of wood chip mulch is preferred.

## 3.4 Disposition of Collected Material

- A. All invasive species plant material shall be hauled off-site. Invasive species plants, or any fragments or mulch thereof, shall not be left on-site, nor burned, nor ground on-site. Transport the material to an appropriate disposal location as designated by GCDWR prior to the time of harvesting.

## 3.5 Integrated Pest Management

- A. The goal of the IPM is to deliver effective pest control while minimizing volume and toxicity of pesticides used.
- B. The Contractor shall have responsibility for inspecting vegetated areas for disease, fungus, insect infestations, and plant material. Treatment to control disease, fungi, insects, and plant material in vegetated areas will be only upon the Contractor's recommendation and GCDWR's approval. GCDWR requests that the Contractor endeavor to provide such treatments through integrated pest management practices but recognizes that use of pesticides may be necessary as a last resort.
- C. When it is determined that a pesticide must be used in order to obtain adequate control, the Contractor shall employ the use of formulations and treatment techniques which minimize the amount of pesticides used and the potential exposure of people and the environment. The Contractor shall be responsible for application of pesticides according to the product label. All pesticides used by the Contractor must be registered with the Environmental Protection Agency (EPA). Transport, handling, and use/application of all pesticides shall be strict accordance with the manufacturer's label instructions and all applicable federal and county laws and regulations.



### 3.6 Herbicides

- A. All herbicide use shall be applied by hand applicator and in accordance with label instructions, state and federal laws and will be conducted by, or under the supervision of experienced, licensed applicators. Herbicide application techniques will generally fall under two types; foliar application and stem cut and treat. Foliar herbicides will be applied to actively growing plants prior to flowering.
- B. Herbicides shall be applied in such a manner to not expose desirable native species in such manner that would result in deleterious effects to the desirable plants.

### 3.7 Exotic Vegetation Removal

- A. This work shall consist of managing invasive plants in accordance with the Contract Documents and as directed by GCDWR.
- B. Hand Pulling - Target Species
  - 1. Plants with stems one inch or smaller can often be removed by hand pulling. Since the root system of most of these plants is extensive, pulling larger plants is seldom possible.
  - 2. Stems up to 2-inch diameter can be removed using a weed wrench or similar uprooting tools. The entire root must be removed since broken fragments may re-sprout.
- C. Foliar Herbicide Application
  - 1. Autumn Olive (*Elaeagnus umbellata*) and Thorny Olive (*Elaeagnus pungens*)
    - a. Foliar application of a solution of 1 to 2 percent glyphosate or triclopyr with a 0.5 percent nonionic surfactant may be adequate for small patches of autumn olive. Ambient air temperature shall be above 65 degrees F.
    - b. Application of herbicide shall be performed in late August or September when the plant is actively translocating materials to the roots.
  - 2. Japanese Privet (*Ligustrum japonicum*), and Chinese Privet (*Ligustrum sinense*)
    - a. Apply a solution of 2 percent glyphosate or triclopyr and 0.5 percent nonionic surfactant. Ambient air temperature shall be above 65 degrees.
    - b. The leaves of the privet shall be completely wetted, one bush at a time. Treatment is most effective on fully developed foliage, especially late in the summer.
  - 3. Japanese Honeysuckle (*Lonicera japonica*)
    - a. Apply a solution of 2 percent glyphosate or triclopyr and 0.5 percent

nonionic surfactant to thoroughly wet all foliage.

- b. For vines climbing into surrounding trees apply a 25 percent solution of glyphosate or triclopyr on cut vine surfaces. Ambient air temperature shall be above 65 degrees F.

D. Cut Stump Method - All Target Species

1. This management method shall be considered when treating individual bushes or where the presence of other desirable species precludes foliar applications over a given area.
2. The plant will be cut off at the main stem 1 to 2 inches above ground and immediately painted with a 50 percent solution of glyphosate or triclopyr. Cover the outer 20 percent of all cut stumps.
3. In addition, the basal section of the plant (ground to 12 inches) can be treated with a solution of 25 percent triclopyr and 75 percent horticultural oil. After treatment, wet the area thoroughly. Ambient air temperature shall be above 65 degrees F.

E. Clear, Mulch, and Spray with Herbicide - All Target Species

1. This management method shall be considered when treating nonspecific stand of invasive species or where the presence of desirable plant species is not abundant and do not provide a significant cover.
2. This method must be used before fruit is produced, generally in the summer and before August.
3. Clearing limits of monospecific stand of exotic and invasive species will be identified by GCDWR and marked with flagging by the Contractor and shown in the exotic species management plan.
4. Desirable shrub and tree species will be marked by GCDWR. Contractor shall install protection barrier fencing on marked shrub and trees. Protection fencing will consist of 3 feet high orange barrier fence. Radius of the barrier will extend 3 feet from trunk of each individual plant. No vegetation shall be removed until all protection zones are established and approved by GCDWR.
5. Undesirable vegetation, except Japanese Privet and Chinese Privet, may be ground to 1 to 2 inches above ground using a mechanical grinder specified in Part 2 of this section. Cut vegetation shall be sprayed with herbicide within 30 minutes after cutting.
6. Cleared and mulched areas shall have remaining stumps painted or sprayed with a 50 percent solution of glyphosate or triclopyr. Where areas are sprayed, herbicide solution shall be mixed with temporary, non-toxic marker indicator dye at the Manufacturer suggested rate.

- a. Adjacent surfaces shall be protected from stain and damage during entire operation. Damaged and permanently stained areas shall be replaced or repaired to equal the original conditions at no additional cost to GCDWR.
7. Mulching on or near stream channel banks shall be done in manner so as not to disturb the soil.

### 3.8 Disposal of Material Not Used as Mulch

- A. Proper disposal of harvested invasive plant parts and soil containing invasive plant seeds or rootstock (rhizomes) is essential to managing the spread of invasive plants and not used as mulch. Full consideration shall be given, as appropriate, as follows:
  1. Transportation: Cut living plant material shall be transported to processing areas in covered vehicles with tarp, topper, cap, or other method to securely fasten the load in order to prevent spread of the plant material from the project work site. Transport the material to an appropriate disposal location as designated by GCDWR prior to the time of harvesting.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all the materials, perform all necessary excavation and backfill, and properly lay and test, at the locations indicated on the Contract Documents or as directed, all storm drainage pipe and pipe appurtenances and specials of the sizes specified or indicated which are necessary for the proper completion of the Work.

### 1.2 Submittals

- A. If required by GCDWR, the Contractor shall submit for approval:
  - 1. All working drawings and schedules of materials and methods proposed to follow in the execution of the Work under this item. Submittals shall show in detail the size and location of all piping and accessories to be used in construction.
  - 2. Samples, specifications, and manufacturer's recommendations for making joints Contractor proposes to use. No pipe shall be laid until approval has been given by GCDWR.
  - 3. Shop drawings of transition joints between pipes of different materials which shall be accomplished by the use of adapters made especially for that purpose.

### 1.3 Warranty

- A. The Contractor shall warrant for a period of twelve months from the date of final acceptance all lines, appurtenances, trenches, and other disturbed surfaces.
- B. The Contractor shall be responsible for repairs to any leaking pipe, fittings, etc. Should trenches settle, Contractor shall promptly furnish and place fill to original grade. Should any leaks or trench settlement occur under new pavement, the Contractor shall be held responsible for the cost of all repairs, including pavement replacement.
- C. Contractor shall arrange with GCDWR for prompt investigation of any evidence of leaking pipe, fittings, etc., such as settlement, sinkholes, deflection of surfaces, etc.

### 1.4 Handling and Transportation

- A. Pipe shall be carefully transported, stored, and handled to prevent damage to the pipe. Damaged pipe shall be cause for rejection of the pipe. Pipe shall be stored in such manner as to keep the interior free of dirt, soil, sediment, or other foreign matter.
- B. Stringing out of pipe more than two days in advance of installation shall not be

permitted.

## 1.5 Storage

- A. Store pipe on a flat surface so the barrel is evenly supported. Do not stack higher than 4 feet. For extended storage, plastic pipe must be covered with an opaque material to shield it from the sun's rays. Bells must be stacked in opposing directions on alternate rows so they are not supporting the full load.

## Part 2 Products

### 2.1 Flowable Fill

- A. Provide in accordance with Specification 31 23 23.33 - Flowable Fill.

### 2.2 Polyvinyl Chloride (PVC) Schedule 40 Pipe

- A. PVC Schedule 40 Pipe shall be of the bell and spigot type and meet the requirements of ASTM F758, Type PS or AASHTO M 278, rigid schedule 40 PVC.
- B. Perforated PVC pipe used in Stormwater BMP applications shall have four 3/8" diameter holes per row, spaced 90 degrees apart and rows spaced 6-inches on-center, unless otherwise specified in the Contract Documents or approved by GCDWR.

### 2.3 Aluminum Coated (Type 2) Corrugated Steel Pipe

- A. Aluminum coated (Type 2) corrugated steel pipe shall meet the requirements the GDOT Standard Specifications Section 844. Pipe shall comply with ASTM A-760 and ASTM A-929/AASHTO M-274 for coating and AASHTO M-36 for fabrication. A paved invert is required where design velocity exceeds 5 feet per second. Pipe thickness shall be a minimum of 14 gage. Minimum pipe lengths shall be 20 feet, unless otherwise indicated.
- B. The following environmental ranges shall be allowed for aluminum coated (Type 2) corrugated steel pipe:
  - 1.  $4.5 \leq \text{pH} < 5.0$  with Soil Resistivity  $> 5,000$  ohm-cm
  - 2.  $5.0 \leq \text{pH} \leq 9.0$  with Soil Resistivity  $\geq 1,500$  ohm-cm
- C. If the NRCS Soil Survey of Gwinnett County shows a potential for soils with a  $\text{pH} \leq 5$  anywhere on the site, GCDWR may require pH and soil resistivity testing. If required, tests are to be completed by an independent testing firm at the Contractor's expense. All testing to be in accordance with ASTM G-51 for pH and ASTM G-57 for soil resistivity.
- D. Each end of each pipe section to be joined by a coupling band shall have a minimum of two annular corrugations. Coupling bands shall be constructed to lap on an equal

portion of each of the pipe sections to be joined. The connecting bands shall have a minimum of two annular corrugations and fully engage over the entire pipe periphery, one corrugation on each pipe. Bands shall be fabricated from the same material as the pipe. The minimum band gauges shall be as specified in AASHTO M-36, Section 9.

- E. Gaskets may be required as determined by GCDWR in the field. Gaskets shall be either sleeve type or O-ring type and shall meet the requirements for gaskets as specified in AASHTO M-36, Section 9.5.

## 2.4 Corrugated Polymer Precoat Steel Pipe

- A. Corrugated Polymer Precoat Steel Pipe shall comply with ASTM A-742 and ASTM A-762/AASHTO M-246 and AASHTO M-245. Pipe thickness shall be a minimum of 14 gage. Minimum pipe lengths shall be 20 feet.
- B. Each end of each pipe section to be joined by a coupling band shall have a minimum of two annular corrugations. Coupling bands shall be constructed to lap on an equal portion of each of the pipe sections to be joined. The connecting bands shall have a minimum of two annular corrugations and fully engage over the entire pipe periphery, one corrugation on each pipe. Bands shall be fabricated from the same material as the pipe.
- C. Gaskets may be required as determined by GCDWR in the field. Gaskets shall be either sleeve type or O-ring type and shall meet the requirements for gaskets as specified in AASHTO M-36, Section 9.5.

## 2.5 Corrugated Aluminum Alloy Pipe

- A. Corrugated Aluminum A1 Alloy Pipe shall comply with ASTM B-744 and ASTM B-745/AASHTO M-196 and AASHTO M-197 for material and fabrication. Pipe thickness shall be a minimum of 14 gage. Minimum pipe lengths shall be 20 feet.
- B. Each end of each pipe section to be joined by a coupling band shall have a minimum of two annular corrugations. Coupling bands shall be constructed to lap on an equal portion of each of the pipe sections to be joined. The connecting bands shall have a minimum of two annular corrugations and fully engage over the entire pipe periphery, one corrugation on each pipe. Bands shall be fabricated from the same material as the pipe. The minimum band gauges shall be as specified in AASHTO M-196, Section 9.
- C. Gaskets may be required as determined by GCDWR in the field. Gaskets shall be either sleeve type or O-ring type and shall meet the requirements for gaskets as specified in AASHTO M-36, Section 9.5.

## 2.6 Reinforced Concrete Pipe (RCP)

- A. RCP shall meet the requirements of ASTM C-76/AASHTO M-170, and the GDOT Standard Specifications Section 843. RCP shall be minimum of Class III in

accordance with GDOT Standard Detail 1030-D, Table No. 1, and shall be provided in joint lengths of not less than 8 feet each. All joints shall be bell and spigot type with a rubber gasket conforming to ASTM C-443.

- B. RCP Arch Pipe shall meet the requirements of ASTM C506 and AASHTO M 206.

## 2.7 Smooth Lined Corrugated High Density Polyethylene (HDPE) Pipe

- A. Smooth Lined Corrugated High Density Polyethylene Pipe shall meet the requirements of ASTM F-2306/AASHTO M-294, Type S, and the GDOT Standard Specifications Section 845.
- B. Joints shall be as recommended by the manufacturer and approved by GCDWR. Connections shall create a soil-tight joint at a minimum and shall use a rubber gasket, which shall comply with ASTM F-477.

## 2.8 Ductile Iron Pipe (DIP)

- A. Where specified, indicated on the Drawings, or directed by GCDWR, DIP gravity sewerage pipe and fittings shall conform to the requirements of ASTM A746. DIP shall be cast, clean, cement-lined, asphalt coated, tested, and certified at a single manufacturing facility.
- B. DIP thickness class shall be as indicated on the Contract Documents. As a minimum, thickness class shall be Pressure Class 350 for 4-inch through 12-inch diameters, Pressure Class 250 for 14-inch through 20-inch diameters, and Pressure Class 200 for 24-inch through 64-inch diameters.
- C. Nominal laying lengths shall be eighteen feet to twenty feet for pipe diameters specified.
- D. DIP shall be marked in accordance with ASTM/ANSI designations at intervals of five feet or less on pipe barrel. As a minimum, pipe marking shall include manufacturer name or trademark, nominal pipe size, specification designation, and date of manufacture.
- E. Push-On Joint Pipe and Fittings
  - 1. Push-On Ductile Iron Pipe shall be manufactured in accordance with ANSI/AWWA C151/A21.51.
  - 2. Push-On Ductile Iron Fittings shall be manufactured with body thickness and radius of curvature conforming to ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53.
  - 3. At a minimum, fittings 4-inch through 20-inch shall be rated for 350 psi, and 24-inch through 64-inch shall be rated for 250 psi.

4. Joint deflection shall be five degrees for 4-inch through 12-inch diameters; four degrees for 14-inch diameter; three degrees for 16-inch through 24-inch diameters; and 2.5 degrees for 30-inch and larger diameters.
5. Manufacturers: Subject to compliance with requirements, provide products by one of the following or an approved equal:
  - i. American Cast Iron Pipe Company
  - ii. U.S. Pipe
  - iii. McWane Ductile

F. Mechanical Joint Fittings

1. Mechanical Joint Ductile Iron Pipe shall be manufactured in accordance with ANSI/AWWA C151/A21.51.
2. Mechanical Joint Ductile Iron Fittings shall be manufactured with body thickness, laying length, and fittings conforming to ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53 and joints in accordance with ANSI/AWWA C111/A21.11.
3. Mechanical joint bolts shall be thoroughly bolted in accordance with manufacturer's recommendations with tee head bolts of high strength, heat treated, cast iron containing 0.50 percent copper or high strength low-alloy steel having a minimum yield point strength of 40,000 psi and an ultimate tensile strength of 70,000 psi.
4. Gasket, bolts, and nuts shall conform to ANSI A21.11. Gaskets shall be of neoprene or rubber, unless specified otherwise, of such quality that they will not be damaged by the liquid or gases with which they come in contact.
5. Glands shall be of cast iron or ductile iron.

G. Push-On and Mechanical Joint Gaskets

1. Sufficient lubricant shall be furnished with each order of pipe to provide a thin coating on each spigot end. Lubricant shall have no deleterious effect on the rubber gasket. Lubricant shall be of such consistency that it can be easily applied to the pipe in either hot or cold weather and shall adhere to either wet or dry pipe. Only lubricant furnished with the pipe by the pipe manufacturer shall be used.
2. Gaskets shall meet applicable requirements of ANSI/AWWA C111/A21.11, and shall be styrene butadiene rubber (SBR) type.

H. Exterior Coating

1. Where corrosive soils, or where the pipe is located within ten feet of a utility line



that has cathodic protection that can cause a deleterious effect on the piping system, the exterior of ductile iron pipe shall be base-coated with a layer of arc-sprayed zinc in accordance with ISO 8179. The mass of the zinc applied shall be 200 g/m<sup>2</sup> of pipe surface area. A finishing layer of asphaltic topcoat shall be applied to the zinc. The mean, dry film thickness of the finishing layer shall not be less than 3 mils with a local minimum not less than 2 mils. The coating system shall conform to ISO 8179-1 "Ductile Iron Pipes – External zinc-based coating – Part 1: Metallic zinc with finishing layer."

2. Where soils with electrical or stray currents are encountered, polywrap may be added to the zinc-coated pipe for additional corrosion protection. Polyethylene tube encasement shall be prefabricated, manufactured, and supplied in accordance with ANSI/AWWA C105/A21.5. The wrap shall be overlapped one foot in each direction at joints, and secured in place around the pipe, and any wrap at tap locations shall be polyethylene taped tightly to prevent the entrance of foreign matter prior to tapping and inspected for any needed repairs following the tap.

#### I. Linings

1. Pipe: Cement mortar lining shall be to standard thickness in accordance with ANSI/AWWA C104/A21.4.
2. Fittings: Cement mortar lining shall be to double thickness in accordance with ANSI/AWWA C104/A21.4.

## Part 3 Execution

### 3.1 Installation

- A. The Contractor shall install pipe bedding and backfill according to typical detail drawings and applicable design details in the Contract Documents or as indicated/directed by GCDWR.
- B. All pipes shall be thoroughly cleaned before being laid and shall be kept clean until acceptance of the completed Work. Proper and suitable tools and appliances for the safe and convenient handling and laying of pipes shall be used.
- C. Trench construction shall be in accordance with GDOT Standard Detail 1030-D for RCP and metal pipes and GDOT Standard Detail 1030-P for HDPE and PVC pipes.
- D. All trenches shall be kept free from water when pipe laying is in progress, and no water shall be allowed to rise within 12 inches of the bottom of the pipe until jointing is completed.
- E. Laying Pipe in Freezing Weather: No pipe shall be laid upon a foundation in which frost exists, nor when GCDWR deems that there is danger of the formation of ice or the penetration of frost at the bottom of the excavation.

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F. Jointing

1. When pipes are ready for jointing, bell interior and spigot surface shall be cleaned of all dirt and foreign matter, coated with manufacturer's approved lubricant, and pipes shoved home. Care shall be exercised after laying to prevent deflection or separation of the joint just made. All joints shall be made in the trench, and only one joint shall be made at a time.
2. When the joint is completed, the storm drainage piping shall have a smooth, unobstructed invert, and the pipe shall be true to grade and alignment. If the invert protrudes above the invert of adjacent pipe, it shall be removed and replaced.
3. After the pipe has been properly bedded and joints made, backfill bedding materials shall be carefully tamped on each side and the centerline of the pipe between the walls of the excavation and the pipe before backfilling with excavated earth is done as specified in Specification 31 23 00 - Excavation and Fill.
4. Great care shall be used to prevent damage to or disturbing of joints during backfilling, or at any other time after the pipes have been laid and the joints have been made. There shall be no walking on or working over the pipe except as may be necessary in tamping, until there is cover no less than one foot in depth over the top of the pipe.
5. Mechanical compaction equipment shall be used over the pipe only after backfill material of sufficient depth has been placed over the pipe in accordance with the equipment manufacturer's instructions.
6. All joints showing leakage shall be uncovered and the joints remade at the Contractor's expense.

G. Reinforced Concrete Pipe: Lay sections in a prepared trench with the socket ends pointing upstream. Join section using either rubber gasket or preformed flexible sealant, installed according to the manufacturer's recommendations. Pipe and specials shall be laid accurately to required lines and grades and shall be uniformly supported along their entire length. Bottoms of excavations shall be properly trimmed, and bell holes dug for joints. Size of bell holes shall be kept to a minimum but shall be large enough to permit the proper making of joints.

H. Aluminum Coated (Type 2) Corrugated Metal Pipe: Lay pipe sections in a prepared trench, with outside laps of circumferential joints pointing upstream and longitudinal joints at the sides. Join the sections with coupling bands, fastened by two or more bolts.

I. Corrugated Polyethylene Pipe: Lay pipe according to Plan details with the perforations on the underside of the pipe (if pipe is corrugated), unless otherwise directed by GCDWR. Lay bell and spigot and tongue and groove pipe with the bell or grooved end upstream and the bells embedded in the classified stone. Firmly connect the joints. Connect pipe and butt joints securely, using the appropriate size

and type of band or coupling.

- J. Smooth Lined Corrugated High Density Polyethylene Pipe, Type S: Install smooth-lined corrugated HDPE pipe according to ASTM D 2321. Lay bell and spigot and tongue and groove pipe with the bell or grooved end upstream and the bells embedded in the classified stone. Use fitting and couplings that comply with the joint performance criteria of AASHTO Standard Specifications for Highway Bridges, Division II. Firmly connect the joints and ensure all joints are "silt tight" as stated in the AASHTO bridge specifications.

### 3.2 Bedding

- A. No pipe shall be brought into position until the preceding length has been thoroughly embedded and secured in place. The supporting of pipe on wood blocks, loose brick, or similar objects shall not be permitted. Defects due to settlement shall be corrected by the Contractor at their own expense.
- B. For laying pipe in rock, the trench shall be made to conform to the general dimensions required, and the sub grade shall be brought to the required elevation by use of bedding materials. Sides and bottom of pipes shall be supported by compacting the bedding and backfill materials in place so as to ensure an even bearing for the pipe. Particular care shall be taken that pipes are not permitted to rest upon or against solid or projecting portions of rock.
- C. Avoid contact between the pipe and mechanical compaction equipment. Do not use compaction equipment directly over the pipe until sufficient backfill has been placed to assure that such equipment shall not damage or disturb the pipe.
- D. Bedding shall conform to the requirements provided in GDOT Standard Detail 1030-D for RCP and metal pipes, except as indicated below, and GDOT Standard Detail 1030-P for HDPE and PVC pipes.
  - 1. For DIP bedding shall be No. 57 Stone in accordance GDOT Standard Specification Section 800. Bedding shall be extend from 4 to 8 inches below the pipe to a height of 1/4 the outside diameter of the pipe.
- E. Where an incompressible foundation exists below the bedding zone, excavate an additional six inches to establish suitable foundation for pipe embedment. Where unstable foundation material is encountered below the bedding zone, excavate to an additional depth as shown on plans or directed by GCDWR. Foundation backfill material, where required, shall comply with GDOT Standard Details 1030-D and 1030-P for the appropriate pipe material.

### 3.3 Backfill

- A. Initial backfill zone refers to trench section extending from the bedding zone to 12 inches above top of pipe for RCP and metal pipe and 6 inches above the top of pipe for HDPE and PVC pipe. Final backfill zone refers to trench section extending from top of the initial backfill zone to ground surface or pavement subbase.

- B. For RCP and Metal pipe installation, initial backfill shall be constructed using Foundation Backfill Material Type I or Type II, as specified in GDOT Standard Specifications Section 812.2.01 and 812.2.02.
- C. For PVC and HDPE pipe installations, initial backfill shall meet the requirements of GDOT Standard Detail 1030-P.
1. For storm drain installations under County- or GDOT-maintained roads and where fill heights exceed 10 feet, initial backfill shall be graded aggregate meeting the requirements of GDOT Standard Specification Section 815.
  2. For all other PVC and HDPE installations, initial backfill shall meet the requirements of Foundation Backfill Material Type Class B2, or better in accordance with GDOT Standard Specification Sections 812 and 800.
- D. Initial backfill material shall be placed in layers of not more than six inches loose. Compaction of this material shall be accomplished by hand tamping or machine tamping. Required compaction levels are as follows:
1. Backfill within all street rights-of-way shall be compacted to 95% maximum density, tested using the AASHTO Method T-99 or ASTM D-698.
  2. Backfill in all other areas shall be compacted to 90% maximum density, tested using the AASHTO Method T-99 or ASTM D-698.
- E. Where GDOT Foundation Backfill Material Type II (open graded aggregate) is used initial backfill material, Contractor shall wrap the backfill material in geotextile separation fabric with an equivalent opening size (eos) suitable for native soils and final backfill material, as approved by GCDWR, if any of the following conditions apply:
1. Pipe installation is under or near paved areas or structural foundations.
  2. Trench width exceeds the outside diameter of the pipe (Do) plus 24-inches for pipes less than 36-inches in diameter.
  3. Trench width exceeds 1.66 times the outside diameter of the pipe for pipes 36-inches and greater in diameter.
  4. GDOT Foundation Backfill Material Type II is installed above the springline of the pipe.
  5. Conditions where fine migration concerns are present (e.g., groundwater, culvert applications, or adjacent to stormwater infiltration facilities).
- F. Final backfill shall consist of compactible material meeting requirements of Foundation Backfill Material Type I, as specified in GDOT Standard Specifications Section 812.2.01. This material shall be placed in layers of not more than six inches loose. Compaction of this material shall be accomplished by hand tamping or machine tamping. Required compaction levels are as follows:

1. Backfill within all street rights-of-way shall be compacted to 95% maximum density, tested using the AASHTO Method T-99 or ASTM D-698.
  2. Backfill in all other areas shall be compacted to 90% maximum density, tested using the AASHTO Method T-99 or ASTM D-698.
- G. Final backfill for RCP and metal pipe installations where height of fill above top of pipe falls to the right of the heavy line in GDOT Standard Detail 1030-D ( $\geq 20$  to 30 feet, dependent on pipe diameter) shall consist of Imperfect Trench Backfill Material, Type III, as specified in GDOT Standard Specifications Section 812.2.03, placed in loose, uncompacted backfill over top of pipe.

### 3.4 Flowable Fill

- A. Provide in accordance with Specification 31 23 23.33 - Flowable Fill.

### 3.5 Connections

- A. Connect to existing storm drainage structures by coring and drilling the existing structures in accordance with Specification 33 42 30 - Storm Drainage Structures.

### 3.6 Cutting

- A. Whenever a pipe requires cutting, the pipe shall be cut in a satisfactory manner so as to leave a smooth end perpendicular to the axis of the pipe. The end shall then be beveled in accordance with manufacturer's recommendations for field beveling, if applicable.

### 3.7 Pipe Invert Paving

- A. Where shown on the Drawings, pave pipe inverts in accordance with the following:
1. Minimum paving thickness: 4 inches at pipe invert.
  2. Taper in thickness towards sides.
  3. Concrete invert paving shall cover all pipe areas that are rusted out (if applicable) but shall at a minimum meet minimum thickness as specified in this article.

### 3.8 Final Inspection Preceding Acceptance

- A. Final inspection may include a visual inspection of each section of pipe by looking from structure to structure with the aid of reflected sunlight, an electric light, or (Closed Circuit Television) CCTV. Such light used for inspection shall be plainly visible from structure to structure. Light reflected along the pipe walls from structure to structure shall not be considered as plainly visible light and shall be reason for rejection of the section of pipe as not being laid true to line and grade.

- B. The pipe shall be true to both line and grade; shall show no leaks, shall be free from cracks and protruding joint materials and contain no deposits of sand, sediment, dirt, or other materials. All finished Work shall be neat in appearance of first-class workmanship. Contractor shall correct any defects at their expense.

### 3.9 Clean-Up

- A. A thorough cleanup of the ground surface shall be made before final acceptance and final payment is made. All excess rock shall be removed, private and public property shall be restored to the general original condition, or in a manner approved by GCDWR, and all excess pipe and fittings shall be removed.

### 3.10 Site Restoration

- A. Replace or restore lawns and flower beds and other surfaces to equal or better than preconstruction conditions.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all materials, tools, labor, and equipment necessary to install precast concrete manholes, junction boxes, drop inlets, catch basins, headwalls, and appurtenances as detailed on the Drawings or Details, including excavation and foundation cushion, base sections, riser sections, cone and flat top, frame, cover, castings, coring, and drilling for connections to existing structures, backfilling, and all other incidentals required for the proper completion of this Work.

### 1.2 Submittals

- A. If required by GCDWR, the Contractor shall submit for approval by GCDWR and any City transportation or public works department, as necessary, all working drawings and schedules of materials and methods proposed to follow in the execution of the Work under this item.
- B. Submittals shall show in detail the size, location, dimensions, and accessories of all manholes and/or other structures such as but not limited to, outlet control structures, special drop structures, etc. to be used in construction. Include information for frames, covers, grates, sealants, mastic, gaskets, connectors, waterproofing, steps, grout, and other materials required.

### 1.3 Quality Assurance

- A. Should a product be brought to the site of the Work which are deemed unacceptable in quality by GCDWR, the Contractor shall at once remove the same and shall not offer that item again for inspection. No refurbished or repaired product specified herein shall be permitted for installation, unless otherwise directed by the Contract Documents or approved by GCDWR after inspection of the product.

## Part 2 Products

### 2.1 Precast Stormwater Manholes

- A. Precast stormwater manholes shall be in accordance with GDOT Standard Specifications Sections 668 and 866.

### 2.2 Precast Junction Boxes

- A. Precast stormwater junction boxes shall be in accordance with GDOT Standard Specifications Sections 668 and 866.

### 2.3 Manhole Frames and Covers

- A. Manhole frames and covers shall be non-traffic rated or traffic rated as called for by

GCDWR.

- B. Manhole Frames and Covers shall be in accordance with Gwinnett County P&D Standard Drawing 611 and GDOT Standard Specification Section 854.
- C. Traffic rated frames and covers shall be stamped in accordance with Gwinnett County P&D Standard Drawing 611.

## 2.4 Precast Drop Inlets

- A. Precast stormwater junction boxes shall be in accordance with GDOT Standard Specifications Sections 668 and 866.

## 2.5 Precast Catch Basins

- A. Pre-cast stormwater catch basins shall be in accordance with GDOT Standard Specifications Sections 668 and 866.

## 2.6 Plastic Drop Inlets

- A. Plastic stormwater drop inlets shall be in accordance with GDOT Standard Specification Sections 573 and 845.

## 2.7 Headwalls

- A. Headwalls may be precast concrete, cast-in-place concrete, rock masonry or brick masonry structures as required on the plans or directed by GCDWR.
- B. Precast concrete headwalls shall be fabricated in accordance with the following:
  - 1. Concrete: 4,000 psi minimum 28-day compressive strength.
  - 2. Reinforcing Bars: ASTM A 615, Grade 60.
  - 3. Reinforcing Wire: AASHTO M 32 and AASHTO M 225, sized in accordance with plans or approved shop drawings as applicable.
  - 4. Welded Wire Fabric: AASHTO M 55 and AASHTO M221, sized in accordance with plans or approved shop drawings as applicable.
- C. Cast-in-place concrete headwalls shall be constructed to the dimensions as shown on the Drawings or Details in accordance with Specification 03 30 00 - Cast-In-Place Concrete.
- D. Rock Masonry headwalls shall be constructed to the dimensions as shown on the Drawings or Details in accordance with Specification 04 43 15 - Rubble Masonry.



## 2.8 Brick Structures

- A. Brick structures shall conform to the following, as applicable:
  - 1. GDOT Standard Specifications 668 and 608.
  - 2. GDOT Standard Detail 1011A.

## 2.9 Outlet Control Structures

- A. All concrete, steel bars, and steel wire reinforcement for outlet control structures shall be in accordance with GDOT Standard Specifications Section 866 and special provision which modify Section 866.
- B. Precast concrete outlet control structures shall be designed by the Manufacturer to the dimensions as shown on the Drawings or Details.

## 2.10 Steps

- A. Steps in Storm Drain Structures shall be equal to MA Industries # PS1 PF and shall be built into the precast concrete bases, risers and cones of the manholes as specified below.

## 2.11 Flared End Sections

- A. Flared end sections shall be of the following types:
  - 1. Concrete flared end sections shall conform to GDOT Standard Detail 1120.
  - 2. Safety flared end sections shall conform to GDOT Standard Detail 1122.
  - 3. Corrugated metal flared end sections shall conform to GDOT Standard Detail 1120.

# Part 3 Execution

## 3.1 General

- A. Manhole coring shall include all work to core and drill into an existing manhole or structure. The manhole coring shall not be backfilled until approved by GCDWR. Manholes must be cored using an industry standard coring machine and shall not be performed using any type of hammer, chisel, jackhammer, or other method.
- B. Manholes in wooded, sloped, or un-maintained (i.e., not routinely landscaped) areas shall be 18-inches above finish grade and in maintained areas “flush” with ground surface grade, unless otherwise indicated in the Contract Documents or directed by GCDWR.

- C. Cast manhole frames and covers shall include all manhole frames, covers, and brick work used in conjunction with pre-cast or cast-in-place concrete manholes or subsurface chambers.
- D. Abandon existing structures by entirely removing and disposing of such structures, unless otherwise indicated on the Contract Documents or directed in writing by DWR.

### 3.2 Construction

- A. Install precast concrete drainage structures in accordance with GDOT Standard Specification Sections 668 and 866, as well as applicable Gwinnett County P&D Development Regulations Standard Drawings.
- B. Install cast-in-place concrete flume structure and flume structures with stone inlay in accordance with GDOT Standard Specification Sections 668 and 866, as well as applicable Gwinnett County P&D Development Regulations Standard Drawings.
- C. Construct Tie into Existing Structures in accordance with Connect to an Existing Stormwater Structure in accordance with GDOT Standard Specification Section 550.
- D. Construct/Install brick structures in accordance with GDOT Standard Specifications 608 and 668, as well as applicable Gwinnett County P&D Development Regulations Standard Drawings.
- E. Construct/install rock structures in accordance with Specification 04 43 15 - Rubble Masonry.
- F. Construct/install other LID/BMP stormwater drainage features as specified within the Contract Documents or as specified or directed by GCDWR.
- G. Construction shall conform to the Drawings or Details.

### 3.3 Materials and Workmanship

- A. All materials shall be new unless otherwise specified on the Contract Documents or directed in writing by GCDWR. All Work shall be performed and finished in a first-class workmanship manner. Precast concrete structures, rings and covers, and other materials shall conform to the standards specified in this section and standards referenced in the Contract Documents. Structures shall rest on a minimum 6-inch-thick bedding of graded aggregate base or No. 57 stone compacted to 95% Standard Proctor, placed on firm subgrade. Where No. 57 stone is used for bedding, the bottom and sides of the bedding layer shall be wrapped with geotextile separation fabric with an equivalent opening size (eos) suitable for native soils and backfill material. Structures shall have a proper cut out, shape, and coring to fit, pipes, valve pipe, and/or associated facilities.

### 3.4 Frames and Covers

- A. Traffic rated frames and covers shall be properly set in place in a full bed of mortar, composed of one part Portland Cement and two parts clean sand conforming to ASTM C144, and adjusted to make the top of the frame conform to the finished surfaces when located in street and public highways. In other locations, frames and covers shall adjusted to conform to such elevations as are indicated on the Drawings or as required elsewhere.
- B. Manhole frames and covers in wooded, sloped, or un-maintained areas shall be a minimum of 18 inches above ground level and the frame shall be cast into the concrete cone. Manhole frames and covers in maintained grassy areas shall be flush with the finished grade. Manhole frames and covers on sloped ground in un-maintained areas shall be a minimum of 18 inches above ground as measured on the uphill side of the manhole.

### 3.5 Pipe Connections

- A. Concrete drop structures requiring a thermoplastic or metal pipe connection shall be designed to have a flexible watertight manhole connector inlaid in the drop structure form prior to cast or production to properly tie-in thermoplastic or metal pipe and to prevent leakage. Field installed connectors and gaskets shall only be used with prior approval from GCDWR.
- B. Set or cut inlet and outlet pipes flush with the inside face of the structure. Completely and neatly close the joint around the pipe in the structure wall with mortar or other specified materials and flexible connectors as indicated in Paragraph 3.5.A.

### 3.6 Steps

- A. The uppermost step shall not be more than twelve inches below the manhole frame top and steps shall be continued downward along the interior vertical side of the manhole to a point no lower than the crown of the pipe. All steps shall be built into the precast concrete products in a manner satisfactory to GCDWR and shall be spaced not more than twelve inches apart. Steps shall be placed directly above each other and not staggered or offset.

### 3.7 Paved Ditches

- A. The Contractor shall construct paved ditches with a minimum of 4-inches of Class A Concrete.
- B. Paved ditches shall be reinforced with minimum 6x6 welded wire fabric with expansion joints spaced at 30-foot maximum and construction joints at 10-foot maximum.
- C. A drop section shall be constructed on both ends of the ditch to a depth of two feet, if and where shown on the Contract Documents or as required.

- D. Ditch shall be construction to a minimum of twelve inches depth with 2:1 side slopes or as otherwise shown or directed.
- E. Ditches shall conform to Gwinnett County Standard Drawing 709, "Drainage Ditch Details", as applicable.

### 3.8 Adjusting Manhole Frame and Cover to Grade

- A. Where indicated on the Drawings and/or directed by GCDWR, the Contractor shall adjust the elevation of manhole frames and covers to be flush with the proposed finished grade. The Contractor shall use brick and mortar or precast concrete grade rings to raise the frame and cover to the correct elevation and re-grout the frame in place to secure it to the manhole. In no case, shall more than four courses of brick or four grade rings be used for adjustment. If adjustment requires more than four courses, a new manhole riser section shall be installed below the top cone section and the frame and cover adjusted thereafter.

## Part 4 Measurement and Payment

### 4.1 Outlet Control Structures

- A. Method of Measurement:
  - 1. Outlet control structures constructed using precast structure units, matching the geometric characteristics and material requirements of GDOT Standard Details 1011A, 1019A, 1033, 1034, 9031S, 9031D or Gwinnett County P&D 610, shall be measured for payment at the applicable drainage structure Unit Price, in accordance with this Section and Section 01 22 00 – Unit Prices.
  - 2. Custom OCS Structures and appurtenances shall not be measured but will be considered specialty products that shall be paid for as described in Paragraph 1.5 of Section 01 22 00 – Unit Prices.
  - 3. Fabrication and Installation of Custom OCS Structures and appurtenances shall be measured for payment as described in Section 32 01 30 – Labor Rates and Section 32 01 31 – Construction Aids - Heavy Equipment.

END OF SECTION

## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all labor, equipment, and materials necessary to maintain traffic control during construction and/or employ off-duty Gwinnett County police officers to aid in traffic control.
- B. Traffic control operations, equipment, materials, signs, and other required items shall conform to the requirements of the Manual of Uniform Traffic Control Devices (MUTCD).

### 1.2 Definitions

- A. Steel plate: A rectangular piece of steel that provides a secure covering over open excavations in a roadway, allowing pedestrians and vehicles to pass over safely when construction is not underway.

### 1.3 Traffic Control Classifications

- A. Major: Major Traffic Control includes, but is not limited to, maintenance of traffic that warrants the use of detour plans or overnight protection, the use of barricades, barrels, portable electronic message boards, crash trucks, arrow boards, and/or changes to normal traffic flow of duration longer than a normal working day. All work zones in the following conditions shall be considered Major Traffic Control:
  - 1. Road Closures requiring planned detours.
  - 2. State Routes.
  - 3. On all roadways designated as Major Collector and above in accordance with the Gwinnett County DOT (GCDOT) Classification.
- B. Minor: Minor Traffic Control is limited to maintenance of traffic operations performed under light to moderate traffic flows and accomplished with portable signs and flagmen. Traffic barrels, cones, and other similar devices may be included in minor traffic control. All work zones in the following conditions shall be considered Minor Traffic Control:
  - 1. Residential streets.
  - 2. Minor Collectors as designated by GCDOT.
- C. Other: Maintenance of traffic for County and similar facilities, such as but not limited to parks, offices, water and sewer process facilities, and pump stations and other projects not described in Paragraphs 1.3 A and 1.3 B.

## 1.4 Submittals

- A. If required by GCDWR, submit for approval to GCDWR, GCDOT, and GDOT when work is within a State road right-of-way, a traffic control plan proposed to be followed in the execution of the Work under this section of the specifications.

## Part 2 Products

### 2.1 Temporary Steel Plates

- A. Steel plates shall consist of ASTM A 36 Grade 36 Steel.
- B. Steel plates where used shall extend a minimum of 12-inches beyond the edges of the trench and have a minimum plate thickness of 1 inch.
- C. Temporary steel plating shall be coated with a non-skid and rust inhibitive product.

## Part 3 Execution

### 3.1 Worker Safety Apparel

- A. All workers within the right-of-way who are exposed to traffic or to work vehicles and construction equipment shall wear high-visibility safety apparel that meets the performance class for the risk exposure.

### 3.2 Maintaining Traffic

- A. All working operations of the Contractor and its subcontractors, suppliers, and employees must be performed to provide the free and unobstructed use of the highway, and structures encountered in the prosecution of the Work under this item.
- B. The Contractor shall proceed with the Work in such manner as shall permit regular transaction of business by the public roadway users and/or property owner without danger to life or property, or undue delay, and shall place necessary barricades, warning signs, signals, lights, and if necessary, watchmen for the protection of the traveling public.
- C. In making open-cut street crossings, Contractor shall not block more than one-half (1/2) of the street at a time. Whenever possible, Contractor shall widen the shoulder on the opposite side of the street to facilitate traffic.

### 3.3 Traffic Control

- A. When directed by GCDWR, under supplemental work, off-duty police officers shall be utilized to assist in maintaining traffic control and providing a safer work zone for the Contractor and GCDWR employees. This use of police officers shall be required, when directed, in areas of high traffic volume, installation in roadways, road closures, and lane closures or in areas of low visibility.

- B. GCDWR will determine when and how many police officers shall be needed to complete the Work depending on the situation. However, the police officer on-site may request, through GCDWR, for additional officers to be engaged.
- C. When directed by GCDWR, the Contractor shall contact the Gwinnett County Police Department Uniform Division Office at 770-513-5700 to schedule the police officers. Arrangements for police officers must be made a minimum of forty-eight hours prior to the Work to allow time for officers to be scheduled.
- D. When the Work is conducted within the various city limits which have their own police department, request for officers must still go through the Gwinnett County Police Department.
- E. Where construction will impact signalized intersections, coordinate with the entity responsible for operating the signal system to ensure safe adjustment of the signal cycling and proper restoration of any disturbances or damage to the signalization equipment and/or traffic loops.

### 3.4 Temporary Pedestrian Facilities

- A. All existing pedestrian routes and facilities, including access to transit stops, shall be maintained unless otherwise shown on Contract Documents or directed by GCDWR.
- B. Where pedestrian routes are closed, alternate routes shall be provided. The temporary pedestrian routes shall comply with accessibility guidelines (ADA/PROWAG).
- C. Temporary pedestrian facilities shall be firm, stable, and slip resistant. If possible, detour routes shall be on paved surfaces. Well-graded granular surfacing, slate chips, or other appropriate material may be used where shown on Contract Documents or as directed by GCDWR.
- D. Maintain temporary pedestrian facility surfaces to remain firm, stable, and slip-resistant at all times.
- E. Temporary pedestrian facilities shall be eligible for payment under the pertinent items specified in the Contract Documents.

### 3.5 Temporary Steel Plates

- A. Plating shall be installed with no edges or corners sticking up and shall be installed, secured, and maintained in a way that will prevent the plate from bouncing, shifting, and moving vertically or horizontally. Plates shall be secured against shifting by tack welding, wedges, adjustable cleats, shims fasteners, or other appropriate devices to the satisfaction of GCDWR.
- B. Plates shall be flush or transitioned with the sidewalk, roadway, and other portions of the right of way. Whenever the grade difference between the existing pavement and the excavated area is greater than 3/4-inch, longitudinal and transverse transitions

with a maximum slope of 1:18 shall be provided. Transitions shall be installed with hot-patch asphalt concrete.

## Part 4 Measurement and Payment

### 4.1 General

- A. No separate measurement and payment shall be made for any work performed or devices and materials used for Major, Minor, or Other traffic control as described in this section. Full compensation for such work shall be considered incidental to other items of Work. Costs in connection therewith shall be considered a subsidiary obligation of the Contractor and shall be included in the overall cost of the Work.
- B. Temporary steel plates used for protection of open excavations in roadways or other paved areas, shall be eligible for payment as described in Section 01 22 00 – Unit Prices.

END OF SECTION



## Part 1 General

### 1.1 Summary

- A. Section includes furnishing all materials for, and properly restore to the satisfaction of GCDWR, all pavements, parking areas, driveways, sidewalks, and curbs, of whatever construction and irrespective of the type, which may be required to be removed, damaged, or disturbed in the progress of Work required under this Contract.
- B. Work under this section shall include in general, but without limitation, all necessary concrete, reinforcing steel, stone, gravel, asphalt, and other bituminous material necessary for the proper completion of the Work as may be shown on the Contract Documents, required, directed, or as specified herein.

### 1.2 Submittals

- A. If requested by GCDWR, submit for approval to GCDWR and other jurisdictions having authority all working drawings and schedules of materials and methods proposed to follow in the execution of the Work under this section of the specifications. Such may include samples, manufacturer's product data, test reports, and material certifications as required in reference sections for concrete, joint fillers, and sealers.

### 1.3 Roadway Permits

- A. The Contractor's attention is called to the requirements that Contractor must obtain all road opening permits from the GCDOT and must assist GCDWR in obtaining all permits required by the State Department of Transportation.
- B. All fees shall be borne by the Contractor.

## Part 2 Products

### 2.1 General

- A. Materials and products for asphalt and other bituminous paving shall comply with Specification Section 32 12 16 - Asphalt Paving.
- B. Concrete and joint filler shall meet the requirements of Specification Section 03 30 00 – Cast-In-Place Concrete and Specification Section 32 16 00 – Curbs, Gutters, and Sidewalks. Steel welded wire reinforcement shall meet the requirements of GDOT Standard Specifications Section 853.2.07.

## Part 3 Execution

### 3.1 General

- A. The Contractor's attention is directed to the provisions of Section 31 23 00 - Excavation and Fill, requiring special backfill material and compaction of backfill under areas to be paved. Any settlement which may occur during the warranty period shall be corrected at the Contractor's expense including repaving and/or replacing of streets, curbs, gutters, parking areas, and driveways which settle during the warranty period.
- B. The Contractor shall repave all areas over excavations in public streets as defined below promptly after completion of backfill to provide full use of the street with a minimum of delay. Restoration shall be in accordance with GCDOT Details for Longitudinal and Perpendicular Road Cuts.
- C. Should settlements, cracks, or other indications of failure appear in adjoining pavements, the adjoining paving shall be removed to the extent necessary to secure firm, undisturbed bearing, and shall be relayed in a satisfactory manner.
- D. When directed by GCDWR, the Contractor shall backfill the entire excavation under a paved surface with aggregate material as specified in Specification Section 31 05 16 – Aggregates for Earthwork as selected by GCDWR.
- E. Where necessary to cut a sidewalk, driveway, or parking area, entire slabs or squares shall be removed and replaced, unless otherwise directed by GCDWR. If sawcut is used, cuts shall be neat and uniform, as indicated on the Contract Documents or as directed by GCDWR.
- F. The Contractor shall replace all sidewalks removed or disturbed by the Contractor in the process of the Work, unless otherwise shown on the Contract Documents or as directed by GCDWR. Sidewalks shall be constructed to the same dimensions and materials as were originally placed, or better. The subbase shall be thoroughly compacted and shall be wetted just before the concrete is placed but shall show no pools of water.
- G. The Contractor shall restore all curbs and combination curbs and gutters which have been removed or disturbed in the progress of the Work, unless otherwise shown in the Contract Documents or directed by GCDWR. Curbs and gutters shall be made to conform accurately in size, line, grade, and materials with the adjoining. In restoring curbs and gutters, the subsoil and foundation material shall be well compacted in accordance with Specification Section 31 23 13 - Subgrade Preparation so to prevent any settlement of new concrete.
- H. The Contractor shall adjust all manhole frames and covers and valve boxes to final grade.

### 3.2 Materials and Workmanship

- A. Materials to be used in the repair and restoration of pavements, drives, sidewalks, and curbs shall be first quality. All materials removed during the excavation of the Work shall be disposed of by the Contractor as specified elsewhere in these Contract Documents. All workmanship shall be first class.

### 3.3 Restoring Curbs, Gutters, And Sidewalks

- A. Restore curbs, gutters and sidewalks as specified in Specification Section 32 16 00 – Curbs, Gutters, and Sidewalks.

### 3.4 Restoring Driveway and Parking Area Pavements

- A. The Contractor shall restore driveway and parking area pavements removed or disturbed during construction. After the pipe has been laid, appurtenant work constructed, and backfill completed, the Contractor shall furnish, place, and maintain wherever the pavements have been removed or damaged in the pursuit of the Work, bituminous concrete surfaces, stone surfaces, concrete or other surfaces as indicated or shown on the Contract Documents. Driveways and parking areas shall be constructed to the thickness of the existing, but concrete shall not be less than 4 inches thick. Surface finish is to match existing; edges to be sawn vertically; expansion joints to be used as directed or otherwise required in these specifications. In general, Concrete driveways shall be replaced ten feet from back of curb or to the closet expansion joint. The limits of this restoration shall be approved/agreed upon by GCDWR for payment quantities.
- B. Concrete driveways and parking areas shall be constructed with steel welded wire reinforcement and provided with contraction joints, expansion joints, joint sealants, bond breakers, and joint fillers in accordance with Specification Section 03 30 00 – Cast-In-Place Concrete and Specification Section 32 16 00 – Curbs, Gutters, and Sidewalks.

### 3.5 Restoring Roadway Pavements

- A. The Contractor shall restore roadway pavements removed or disturbed during construction. After work in excavated paved areas is complete, appurtenant work constructed, and backfill completed, the Contractor shall furnish, place, restore and maintain wherever the pavements or road surfaces have been removed or damaged in the pursuit of the Work, bituminous concrete roadways, stone road surfaces, bituminous concrete over concrete base, and complete bituminous concrete roadway resurfacing as indicated or shown on the Contract Documents.
- B. All roadway restoration shall be performed in accordance with the requirements of the authorities within whose jurisdiction such pavement is located. All highway utilities and traffic controls are to be maintained, and Work shall conform to the rules and regulations of GCDWR, including the use of standard signs. The Contractor shall provide all such bonds or checks, which may be required by the highway authorities to ensure proper restoration of paved areas, at no cost to GCDWR. All road closures

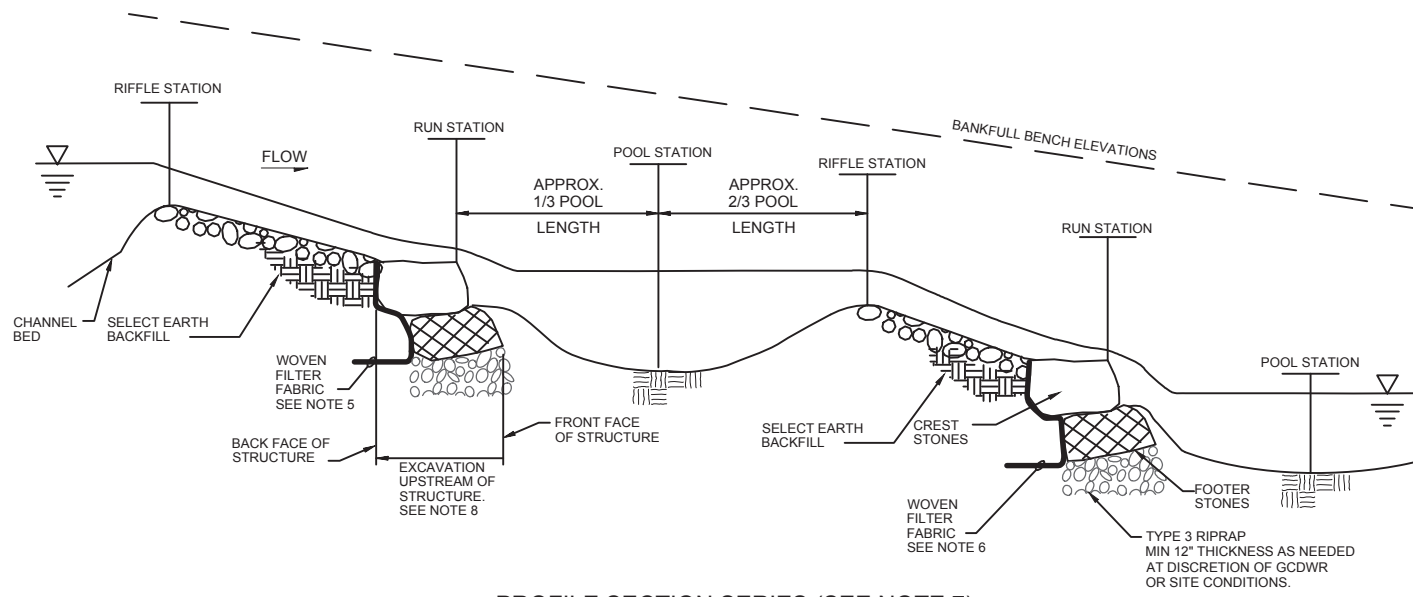
and detours must be submitted and approved with the authorities within whose jurisdiction they are located.

- C. The Contractor shall resurface the entire street from curb to curb, in the disturbed area or as shown on the Contract Documents, or any other area designated by GCDWR. Bituminous concrete paving shall conform to the requirements of the Contract Documents and Specification Section 32 12 16 – Asphalt Paving.
- D. If, prior to the expiration of the warranty period, the bituminous concrete pavements or stone road surfaces within the lines of excavation or adjacent thereto, shall have been damaged or injured, due to undermining, or for any other cause which may be attributed to the Work of the Contractor, then the Contractor shall remove such damaged surfaces, foundations of same, and all loose earth, and otherwise incompetent base and subbase material. Contractor shall then backfill with sand properly rammed and furnish, place, and maintain a bituminous concrete pavement or stone road surface, as applicable, until such time as the final acceptance of the Work.
- E. Bituminous concrete pavements or stone road surfaces, which the Contractor is required to replace shall, at the expiration of the warranty period be in at least as good condition as at the time of awarding the Contract, less normal expected wear.
- F. All cuts shall be made by channeling machine, by pneumatic tools, appropriate saw, or by such other methods as shall furnish a clean cut in the pavement and pavement base without undue shattering.

### 3.6 Roadway Appurtenances

- A. **Resetting Highway Signs:** The Contractor shall reset all disturbed highway signs in accordance with the applicable GDOT and Gwinnett County DOT standards and specifications. The Contractor shall preserve and protect all disturbed signs during construction. Any damage to signs shall be either repaired at the Contractor's expense, or the damaged signs replaced in like and kind with new materials at no additional cost to GCDWR.
- B. **Traffic Striping, General and Gore Area:** The Contractor shall restripe all disturbed pavements to meet preconstruction conditions. Striping shall be thermoplastic materials conforming to the applicable GDOT specifications or as otherwise called for in the Contract Documents.
- C. **Raised Traffic Markers:** The Contractor shall replace all disturbed raised traffic markers in like and kind with new materials.

END OF SECTION



PROFILE SECTION SERIES (SEE NOTE 7)

NTS

DIMENSIONS ( TO BE PROVIDED BY DESIGNER)

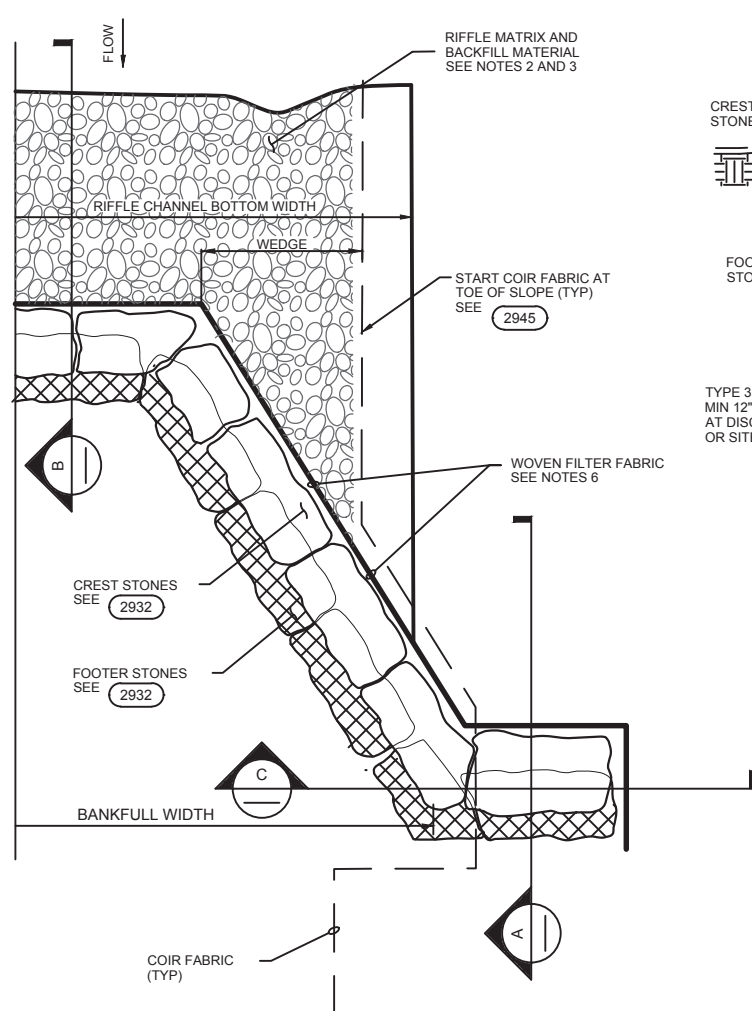
ROCK TYPE	ROCK MEDIAN DIAMETER		
	MIN	MEAN	MAX
RIFFLE ROCK	3"	6"	8"
RIVER COBBLE	8"	10"	12"
RIVER PEBBLE	0.5"	1"	2"

1 ROCK DIAMETER SIZES

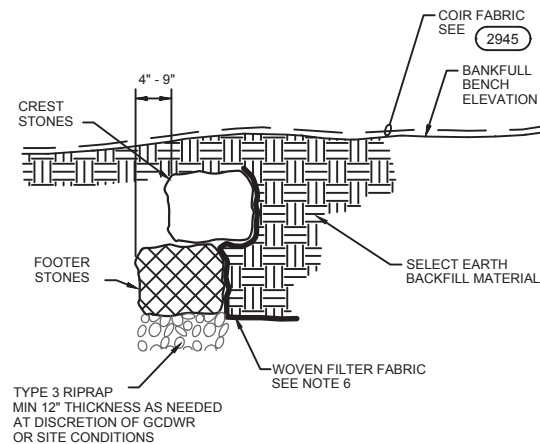
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NOTES:

- COIR FABRIC PER TECHNICAL SPECIFICATION SECTION 31 32 01. WOVEN FILTER FABRIC PER TECHNICAL SPECIFICATION SECTION 31 32 19.16.
- CONTRACTOR SHALL BRING THE CHANNEL BED UPSTREAM OF CREST STONES TO FINAL GRADE WITH SELECT EARTH BACKFILL AS SHOWN ON CONTRACT DRAWINGS.
- WHERE APPLICABLE AS SHOWN IN CONTRACT DRAWINGS, CONTRACTOR SHALL BRING THE CHANNEL BED UPSTREAM OF CREST STONES TO FINAL GRADE WITH RIFFLE MATRIX (SEE 1).
- WHERE APPLICABLE AS SHOWN IN CONTRACT DRAWINGS, CONTRACTOR SHALL PLACE RIFFLE MATRIX TO ARMOR THE CHANNEL BED UPSTREAM OF THE CREST STONES CONTINUOUSLY TO 5-10 FEET BEYOND THE NEXT RIFFLE STATION, AS SHOWN IN THE CONTRACT DRAWINGS.
- CONTRACTOR SHALL PLACE RIFFLE MATRIX TO ARMOR THE CHANNEL BED UPSTREAM OF THE CREST STONES CONTINUOUSLY TO 5-10 FEET BEYOND THE NEXT RIFFLE STATION, AS SHOWN ON PROFILE SECTION SERIES IN THE CONTRACT DRAWINGS. CHANNEL CROSS SECTIONS SHALL BE AS SHOWN IN THE CONTRACT DRAWINGS.
- WOVEN FILTER FABRIC SHALL EXTEND TO BOTTOM OF RIPRAP FOOTER AND 1 FT BEYOND. TRIM EXPOSED FILTER FABRIC TO WITHIN 1 INCH OF CREST STONE TOP.
- PROFILE SECTION SERIES IS SHOWN TO ILLUSTRATE SEQUENCE OF IN-STREAM STRUCTURES. CHANNEL PROFILE SHALL BE CONSTRUCTED ACCORDING TO STATIONS AND ELEVATIONS SHOWN IN CONTRACT DRAWINGS.
- EXCAVATION FOR THE STRUCTURE BELOW FINAL GRADE WILL BE FROM THE FRONT FACE (I.E., DOWNSTREAM) OF THE STRUCTURE TO THE BACK (I.E., UPSTREAM) FACE OF THE STRUCTURE AS ILLUSTRATED IN THE CONTRACT DOCUMENTS.
- INSTALL A LIFT OF TYPE 3 RIPRAP WITH A MINIMUM THICKNESS OF 12" AS THE FOUNDATION BELOW THE FOOTER STONES AND FOOTER LOGS OF ALL IN-STREAM STRUCTURES AS DIRECTED BY GCDWR.
- SPRAY PAINT SPOTS ON CREST STONES WHERE ELEVATIONS ARE SURVEYED FOR AS-BUILT DRAWINGS.
- IN-STREAM STRUCTURE SHALL BE CONSTRUCTED WITH CREST STONES AND FOOTER STONES TO AVOID GAPS BETWEEN THE STONES. ALL GAPS SHALL BE FILLED USING SMALLER PIECES OF FRACTURED FIELDSTONE HAND-CHINKED UNTIL FLUSH WITH THE EDGES OF ADJACENT CREST STONES OR FOOTER STONES.
- GROUT ALL GAPS BETWEEN CREST STONES OR FOOTER STONES UNLESS OTHERWISE DIRECTED BY ENGINEER OR OWNER. GROUT SHALL EXTEND CONTINUOUSLY TO A MINIMUM DEPTH OF 9" INTO THE GAP BETWEEN STONES. GROUT SHALL BE FINISHED FLUSH WITH THE EDGES OF ADJACENT CREST STONES OR FOOTER STONES.
- CREST STONE AND SILL STONES AT SILL LOCATION SHALL BE BURIED UP TO BANKFULL ELEVATION WITH EARTH AND MATTED AS SHOWN IN 1 AND 2 UNLESS OTHERWISE DIRECTED BY GCDWR.

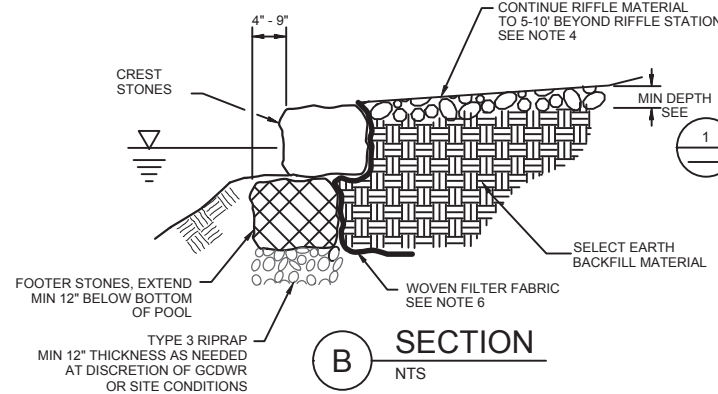


TYPICAL PLAN VIEW  
MIRROR FOR APPLICATION TO OPPOSITE BANK



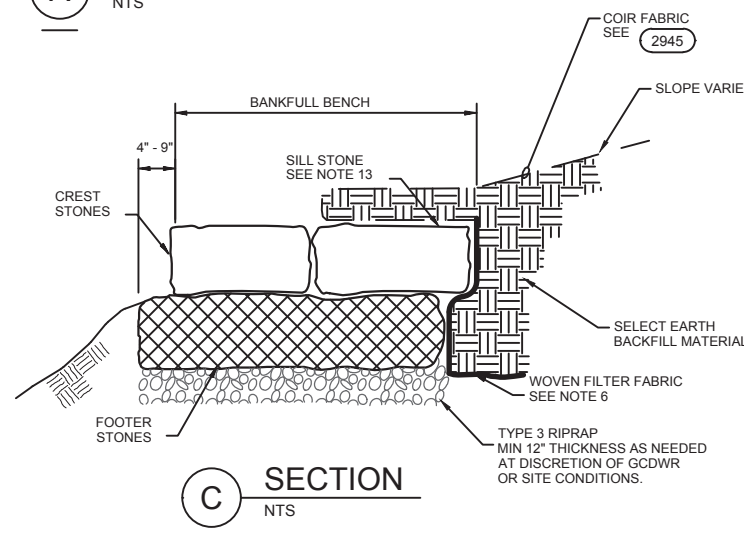
A SECTION

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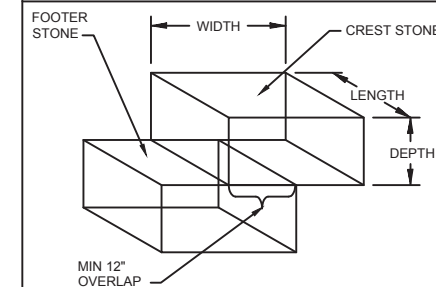
B SECTION

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C SECTION

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DIMENSION	SMALL	MEDIUM	LARGE	EX-LARGE
DEPTH	12" MIN	18" MIN	24" MIN	30" MIN
WIDTH	24" MIN	24" MIN	30" MIN	42" MIN
LENGTH	36" MIN	36" MIN	48" MIN	60" MIN

NOTES:

- CREST STONES AND FOOTER STONES ARE TO BE LARGE BOULDERS OF STONE, GENERALLY RECTANGULAR, WITH SMALLEST AXIS APPROXIMATELY 1/2 OF LARGEST AXIS. AT LEAST ONE FLAT SURFACE IS NEEDED PER STONE TO CONSTRUCT STABLE STRUCTURES.
- CREST STONES SHALL BE PLACED TO SPAN SEAMS BETWEEN FOOTER STONES. CREST STONES AND FOOTER STONE DIMENSIONS SHALL BE AS SPECIFIED IN THIS DETAIL.

CREST STONES AND FOOTER STONES

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2932



GWINNETT COUNTY  
DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

IN-STREAM STRUCTURE INSTALLATION DETAILS

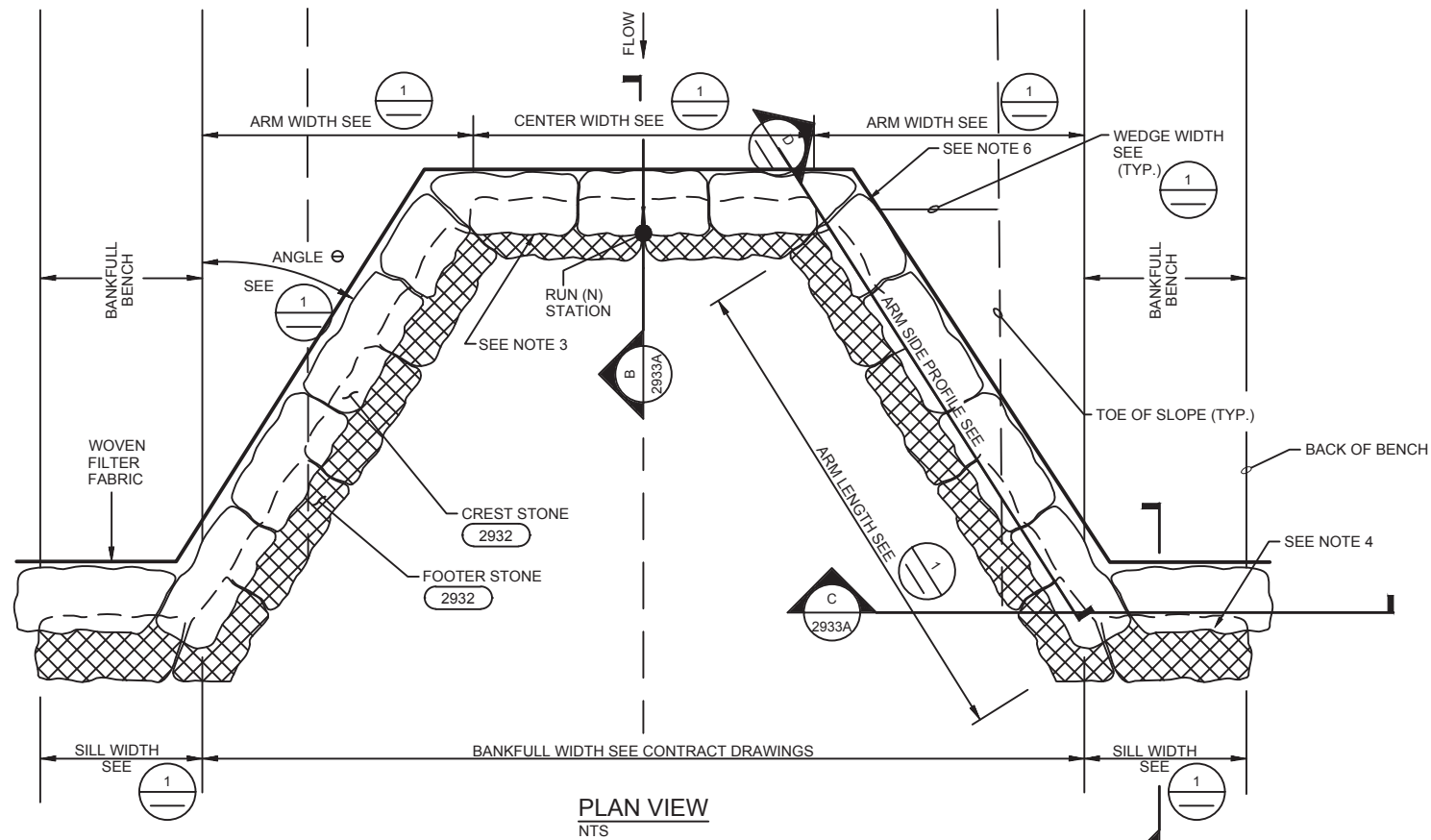
DATE: APRIL 2018 SHEET: 2933A

IN-STREAM STRUCTURE INSTALLATION DETAILS

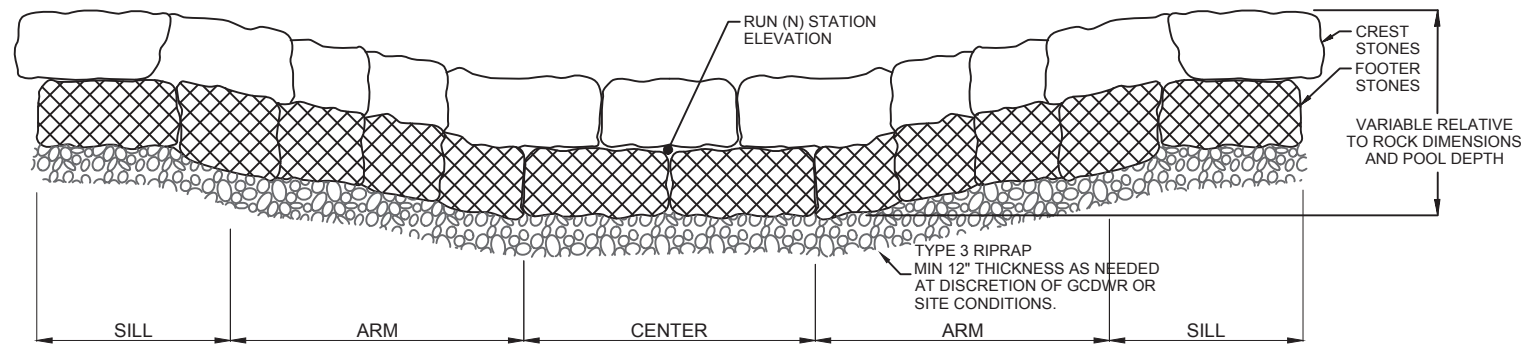
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2933A

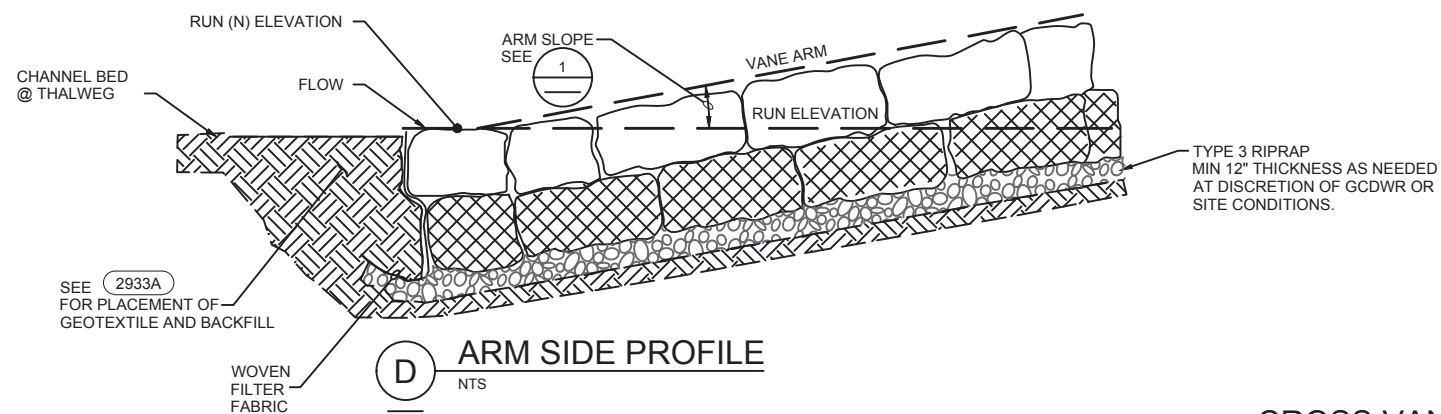




PLAN VIEW  
NTS



FRONT ELEVATION  
NTS



ARM SIDE PROFILE  
NTS

NOTES:

1. FOR RUN (N) STATIONS AND ELEVATIONS SEE CHANNEL PLAN AND CONTRACT DRAWINGS.
2. FOR INFORMATION ON GAPS BETWEEN CREST STONES OR FOOTER STONES, REFER TO DETAIL (2933A), NOTES 11 AND 12.
3. WEDGE CENTER CREST STONES BEHIND AND UPSTREAM OF ARM STONES TO PREVENT DOWNSTREAM MOVEMENT OF CENTER CREST STONES.
4. KEY CROSS VANE ARMS INTO BENCH WITH SILL STONES AT THE BANKFULL BENCH EXTENDING TO THE BACK OF THE BENCH.
5. COIR FABRIC, WOVEN FILTER FABRIC, AND BACKFILL INSTALLATION DETAILS ARE SHOWN ON (2933A).
6. RUN STATIONS AND ELEVATIONS SHOWN ON CONTRACT DRAWINGS ARE SET AT THE TOP FRONT EDGE OF THE CREST STONES AS SHOWN IN THE FRONT ELEVATION VIEW. ALL CENTER CREST STONES SHALL BE INSTALLED PER THE DESIGN ELEVATION TOLERANCE WITH RESPECT TO THE CENTER CREST STONE TOP FACE ELEVATION, BUT NO LOWER THAN THE CENTER CREST STONE.
7. EXCAVATE POOL PRIOR TO STRUCTURE INSTALLATION.

FEATURE	TYPICAL STRUCTURE DIMENSIONS			
	SMALL	MEDIUM	LARGE	EXTRA LARGE
ANGLE $\Theta$	17° MIN	16° MIN	17° MIN	17° MIN
CENTER WIDTH (FT)*	2.0' MAX	3.5' MAX	6.1' MAX	10.1' MAX
ARM WIDTH (FT)	3.0' MAX	5.5' MAX	9.2' MAX	15.2' MAX
SILL WIDTH (FT)*	3.0' MIN	3.0' MIN	3.0' MIN	6.0' MIN
ARM LENGTH (FT)*	10.3' MIN	19.8' MIN	31.5' MIN	52.0' MIN
ARM RISE (FT)	0.4' MIN	0.8' MIN	1.3' MIN	2.0' MIN
ARM SLOPE (%)	3.9% MAX	4.0% MAX	4.0% MAX	3.9% MAX
WEDGE WIDTH	2.0' MIN	3.7' MIN	6.2' MIN	10.2' MIN

\*CROSS VANE SHALL BE MEASURED FOR PAYMENT PER LINEAR FOOT ALONG THE HORIZONTAL CENTERLINE OF FEATURES.

1 CROSS VANE DIMENSION TABLE  
NTS

CROSS VANE DETAIL  
NTS

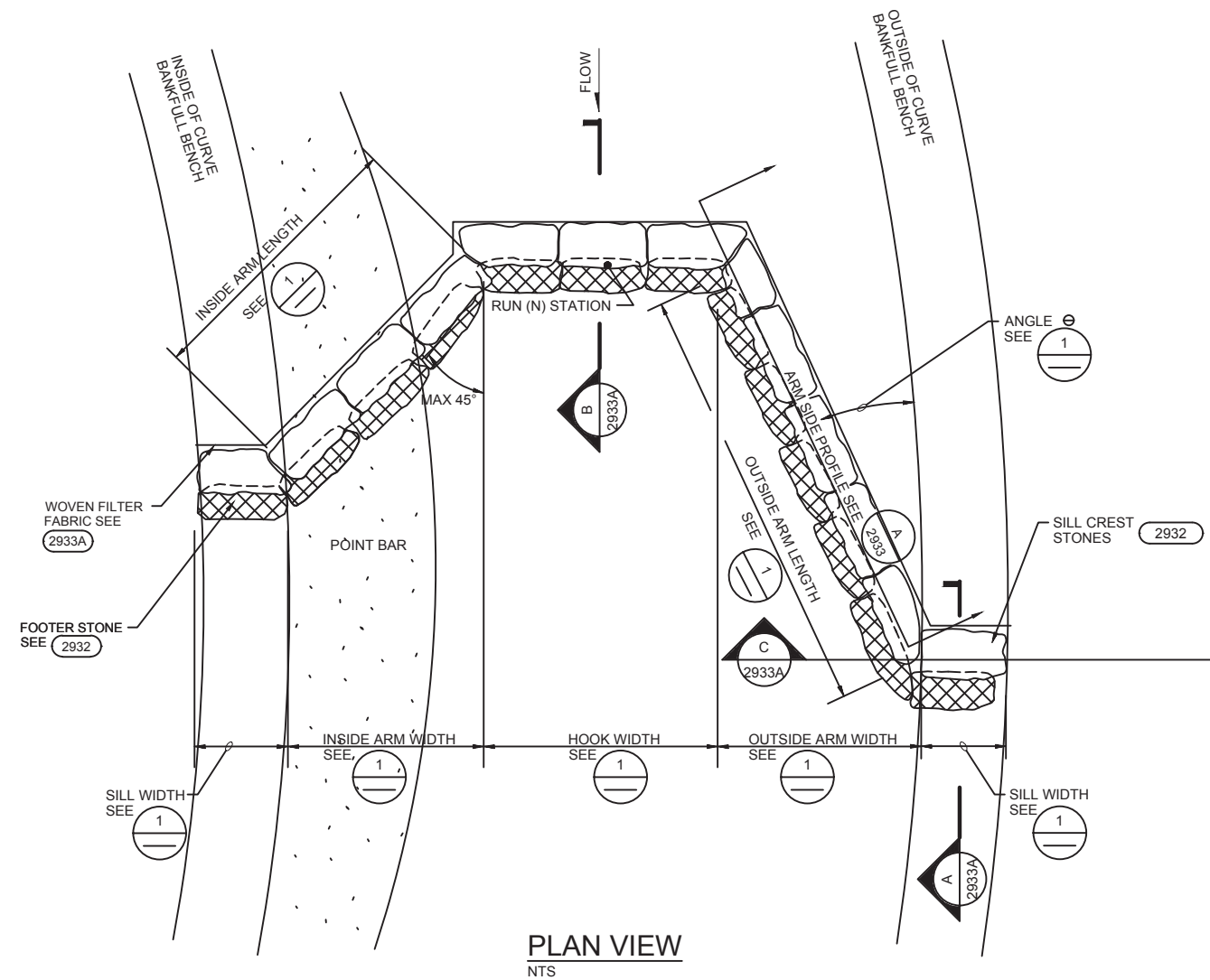
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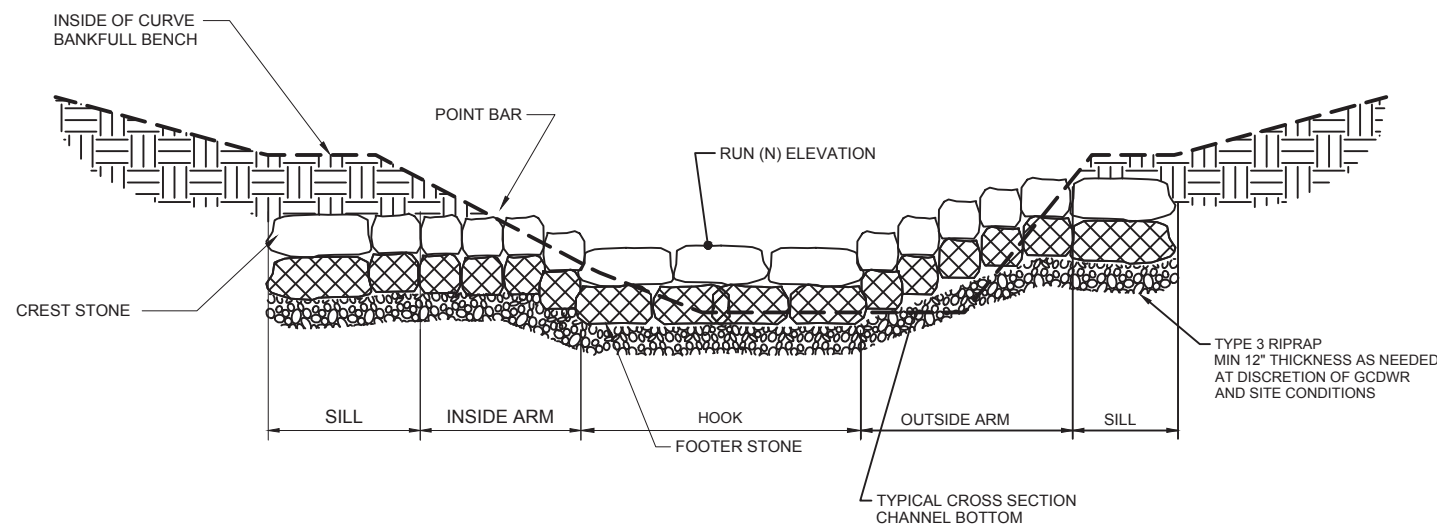
GWINNETT COUNTY  
DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

CROSS VANE

DATE: MAY 2014 SHEET: 2933



**PLAN VIEW**  
NTS



**FRONT ELEVATION**  
NTS

**J-HOOK VANE DETAIL**

2934

**NOTES:**

1. FOR RUN (N) STATIONS AND ELEVATIONS SEE CONTRACT DRAWINGS.
2. COIR FABRIC, WOVEN FILTER FABRIC, BACKFILL, AND GENERAL IN-STREAM STRUCTURE INSTALLATION DETAILS ARE SHOWN ON (2933A).
3. REVERSE DETAIL FOR APPLICATIONS WHERE OUTSIDE OF CURVE IS ON OPPOSITE BANK.
4. RUN (N) STATION AND ELEVATIONS SHOWN ON CONTRACT DRAWINGS ARE SET AT THE TOP FRONT EDGE OF THE CREST STONES AS SHOWN IN THE FRONT ELEVATION VIEW. ALL HOOK AND INSIDE ARM CREST STONES SHALL BE INSTALLED PER THE DESIGN ELEVATION TOLERANCE WITH RESPECT TO THE CENTER CREST STONE TOP FACE ELEVATION, BUT NO LOWER THAN THE CENTER CREST STONE.
5. AS CHANNEL CURVES FROM LEFT TO RIGHT, TRANSITION INSIDE AND OUTSIDE CURVE FLOOD-PRONE WIDTHS FROM BANK TO BANK. FOR DOUBLE POOL APPLICATIONS, KEEP WIDE FLOOD-PRONE WIDTH ON THE INSIDE OF THE CURVE. REFER TO CONTRACT DRAWINGS FOR PROPOSED GRADING.
6. FOR INFORMATION ON GAPS BETWEEN CREST STONES OR FOOTER STONES, REFER TO NOTES 11 AND 12 OF DETAIL (2933A).
7. WEDGE CENTER CREST STONES BEHIND AND UPSTREAM OF ARM STONES TO PREVENT DOWNSTREAM MOVEMENT OF CENTER CREST STONES.
8. KEY OUTSIDE ARM INTO BENCH WITH SILL STONES AT THE BANKFULL BENCH AND EXTENDING TO THE BACK OF THE BENCH.

**BOULDER VANE:**

1. BOULDER VANE INSTALLATION SHALL INCLUDE ONLY THE OUTSIDE ARM OUTSIDE SILL, AND WEDGE. INSIDE ARM, INSIDE SILL AND HOOK ARE NOT INCLUDED IN THE INSTALLATION OF A BOULDER VANE.

FEATURE	TYPICAL STRUCTURE DIMENSIONS			
	SMALL	MEDIUM	LARGE	EXTRA LARGE
ANGLE $\Theta$	17° MIN	16° MIN	17° MIN	17° MIN
HOOK WIDTH (FT) *	2.0' MAX	3.6' MAX	6.1' MAX	10.1' MAX
INSIDE ARM WIDTH (FT)	3.0' MIN	5.5' MIN	9.2' MIN	15.2' MIN
OUTSIDE ARM WIDTH (FT)	3.0' MIN	5.5' MIN	9.2' MIN	15.2' MIN
SILL WIDTH (FT) * †	3.0' MIN	3.0' MIN	3.0' MIN	6.0' MIN
INSIDE ARM LENGTH (FT) *	4.2' MIN	7.7' MIN	13.0' MIN	21.5' MIN
OUTSIDE ARM LENGTH (FT) * †	10.3' MIN	19.8' MIN	31.5' MIN	52.0' MIN
OUTSIDE ARM RISE (FT)	0.4' MIN	0.8' MIN	1.3' MIN	2.0' MIN
OUTSIDE ARM SLOPE (%)	3.9% MAX	4.0% MAX	4.0% MAX	3.9% MAX
INSIDE ARM SLOPE (%)	4.7% MAX	5.2% MAX	4.8% MAX	4.8% MAX

\*J-HOOK VANE SHALL BE MEASURED FOR PAYMENT PER LINEAR FOOT ALONG THE HORIZONTAL CENTERLINE OF FEATURES.  
 † BOULDER VANE SHALL BE MEASURED FOR PAYMENT PER LINEAR FOOT ALONG THE HORIZONTAL CENTERLINE OF FEATURES.

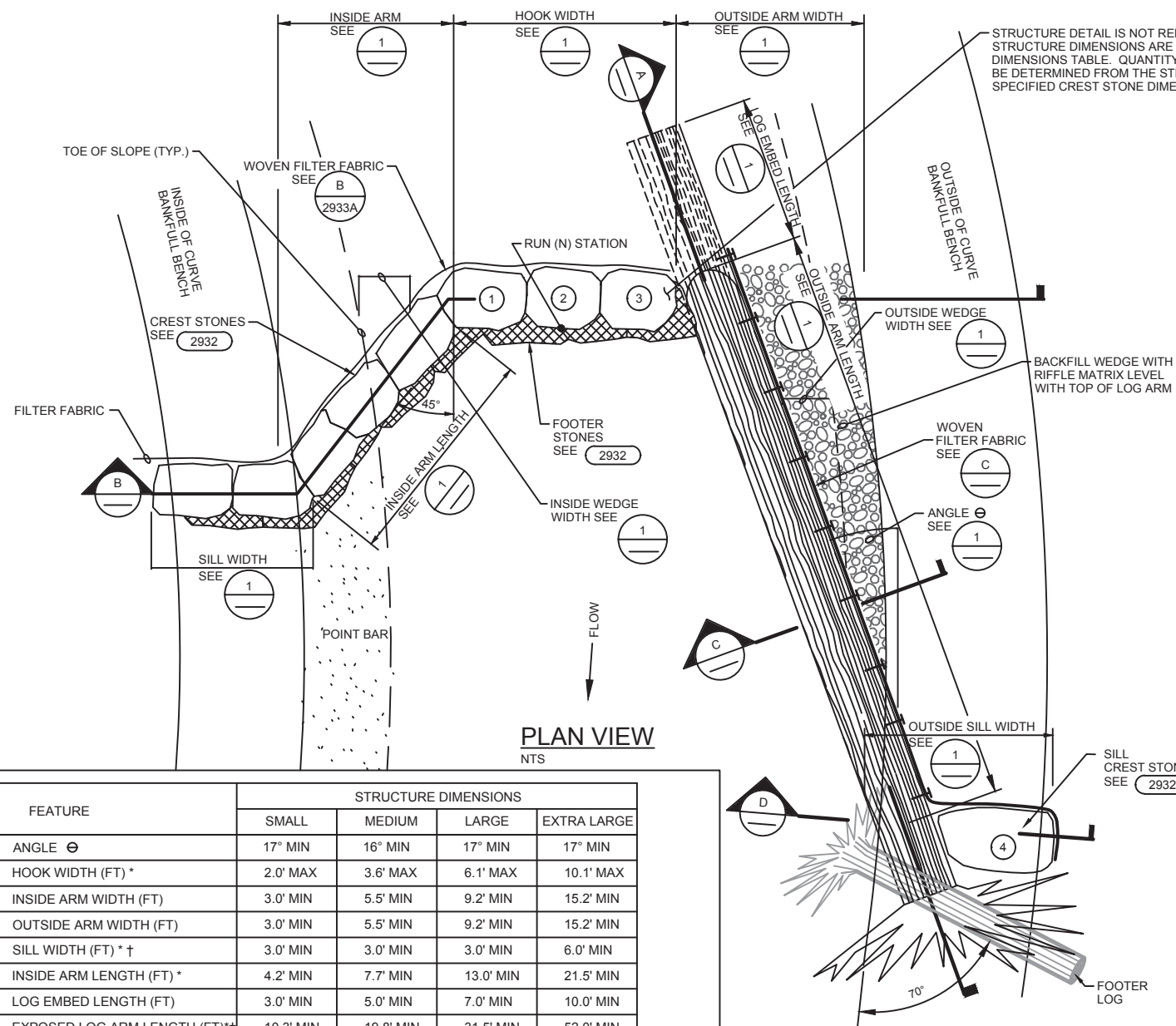
**1 J-HOOK VANE DIMENSION TABLE**  
NTS



GWINNETT COUNTY  
DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

**J-HOOK VANE/BOULDER VANE**

DATE: APRIL 2018 SHEET: 2934



**PLAN VIEW**  
NTS

FEATURE	STRUCTURE DIMENSIONS			
	SMALL	MEDIUM	LARGE	EXTRA LARGE
ANGLE $\Theta$	17° MIN	16° MIN	17° MIN	17° MIN
HOOK WIDTH (FT) *	2.0' MAX	3.6' MAX	6.1' MAX	10.1' MAX
INSIDE ARM WIDTH (FT)	3.0' MIN	5.5' MIN	9.2' MIN	15.2' MIN
OUTSIDE ARM WIDTH (FT)	3.0' MIN	5.5' MIN	9.2' MIN	15.2' MIN
SILL WIDTH (FT) * †	3.0' MIN	3.0' MIN	3.0' MIN	6.0' MIN
INSIDE ARM LENGTH (FT) *	4.2' MIN	7.7' MIN	13.0' MIN	21.5' MIN
LOG EMBED LENGTH (FT)	3.0' MIN	5.0' MIN	7.0' MIN	10.0' MIN
EXPOSED LOG ARM LENGTH (FT) ††	10.3' MIN	19.8' MIN	31.5' MIN	52.0' MIN
OUTSIDE ARM SLOPE (%)	3.9% MAX	4.0% MAX	4.0% MAX	3.9% MAX
OVERALL LOG ARM LENGTH (FT)	16.3' MIN	29.8' MIN	45.5' MIN	72.0' MIN
LOG ARM RISE (FT)	0.4' MIN	0.8' MIN	1.3' MIN	2.0' MIN
LOG DIAMETER (FT)	1.0 - 1.5	1.0 - 1.5	1.0 - 2.0	1.5 - 2.0
INSIDE WEDGE WIDTH (FT)	2.0' MIN	3.7' MIN	6.2' MIN	10.2' MIN
OUTSIDE WEDGE WIDTH (FT)	2.0' MIN	3.7' MIN	6.2' MIN	10.2' MIN

\* J-HOOK LOG VANE SHALL BE MEASURED FOR PAYMENT PER LINEAR FOOT ALONG THE HORIZONTAL CENTERLINE OF FEATURES.  
 † LOG VANE SHALL BE MEASURED FOR PAYMENT PER LINEAR FOOT ALONG THE HORIZONTAL CENTERLINE OF FEATURES.

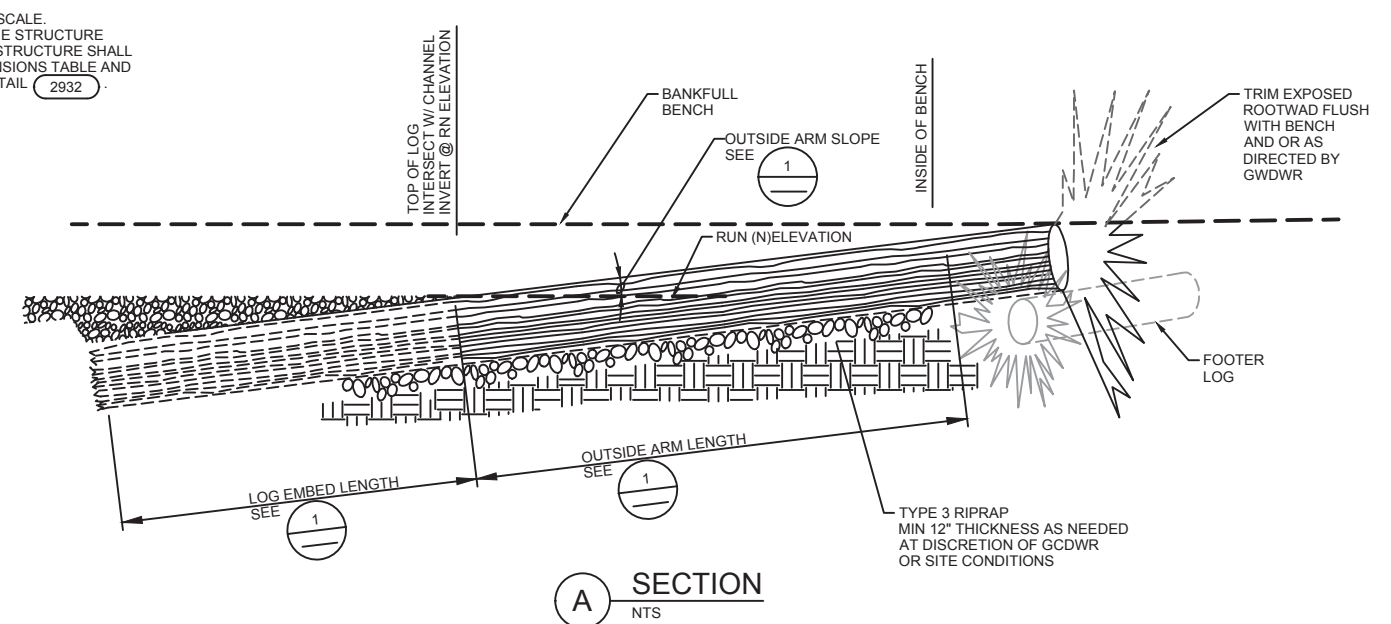
**1 J-HOOK LOG VANE DIMENSION TABLE**  
NTS

**NOTES:**

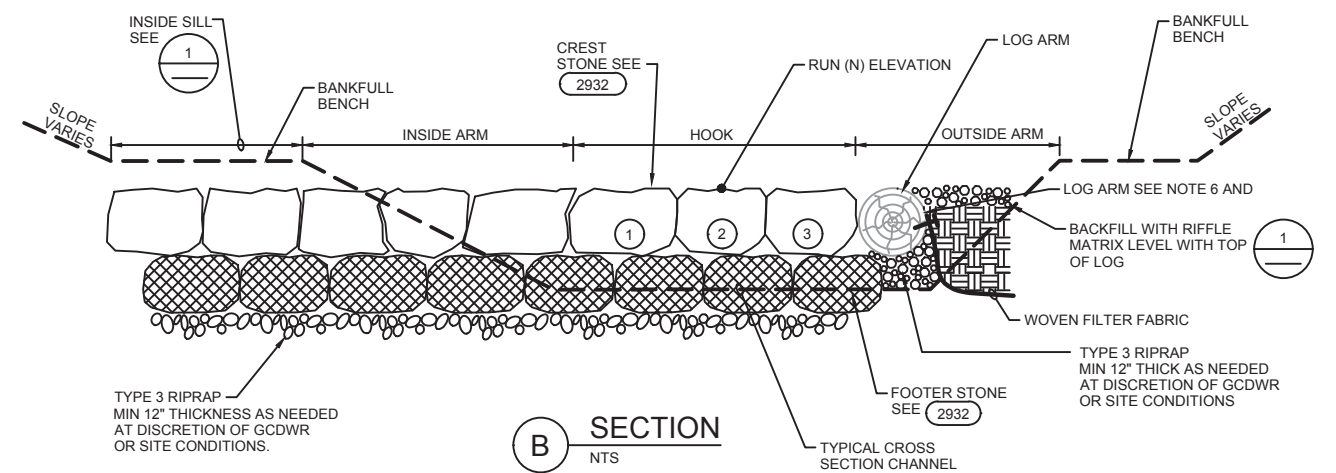
- EXCAVATE POOL PRIOR TO STRUCTURE INSTALLATION.
- SET LOG ARM ON TOP OF FOOTER LOG WITH ROOT BALL INTACT. ADJUST LOG ELEVATION AT SILL TO OBTAIN OUTSIDE ARM SLOPE.
- COIR FABRIC, WOVEN FILTER FABRIC, BACKFILL, AND GENERAL IN-STREAM STRUCTURE INSTALLATION DETAILS ARE SHOWN ON 2933A
- REVERSE DETAIL FOR APPLICATIONS WHERE OUTSIDE OF CURVE IS ON OPPOSITE BANK.
- LOGS SHALL HAVE A DIAMETER WITHIN THE RANGE SPECIFIED (SEE DIMENSION TABLE). HARVEST LOGS FROM ONSITE TREES MARKED FOR REMOVAL. SUITABLE LOGS SHALL BE GENERALLY STRAIGHT WHEN PLACED IN STREAM CHANNEL. TRIM LIMBS AND LEAVE ROOT BALL INTACT. REMOVE BARK FROM LOG PRIOR TO NAILING FILTER FABRIC.
- FOR RUN (N) STATIONS AND ELEVATIONS SEE CONTRACT DRAWINGS.
- FOR INFORMATION ON GAPS BETWEEN CREST STONES OR FOOTER STONES, REFER TO NOTES 11 AND 12 OF DETAIL 2933A
- RUN (N) STATION AND ELEVATIONS SHOWN ON CONTRACT DRAWINGS ARE SET AT THE TOP FRONT EDGE OF THE CREST STONES AS SHOWN IN THE FRONT ELEVATION VIEW. ALL HOOK AND INSIDE ARM CREST STONES SHALL BE INSTALLED PER THE DESIGN ELEVATION TOLERANCE WITH RESPECT TO THE CENTER CREST STONE TOP FACE ELEVATION, BUT NO LOWER IN ELEVATION.
- KEY OUTSIDE ARM INTO BENCH WITH SILL CREST STONE AT THE BANKFULL BENCH AND EXTENDING TO THE BACK OF THE BENCH.

**LOG VANE:**

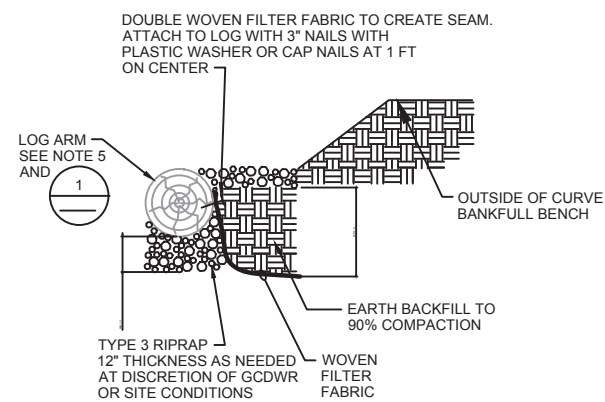
- LOG VANE INSTALLATION SHALL INCLUDE ONLY THE OUTSIDE ARM, OUTSIDE SILL AND WEDGE. INSIDE ARM, INSIDE SILL, AND HOOK ARE NOT INCLUDED IN THE INSTALLATION OF A LOG VANE.



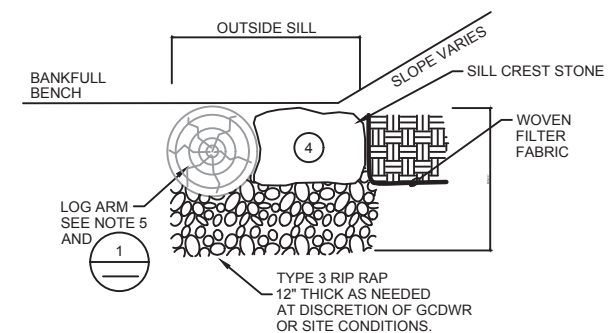
**A SECTION**  
NTS



**B SECTION**  
NTS



**C SECTION**  
NTS



**D SECTION**  
NTS

**J - HOOK LOG VANE**

2935

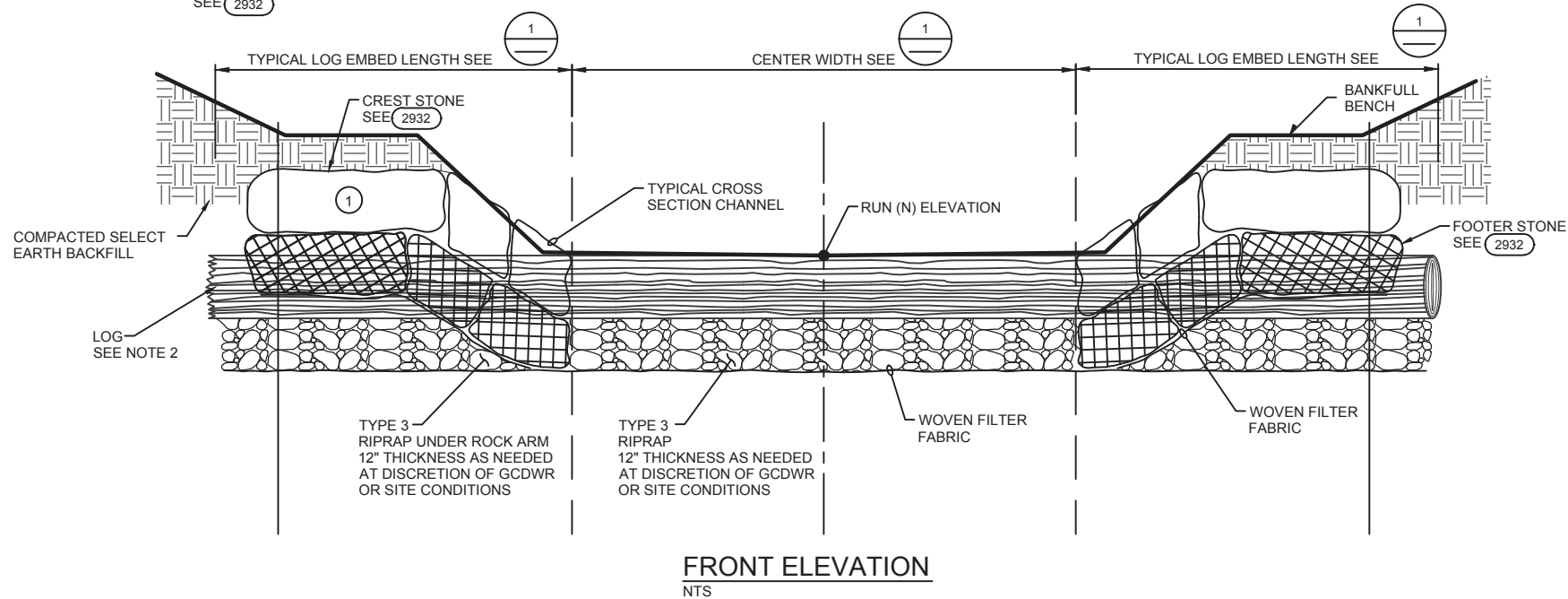
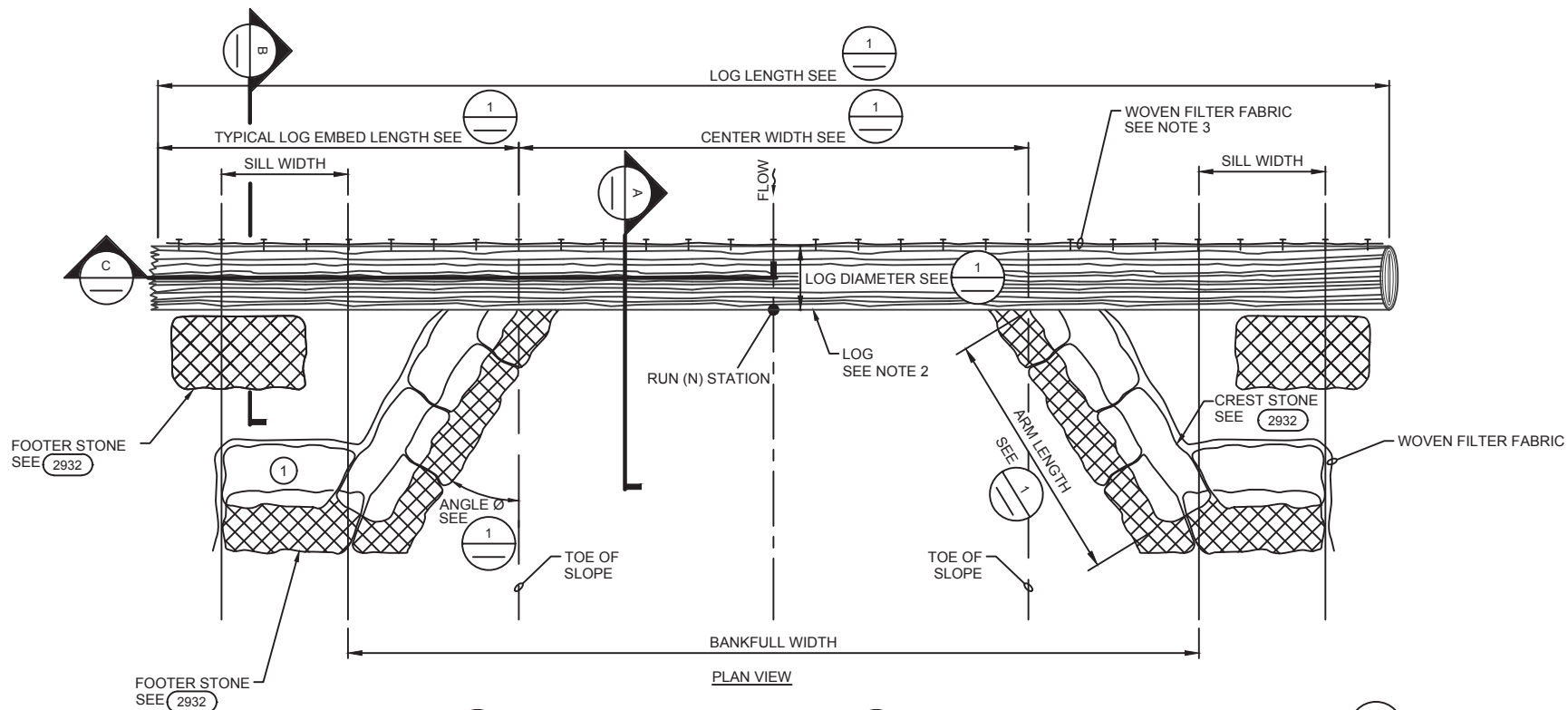


GWINNETT COUNTY  
DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

**J-HOOK LOG VANE / LOG VANE**

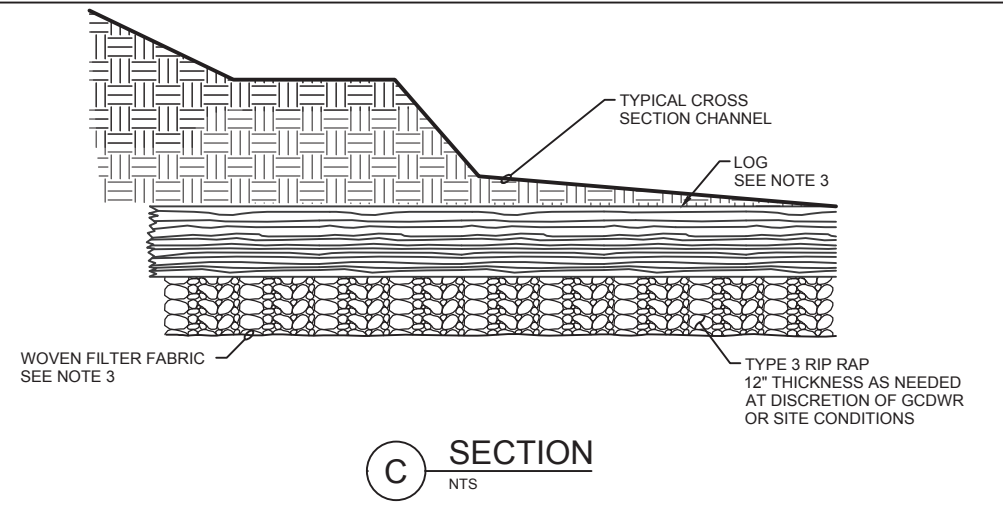
DATE: APRIL 2018 SHEET: 2935





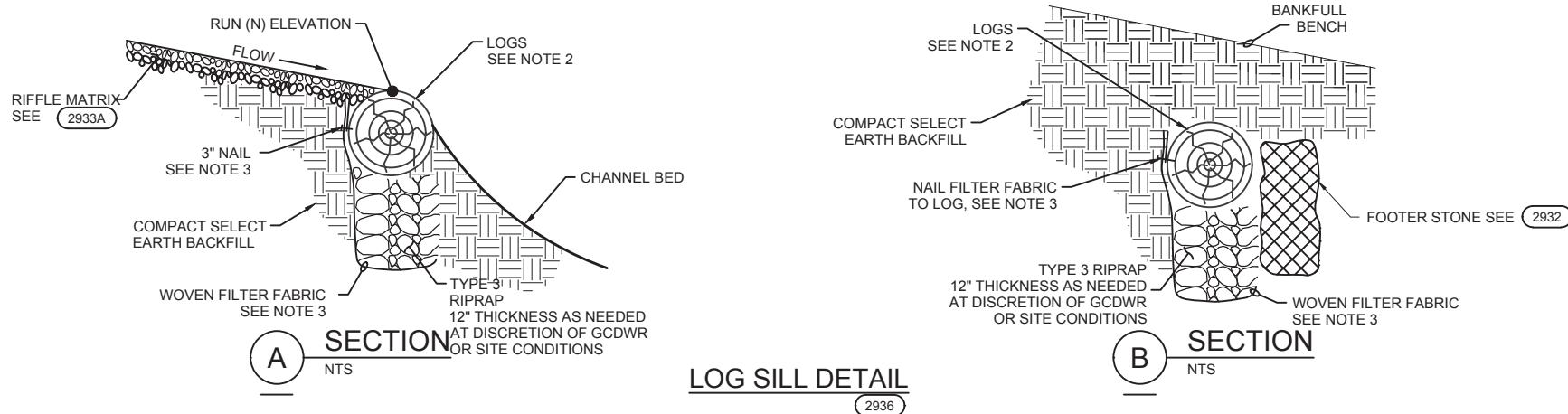
**NOTES:**

- FOR RUN (N) STATIONS AND ELEVATIONS SEE CONTRACT DRAWINGS.
- LOGS USED SHALL HAVE DIAMETER AS SPECIFIED IN (1) AT MID POINT. HARVEST LOGS FROM ONSITE TREES MARKED FOR REMOVAL. SUITABLE LOGS SHALL BE GENERALLY STRAIGHT SUCH THAT WHEN PLACED IN STREAM CHANNEL THE TOP IS FLAT AT RUN ELEVATION. THE TOP OF LOG SHALL BE FLUSH WITH RUN ELEVATION AND DOWN STREAM FACE OF LOG SHALL BE SET AT RUN STATION UNLESS NOTED OTHERWISE. REMOVE BARK FROM LOG PRIOR TO NAILING FILTER FABRIC.
- DOUBLE OVER WOVEN FILTER FABRIC AND NAIL TO UP STREAM FACE OF LOG AT 1 FT INTERVALS. USE 3" NAILS WITH 1" DIA. PLASTIC WASHER AT HEAD.
- PLACE CREST STONE AND FOOTER STONE (SEE (B)) AT THE INTERSECT OF LOG AND BANKFULL BENCH. FOOTER STONE SHALL BE PLACED AT THE DOWNSTREAM FACE OF THE LOG, EMBEDDED IN THE BANKFULL BENCH SO TOP IS LEVEL WITH LOG. CREST STONE SHALL BE ON TOP OF THE LOG.
- INSTALL LOG SO TOP OF LOG IS FLAT ACROSS STREAM BOTTOM TO PREVENT CONCENTRATED FLOW NEAR STREAM BANKS.
- FOR INSTALLATION IN A BEND, INSTALL LOG HORIZONTALLY SKEWED DOWNSTREAM ON THE OUTER BEND (30° MAX.) COORDINATE WITH GCDWR ON PLACEMENT.
- BEGINNING AT TOE OF SLOPE, PLACE CREST STONES AND FOOTERS (2932) AT 45° ANGLE TO LOG BEGINNING AT CHANNEL BOTTOM AND LOG INTERFACE EXTENDING TO HALF BANKFULL ELEVATION. KEY ROCK ARM INTO BANK. SEE (1) FOR SILL WIDTH.
- COIR FABRIC, FILTER FABRIC, AND BACKFILL INSTALLATION DETAILS ARE SHOWN ON (2933A).
- PROVIDE TYPE 1 RIP RAP IN LIEU OF TYPE 3 RIP RAP WHERE ORDERED BY GCDWR.



FEATURE	STRUCTURE DIMENSIONS			
	SMALL	MEDIUM	LARGE	EXTRA LARGE
ANGLE $\theta$	45° MAX	45° MAX	45° MAX	45° MAX
CENTER WIDTH (FT) *	4.0' MAX	7.5' MAX	12.5' MAX	20.0' MAX
SILL WIDTH (FT) *	3.0' MIN	3.0' MIN	3.0' MIN	6.0' MIN
LOG EMBEDDED LENGTH (FT)	3.0' MIN	5.0' MIN	7.0' MIN	10.0' MIN
ARM LENGTH (FT) *	3.0' MIN	4.9' MIN	8.5' MIN	14.5' MIN
OVERALL LOG LENGTH (FT)	10.0' MIN	17.5' MIN	26.5' MIN	40.0' MIN
LOG DIAMETER (FT)	1.0' TO 1.5'	1.0' TO 1.5'	1.0' TO 2.0'	1.5' TO 2.0'

\* LOG SILL SHALL BE MEASURED FOR PAYMENT PER LINEAR FOOT ALONG THE HORIZONTAL CENTERLINE OF FEATURES.



**(1) LOG SILL DIMENSION TABLE**  
NTS



GWINNETT COUNTY  
DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

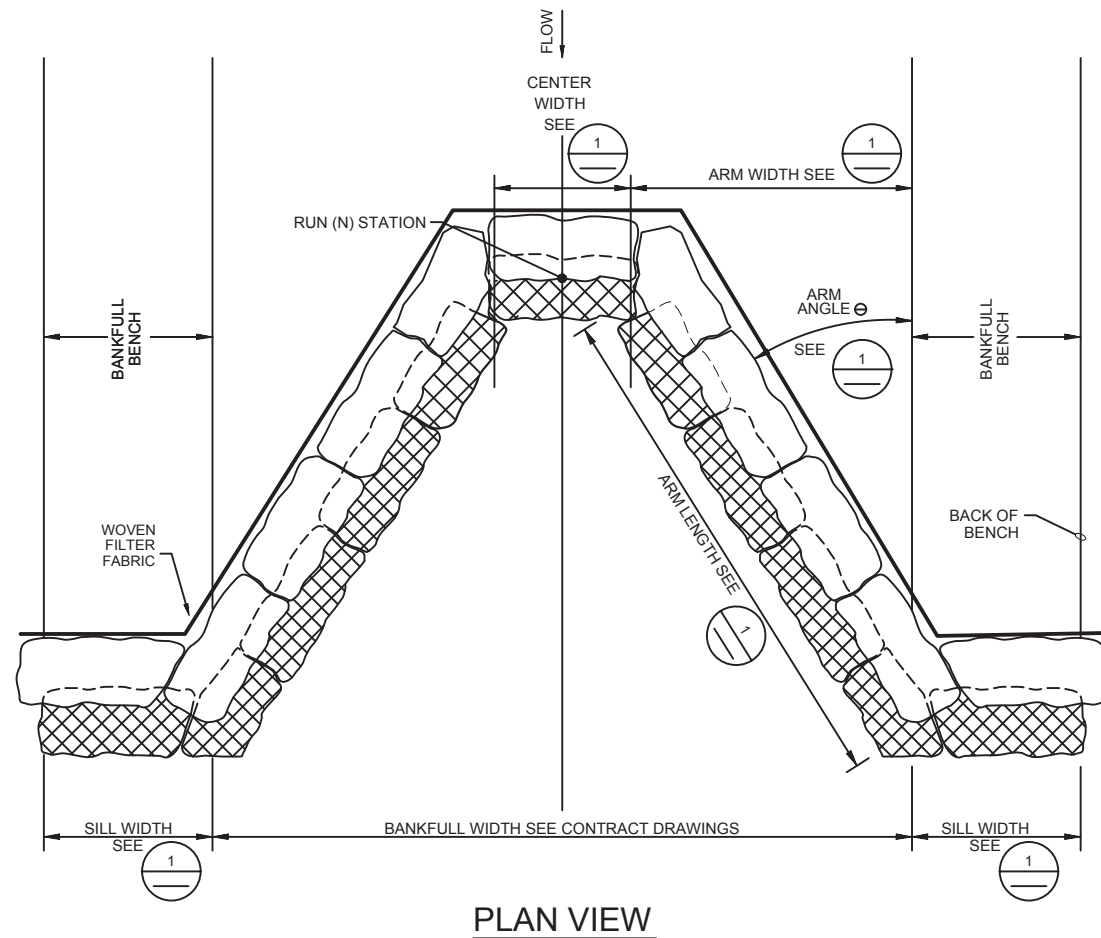
**LOG SILL**

DATE: APRIL 2018 SHEET: 2936

FEATURE	STRUCTURE DIMENSIONS			
	SMALL	MEDIUM	LARGE	EXTRA LARGE
ARM ANGLE (°)	15° MIN	17° MIN	19° MIN	20° MIN
CENTER WIDTH (FT) *	3.0' MAX	3.0' MAX	4.0' MAX	5.0' MAX
ARM WIDTH (FT)	2.5' MAX	5.8' MAX	10.25' MAX	17.8' MAX
SILL WIDTH (FT) *	3.0' MIN	3.0' MIN	3.0' MIN	6.0' MIN
ARM LENGTH (FT) *	9.7' MIN	19.7' MIN	31.5' MIN	51.9' MIN
RISE ACROSS ARM (FT)	0.4' MIN	0.8' MIN	1.3' MIN	2.1' MIN
ARM SLOPE (%)	4.1% MAX	4.1% MAX	4.0% MAX	4.0% MAX

\* STEP POOL VANE SHALL BE MEASURED FOR PAYMENT PER LINEAR FOOT ALONG THE HORIZONTAL CENTERLINE OF FEATURES.

**1** STEP POOL DIMENSION TABLE  
NTS



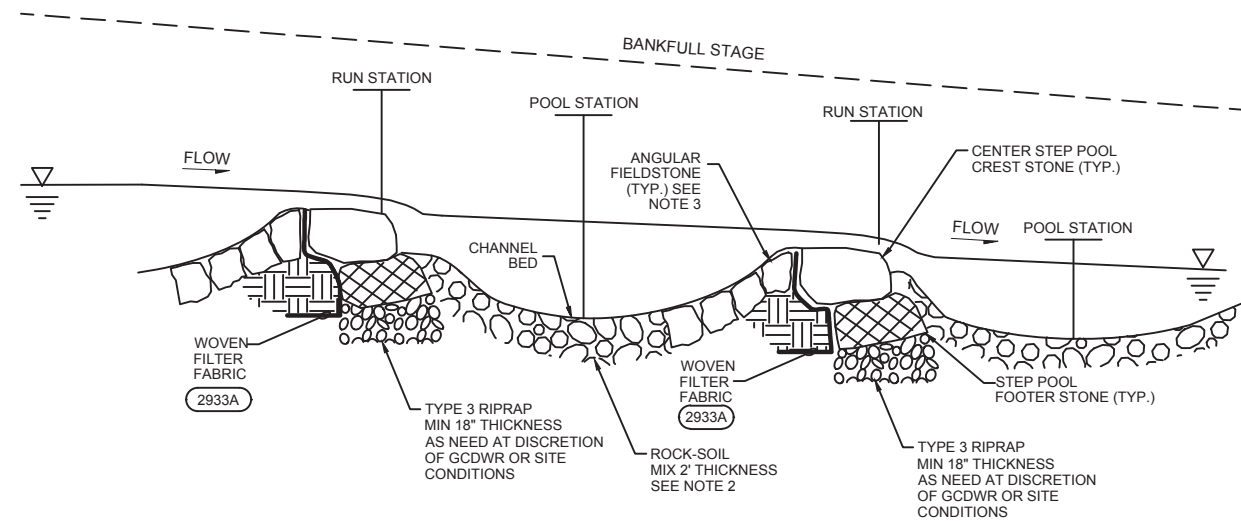
PLAN VIEW

STEP POOL SERIES DETAIL  
NTS

2937

NOTES:

- INSTALL STEP POOL SERIES AS CROSS VANES PER 2933 EXCEPT WHERE NOTED IN THIS DETAIL.
- CREST STONES AND FOOTER STONES USED TO CONSTRUCT THE STEP POOL CENTER, ARMS, AND SILL SHALL BE DIMENSIONED PER THE MINIMUM DIMENSIONS IN DETAIL 2932 FOR STEP POOL CREST STONES AND FOOTER STONES.
- MIX UNIFORMLY 35% RIVER COBBLE AND 35% RIFFLE ROCK BY VOLUME WITH 30% OF APPROVED SOIL BY VOLUME PRIOR TO PLACEMENT. PLACE THIS ROCK-SOIL MIX TO RESULT IN SECURELY INTERLOCKED ROCK AT THE DESIGN THICKNESS AND GRADE. COMPACT AND LEVEL TO ELIMINATE VOIDS AND ROCKS PROJECTING ABOVE DESIGN TOP GRADE.
- DOWNSTREAM 1/3 OF POOL LENGTH SHALL BE ARMORED WITH ANGULAR FIELDSTONE HAVING 12" MEDIAN AXIS LENGTH AND EMBEDDED INTO THE SUBSTRATE SURFACE.
- COIR FABRIC, WOVEN FILTER FABRIC, BACKFILL, AND GENERAL IN-STREAM STRUCTURE INSTALLATION DETAILS ARE SHOWN ON 2933A.
- INSTALL STEP POOL CREST STONES AND FOOTER STONES PER DETAIL 2933A TO CONNECT THE ENDS OF THE ARMS AT THE ELEVATION OF THE FOOTER STONES TO THE CENTER CREST STONE OF THE NEXT DOWNSTREAM STEP POOL STRUCTURE, UNLESS OTHERWISE DIRECTED BY GCDWR.
- FOR INFORMATION ON GAPS BETWEEN CREST STONES OR FOOTER STONES, REFER TO NOTES 11 AND 12 OF DETAIL 2933A.
- WEDGE CENTER CREST STONES BEHIND AND UPSTREAM OF ARM STONES TO PREVENT DOWNSTREAM MOVEMENT OF CENTER CREST STONES.
- KEY STEP POOL VANE INTO BENCH WITH SILL STONES AT THE BANKFULL BENCH ELEVATION AND EXTENDING BEYOND THE BACK OF THE BENCH.



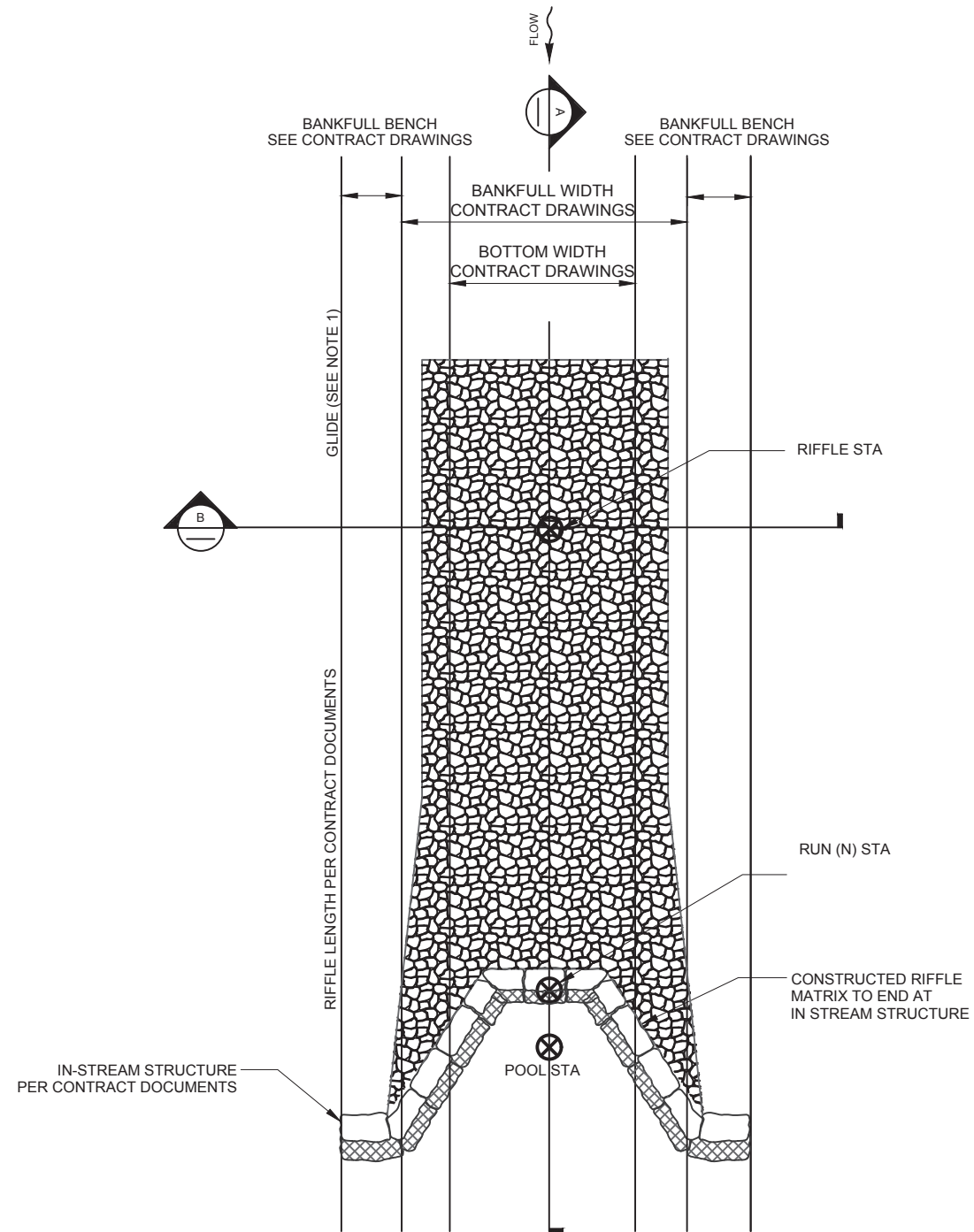
**2** TYPICAL STEP POOL SERIES PROFILE SECTION  
NTS



GWINNETT COUNTY  
DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

STEP POOL SERIES

DATE: MAY 2014 SHEET: 2937



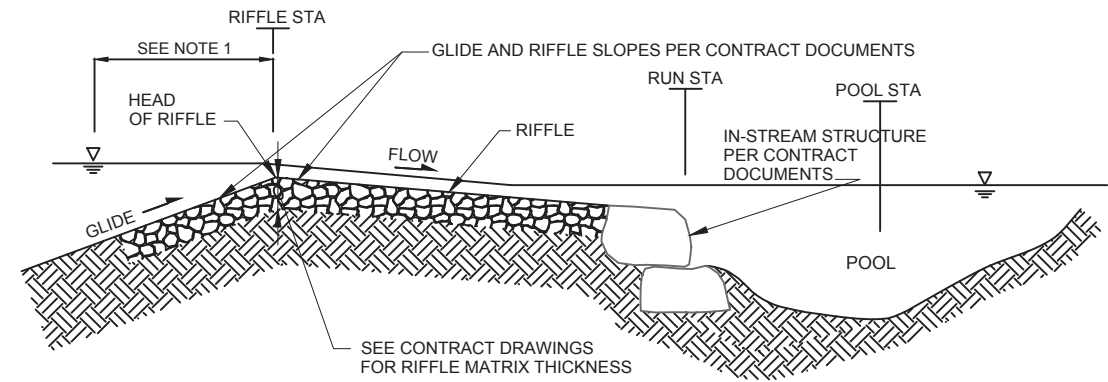
PLAN VIEW

NOTES:

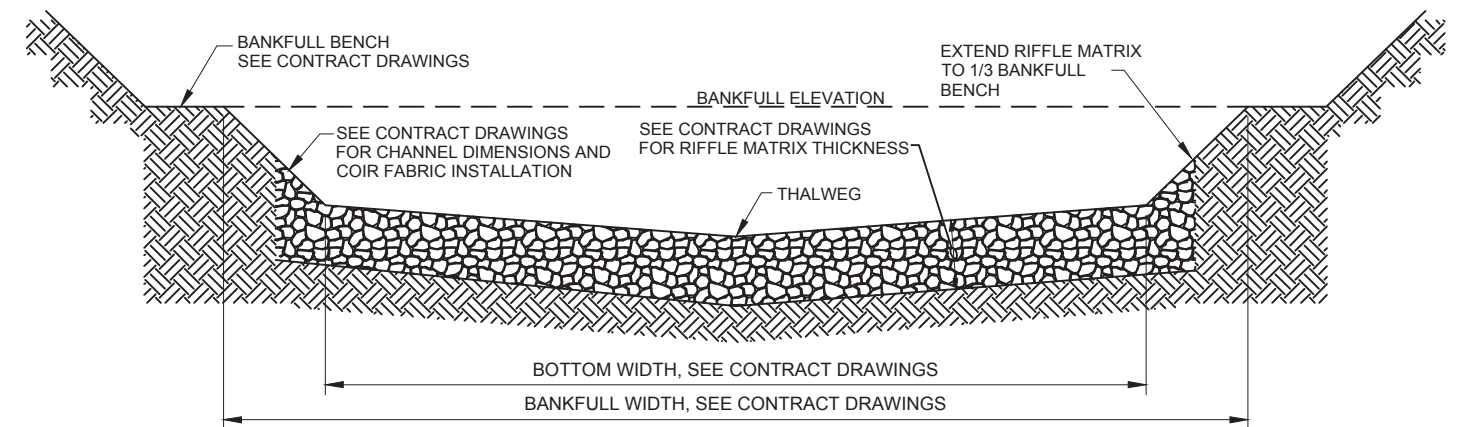
1. RIFFLE MATRIX BEGINS 5-10 UPSTREAM OF RIFFLE STATION PER CONTRACT DRAWINGS OR AS DIRECTED BY GCDWR.
2. SEE (1) FOR CONSTRUCTED RIFFLE MATRIX GRADATION.
3. CONSTRUCTED RIFFLE TO BE INSTALLED IN SIX INCH VERTICAL LIFTS.

GRADATIONS (TO BE PROVIDED DESIGNER)	
PERCENT BY VOLUME	ROCK TYPE (FOR ROCK SIZES, REFER TO 2933A)
-	RIVER COBBLE
-	RIFFLE ROCK
-	RIVER PEBBLE

(1) CONSTRUCTED RIFFLE MATRIX GRADATION  
NTS



(A) SECTION  
NTS



(B) SECTION  
NTS

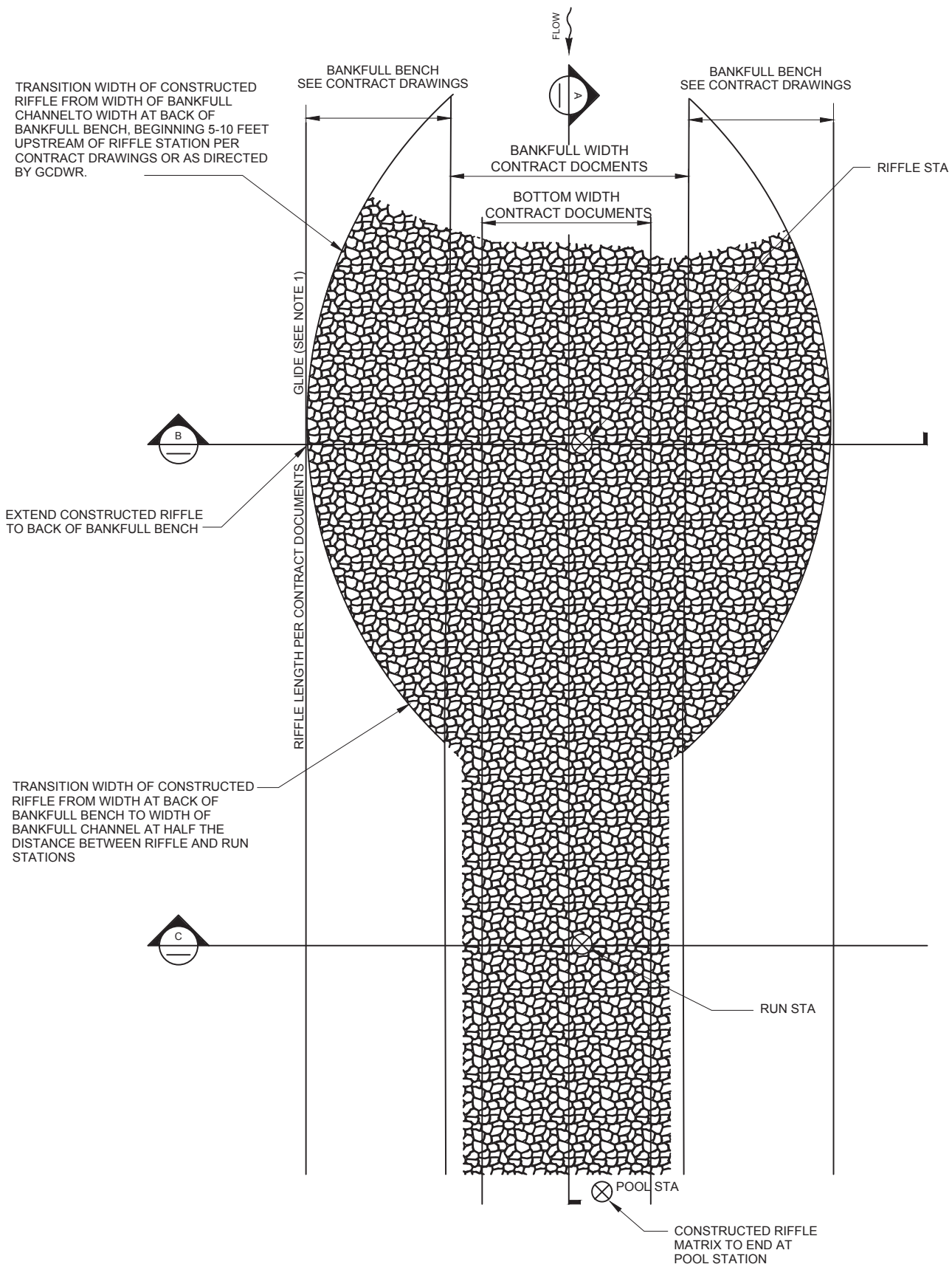


GWINNETT COUNTY  
DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

CONSTRUCTED RIFFLE

DATE: MAY 2014 SHEET: 2938





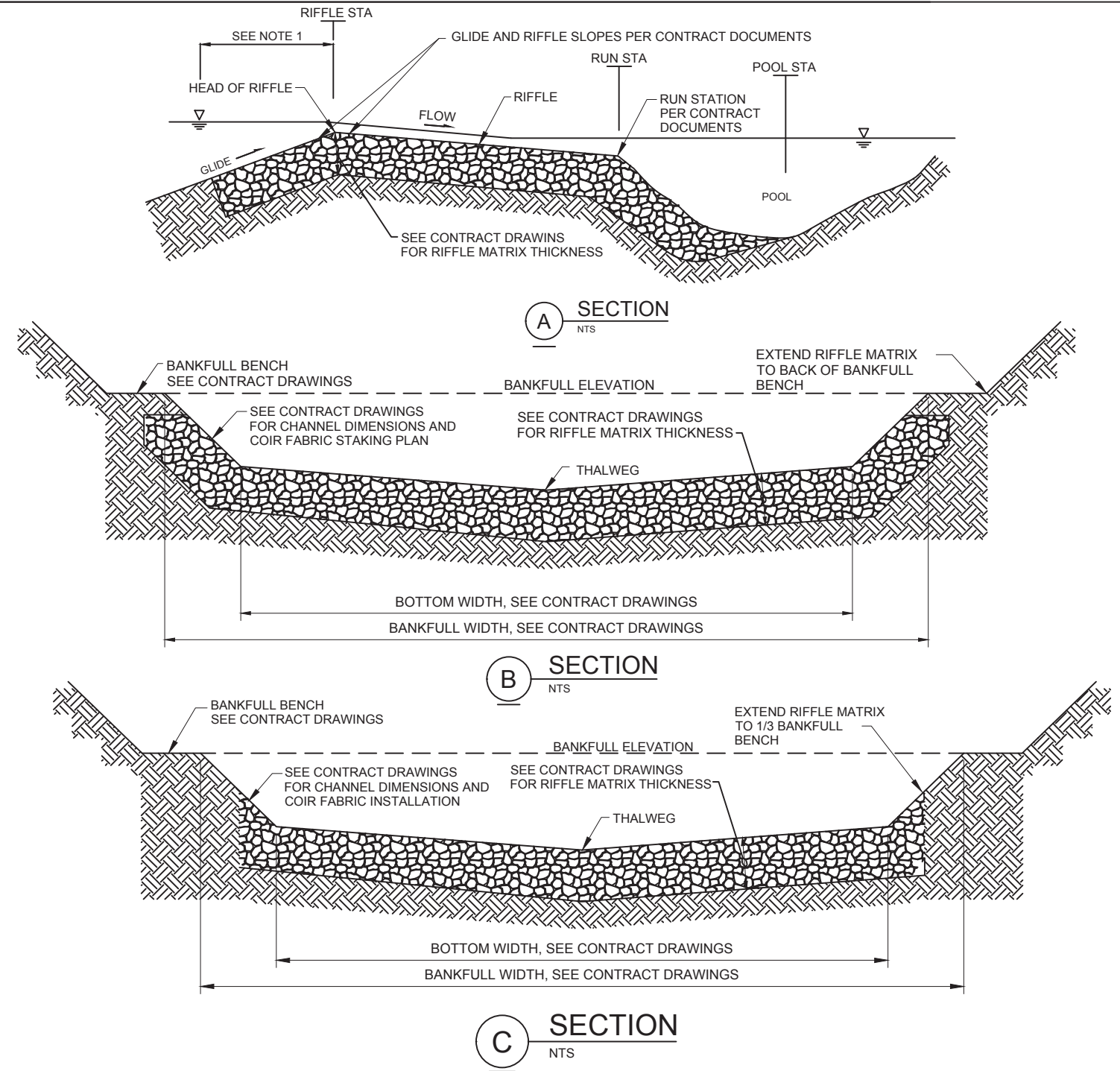
PLAN VIEW

NOTES:

1. RIFFLE MATRIX BEGINS 5-10 FEET UPSTREAM OF RIFFLE STATION PER CONTRACT DRAWINGS OR AS DIRECTED BY GCDWR.
2. SEE (1) FOR CONSTRUCTED RIFFLE MATRIX GRADATION.
3. CONSTRUCTED RIFFLE TO BE INSTALLED IN SIX INCH VERTICAL LIFTS.

GRADATIONS (TO BE PROVIDED DESIGNER)	
PERCENT BY VOLUME	ROCK TYPE (FOR ROCK SIZES, REFER TO 2933A)
-	RIVER COBBLE
-	RIFFLE ROCK
-	RIVER PEBBLE

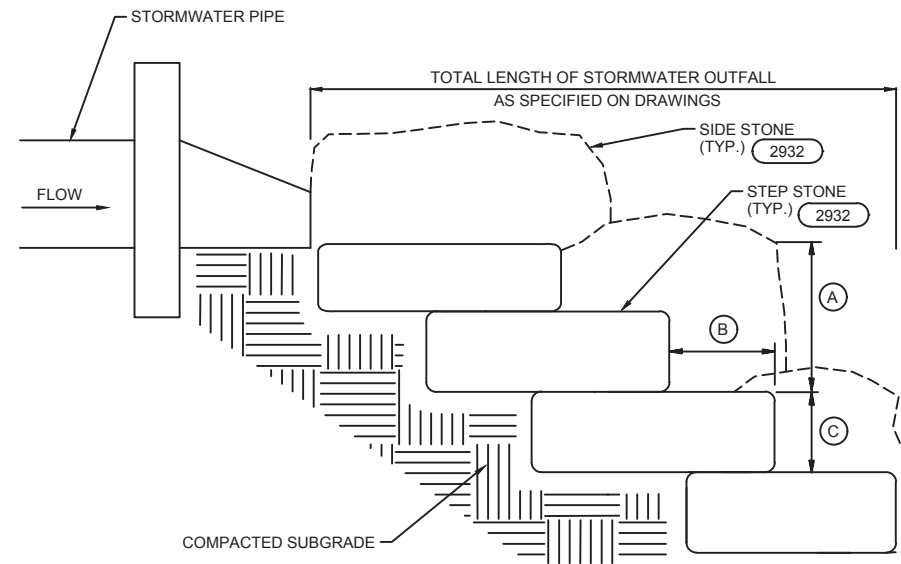
(1) CONSTRUCTED RIFFLE MATRIX GRADATION  
NTS



GWINNETT COUNTY  
DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

CONSTRUCTED RIFFLE WITH SILLS

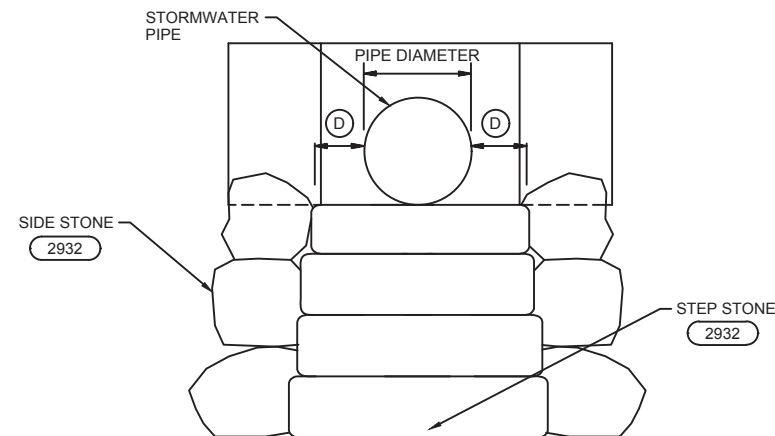
DATE: MAY 2014 SHEET: 2939



**TYPICAL PROFILE**  
NTS

**NOTES:**

1. SIDE STONE HEIGHT (A) ABOVE STEP IS 1 FOOT MINIMUM OR 1/2 PIPE DIAMETER IF GREATER THAN 1 FOOT.
2. STEP MINIMUM EXPOSURE (B) IS 2 FEET, OR PIPE DIAMETER IF GREATER THAN 2 FEET.
3. HEIGHT OF STEP (C) IS A MINIMUM OF 6 INCHES TO A MAXIMUM OF 1 FOOT.
4. MINIMUM STEP WIDTH IS THE PIPE DIAMETER AND 6 INCH ON EACH SIDE OF THE PIPE (D).
5. STEP STONES EMBEDDED IN THE BANK A MINIMUM LENGTH OF ONE THIRD OF THE EXPOSURE LENGTH (B).
6. SIDE STONES MUST BE EMBEDDED IN THE SIDEWALLS A MINIMUM LENGTH OF TWICE THE EXPOSURE HEIGHT (A).
7. VOIDS BETWEEN STONES MUST BE FILLED WITH #57 WASHED STONE OR BALLAST.
8. AT TIE IN TO STREAM CHANNEL, STONES BELOW BANKFULL ELEVATION MUST NOT PROTRUDE FROM THE BANK. THE BOTTOM STEP MUST BE PLACED SUCH THAT THAT THE TOP OF THE STONE IS 0.7 FEET BELOW BANKFULL ELEVATION.
9. GROUT AS NECESSARY. DO NOT LEAVE ANY STANDING WATER ON STEPS.



**FACE VIEW**  
NTS

**1 STORMWATER OUTFALL STEPS**  
NTS

2940

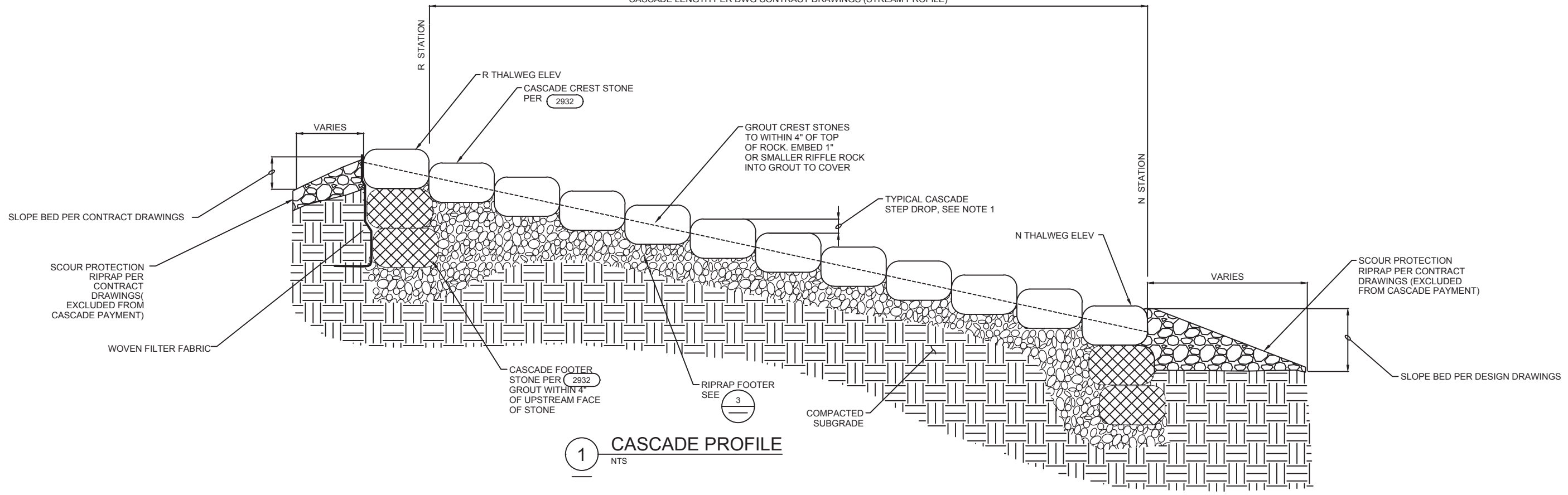


GWINNETT COUNTY  
DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

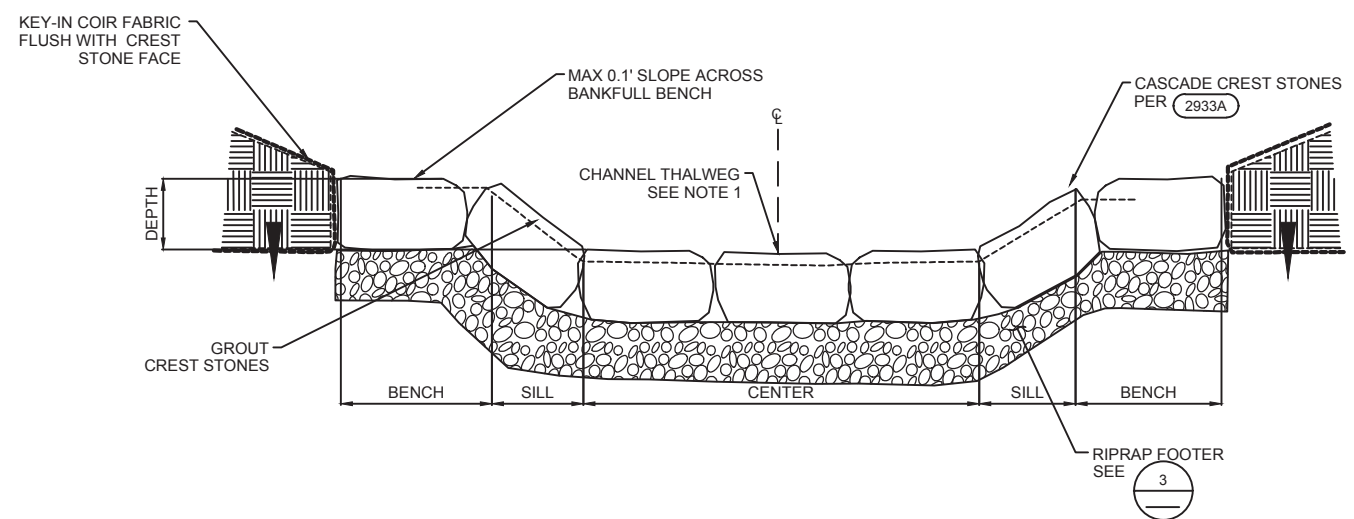
**STORMWATER OUTFALL STEPS**

DATE: MAY 2014 SHEET: 2940

CASCADE LENGTH PER DWG CONTRACT DRAWINGS (STREAM PROFILE)



**1** CASCADE PROFILE  
NTS



**2** TYPICAL CASCADE CROSS SECTION  
NTS

STRUCTURE SIZE	TYPICAL STEP ELEV. DROP	RIP RAP FOOTER TYPE	RIP RAP FOOTER DEPTH
SMALL	TYP = 0.2 FT	TYPE 3	1 FT
MEDIUM	TYP = 0.2 FT	TYPE 3	1 FT
LARGE	TYP = 0.25 FT	TYPE 3	1.5 FT
EXTRA LARGE	TYP = 0.35 FT	TYPE 3	2 FT

**3** CASCADE DIMENSIONS TABLE  
NTS

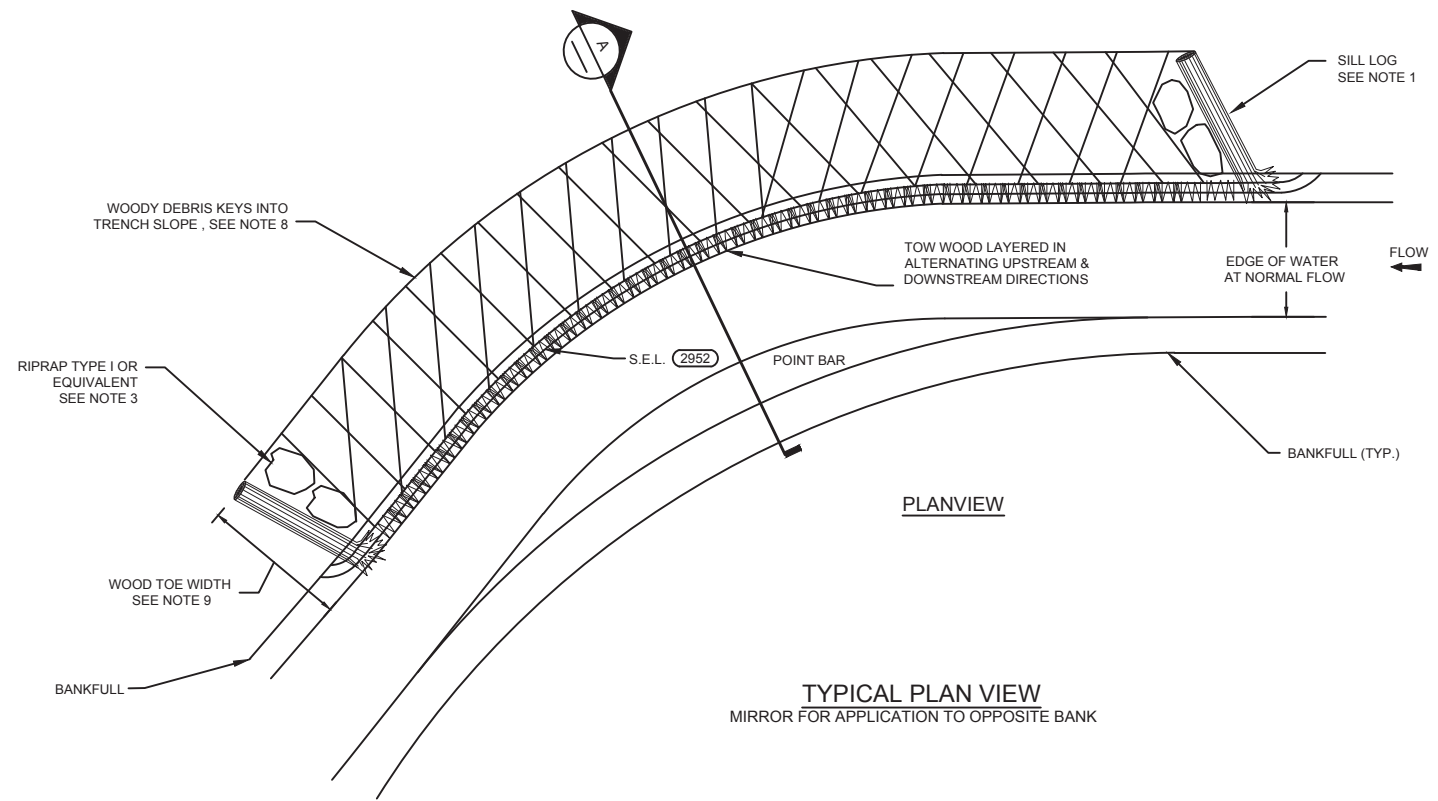
- NOTES:**
1. PLACE CASCADE CREST STONES SO THE THALWEG (LOWEST POINT FLOWLINE) IS WITHIN 3 FEET LEFT OR RIGHT OF THE CASCADE CENTERLINE, WITH THE FLOWLINE CASCADE STEP DROP VARYING UP TO 50% OF TYPICAL DROP.
  2. STAGGER THE CREST STONES WITH VARIED LENGTH IN EACH STEP SO THE GAPS BETWEEN STONES ARE OFFSET.
  3. R STATION AND N STATION ELEVATIONS PER THE STREAM PROFILE (SEE CONTRACT DRAWINGS) SHALL BE MAINTAINED.
  4. COIR FABRIC, WOVEN FILTER FABRIC, BACKFILL, AND GENERAL IN-STREAM STRUCTURE INSTALLATION DETAILS ARE SHOWN ON 2933A.
  5. PROVIDE TYPE 1 RIP RAP IN LIEU OF TYPE 3 RIP RAP WHERE ORDERED BY GCDWR.



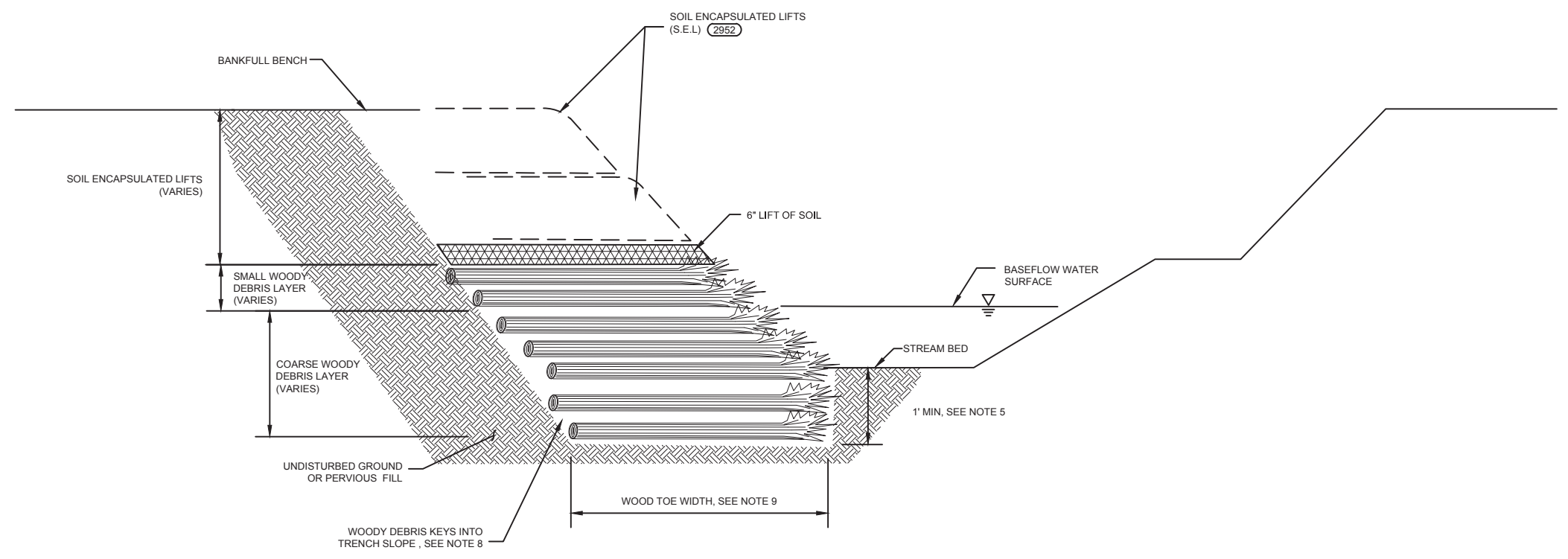
GWINNETT COUNTY  
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STANDARD DRAWING

**CASCADE**

DATE: APRIL 2018 SHEET: 2943



**TYPICAL PLAN VIEW**  
MIRROR FOR APPLICATION TO OPPOSITE BANK



**SECTION A**  
NTS

**NOTES:**

1. GCDWR WILL ASSIST WITH LAYOUT AND IDENTIFY FIELD-ADJUSTED WORK LIMITS.
2. SILL LOG WITH ROOTWAD SHALL BE PLACED AT THE UPSTREAM AND DOWNSTREAM ENDS OF THE STRUCTURE.
3. RIP RAP TYPE 1 OR EQUIVALENT SHALL BE PLACED BETWEEN SILL LOG AND THE UPSTREAM AND DOWNSTREAM ENDS OF STRUCTURE.
4. THE BOTTOM MOST LAYER OF TOE WOOD SHALL CONSIST OF COARSE WOODY DEBRIS COMPOSED OF LOGS AND LARGE BRANCHES, 12-INCH TO 18-INCH DIAMETER, PLACED IN A HERRINGBONE PATTERN WITH COARSE WOODY DEBRIS POINTING IN ALTERNATING UPSTREAM AND DOWNSTREAM DIRECTION.
5. COARSE WOODY DEBRIS SHALL BE INSTALLED IN 1' LIFTS BEGINNING 1' BELOW MAXIMUM POOL DEPTH TO A HEIGHT OF APPROXIMATELY ONE QUARTER BANKFULL ELEVATION.
6. SMALL WOODY DEBRIS, 6-INCH TO 12-INCH DIAMETER, SHALL BE PLACED ABOVE FINAL LIFT OF COARSE WOODY DEBRIS.
7. SMALL WOODY DEBRIS SHALL BE INSTALLED IN 1' LIFTS POINTING IN ALTERNATING UPSTREAM AND DOWNSTREAM DIRECTION TO A HEIGHT OF APPROXIMATELY ONE HALF BANKFULL ELEVATION.
8. THE ENDS OF WOODY DEBRIS SHALL BE PUSHED INTO TRENCH SLOPE DURING EACH LIFT.
9. WOOD TOE WIDTH SHALL BE A MINIMUM HALF BANKFULL WIDTH.
10. SMALL AND COARSE WOODY DEBRIS SHALL HAVE BROKEN ENDS RATHER THAN CLEAN, STRAIGHT CUTS.
11. FINAL LIFT OF SMALL WOODY DEBRIS SHALL BE COVERED WITH A 6" LIFT OF SOIL.
12. SOIL ENCAPSULATED LIFTS TO BE INSTALLED PER (2952) TO BANKFULL ELEVATION OR OTHERWISE DIRECTED BY GCDWR.
13. SOIL ENCAPSULATED LIFTS TO BE PAID SEPERATELY.
14. THE SLOPE CREATED BY THE COARSE AND SMALL WOODY DEBRIS LAYERING SHALL MATCH THE PROPOSED CROSS SECTION SHAPE FOR THE OUTER BANK OF THE TYPICAL POOL CROSS SECTION FOR EACH REACH AS SHOWN IN THE CONTRACT DRAWINGS.
15. FILL VOIDS WITH SOIL AND CLASSIFIED STONE MIX DURING INSTALLATION OF WOODY DEBRIS MIX.

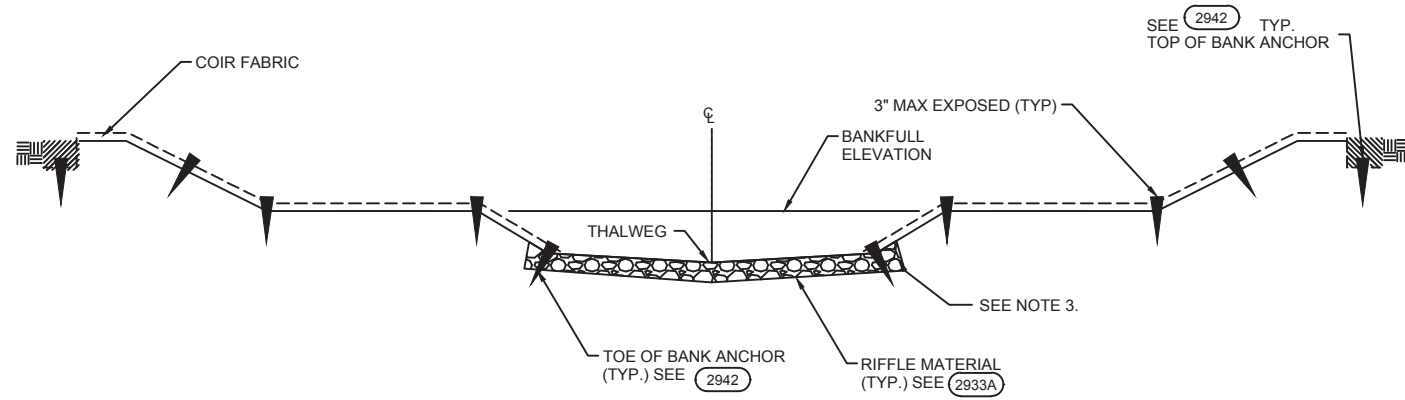


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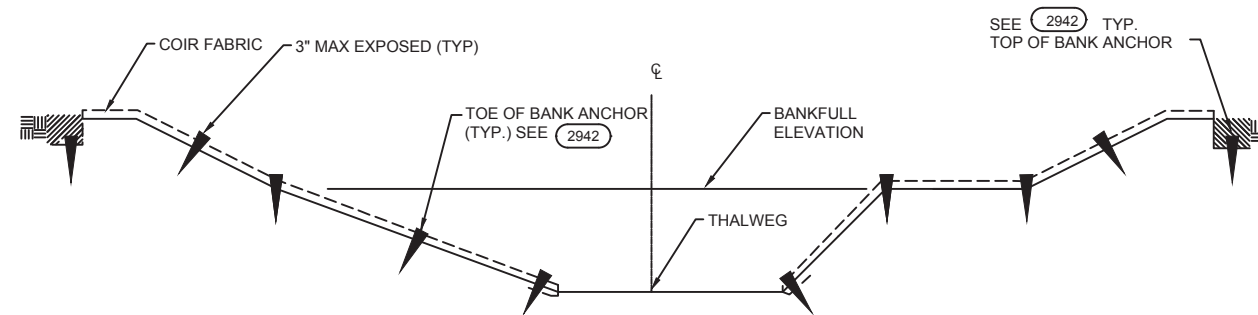
**TOE WOOD PROTECTION**

DATE: MAY 2014 SHEET: 2944

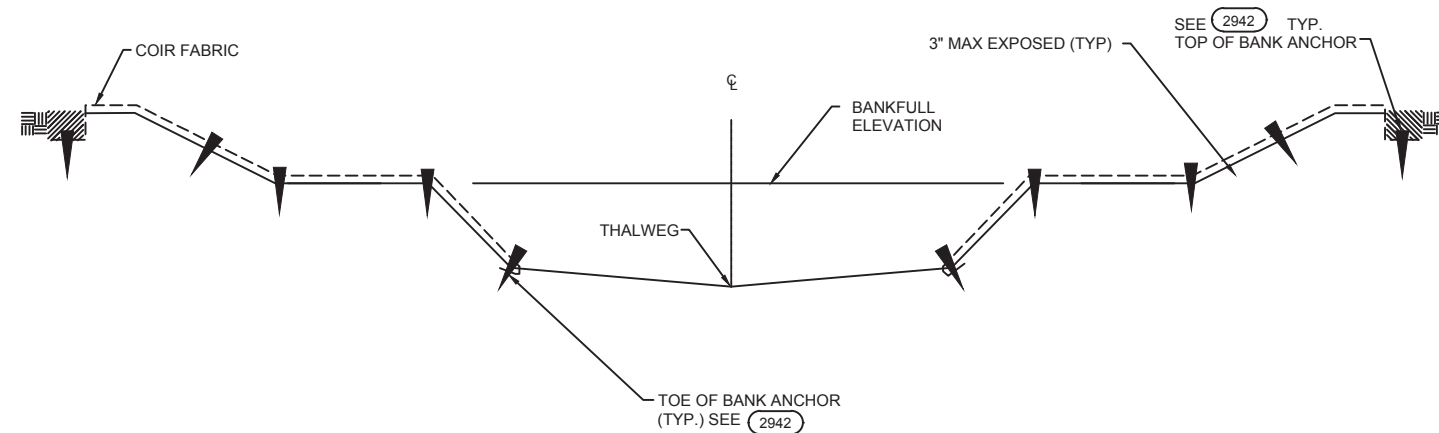




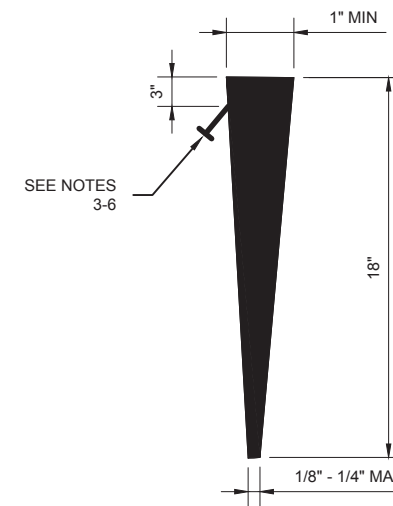
**1** TYPICAL COIR FIBER MATTING - RIFFLE  
NTS



**2** TYPICAL COIR FIBER MATTING - SKEWED POOL  
NTS (RIGHT SKEW SHOWN. LEFT SKEW ROTATED ABOUT CL)



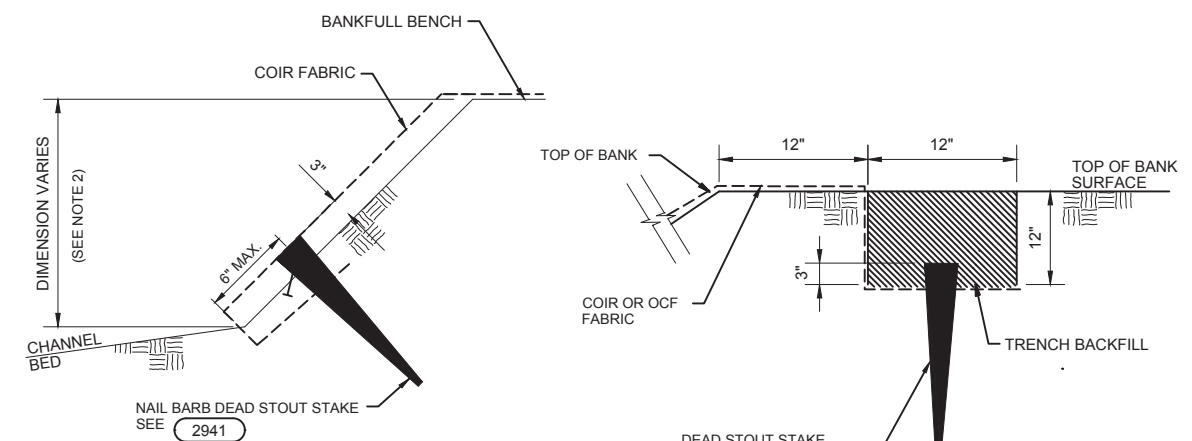
**3** TYPICAL COIR FIBER MATTING - CENTER POOL  
NTS



**NOTES:**

1. DEAD STOUT STAKES TO BE USED FOR SECURING ALL COIR FABRIC SHALL HAVE MINIMUM DIMENSIONS OF 1" X 1.25" X 18" AND SHALL BE FASHIONED FROM UNTREATED PINE OR HARDWOOD.
2. DEAD STOUT STAKES TO BE USED FOR SECURING ALL COIR FABRIC. STAPLES OR FASTENERS (METAL OR OTHERWISE) SHALL NOT BE USED FOR SECURING COIR FABRIC.
3. NAIL BARB STAKES REQUIRED IN THE TOE OF BANK ANCHOR ROW.
4. NAIL HEAD DIAMETER SHALL BE  $\geq 0.2$  INCHES, PROTRUDING 2" FROM DEAD STOUT STAKE.
5. NAIL SHALL ANGLE DOWNWARD AS SHOWN TO PRODUCE A "BARB" EFFECT.
6. DRIVE STAKE INTO GROUND SUCH THAT HEAD OF NAIL CATCHES ON COIR FABRIC AND BASE OF BARB IS FLUSH WITH THE GROUND.

**DEAD STOUT STAKE**  
NTS (2941)



**TOE OF BANK ANCHOR**

**NOTES:**

1. DETAIL IS SHOWN FOR RIGHT BANK (LOOKING DOWNSTREAM) INSTALLATION. REVERSE FOR LEFT BANK INSTALLATION. CLEAN SOIL BACKFILL SHALL BE USED TO SECURE DEAD STOUT STAKES AND FABRIC INTO THE SOIL.
2. SEE CONTRACT DRAWINGS FOR LENGTH OF COIR FABRIC WITHIN CHANNEL AND DEAD STOUT STAKE SPACING.

**TOP OF BANK ANCHOR**

**COIR FABRIC ANCHORS**  
NTS (2942)

**NOTES:**

1. COIR FABRIC SHALL BE INSTALLED ON ALL BANKS IMMEDIATELY AFTER GRADING. DIRT SHALL BE ROUGHENED BY HARD-TINE RAKE, SOIL AMENDED, SEEDED WITH TEMPORARY AND PERMANENT SEED MIXES, AND THIN LAYER OF STRAW MULCH SHOULD BE APPLIED PRIOR TO INSTALLING COIR FABRIC. COIR FABRIC SHALL BE LAID IN THE DIRECTION OF FLOW ON CHANNEL BANKS "LOOSE" TO CONFORM TO IRREGULARITIES OF STREAM BANK. REFER TO SPECIFICATIONS FOR DETAILED INSTALLATION GUIDELINES.
2. SECURE COIR FABRIC USING DEAD STOUT STAKES AND STAKING PATTERN SHOWN. REPEAT TOE OF BANK ANCHORS AT 3' SPACING DOWN THE CHANNEL. REPEAT ALL OTHER DEAD STOUT STAKES AT STAGGERED 6' SPACING DOWN THE CHANNEL AND 3' SPACING UP THE BANK SLOPES.
3. RIFFLE MATRIX SHALL BE INSTALLED FOLLOWING COIR FABRIC STAKING AND TOE OF BANK ANCHOR INSTALLATION. RIFFLE MATRIX EXTEND A MIN OF 1/3 UPSLOPE BEYOND TOE OF BANK ANCHORS FOR FULL LENGTH OF RIFFLE.

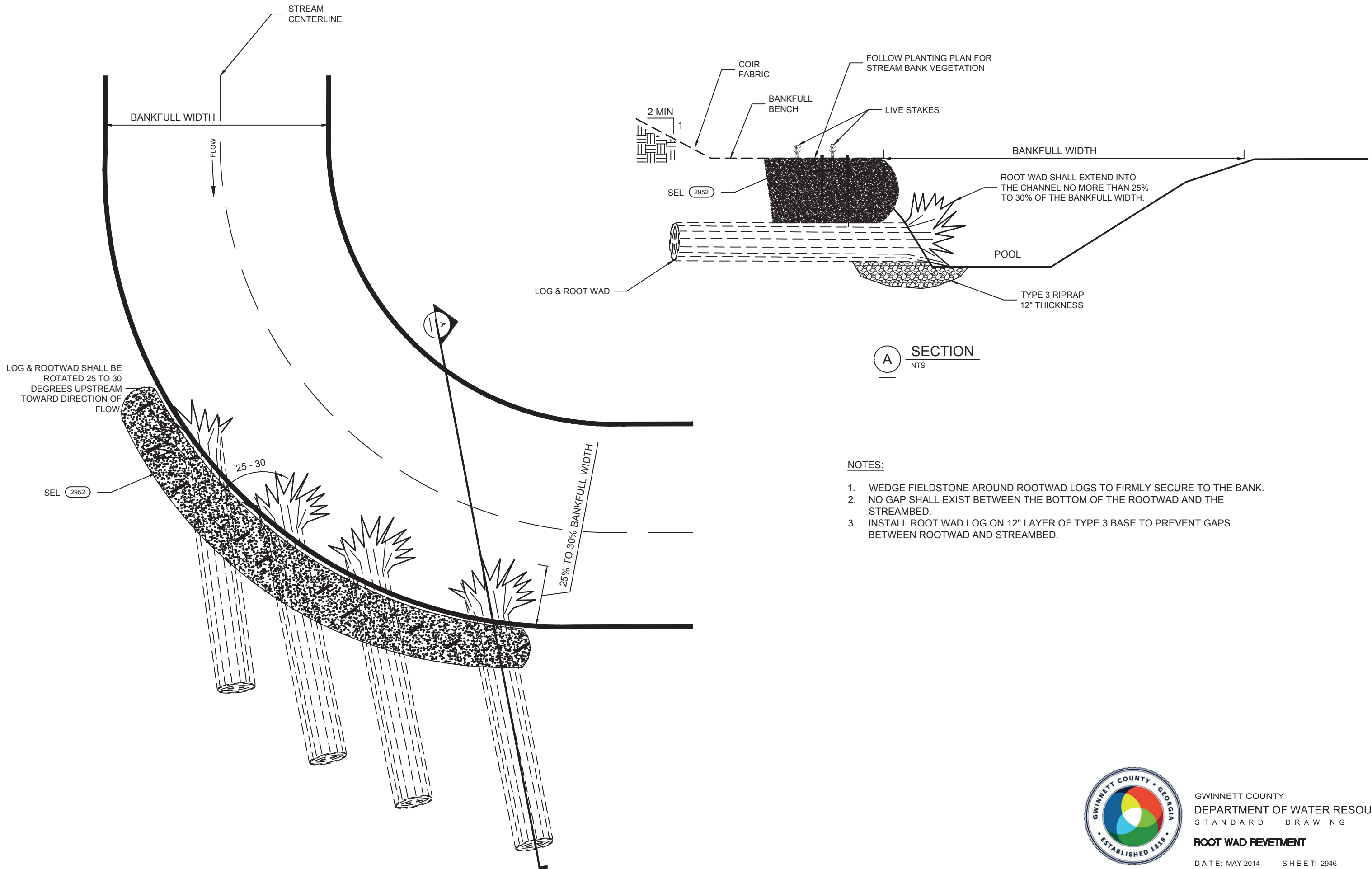


GWINNETT COUNTY  
DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

**TYPICAL COIR FIBER MATTING**

DATE: MAY 2014 SHEET: 2945





LOG & ROOTWAD SHALL BE ROTATED 25 TO 30 DEGREES UPSTREAM TOWARD DIRECTION OF FLOW

SEL 2952

25 - 30

25% TO 30% BANKFULL WIDTH

COIR FABRIC  
BANKFULL BENCH  
LIVE STAKES  
FOLLOW PLANTING PLAN FOR STREAM BANK VEGETATION

2 MIN

SEL 2952

ROOT WAD SHALL EXTEND INTO THE CHANNEL NO MORE THAN 25% TO 30% OF THE BANKFULL WIDTH.

POOL

TYPE 3 RIPRAP  
12" THICKNESS

A SECTION  
NTS

NOTES:

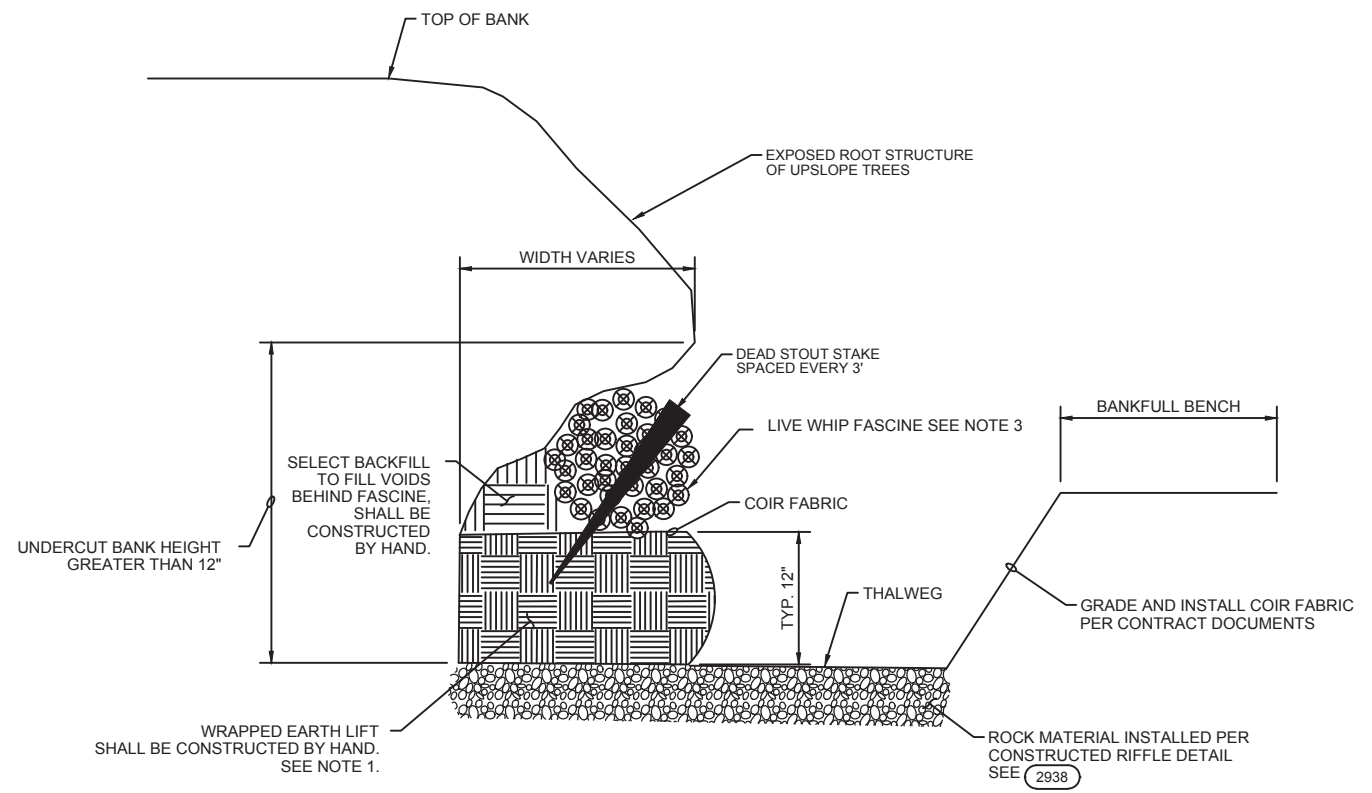
1. WEDGE FIELDSTONE AROUND ROOTWAD LOGS TO FIRMLY SECURE TO THE BANK.
2. NO GAP SHALL EXIST BETWEEN THE BOTTOM OF THE ROOTWAD AND THE STREAMBED.
3. INSTALL ROOT WAD LOG ON 12" LAYER OF TYPE 3 BASE TO PREVENT GAPS BETWEEN ROOTWAD AND STREAMBED.



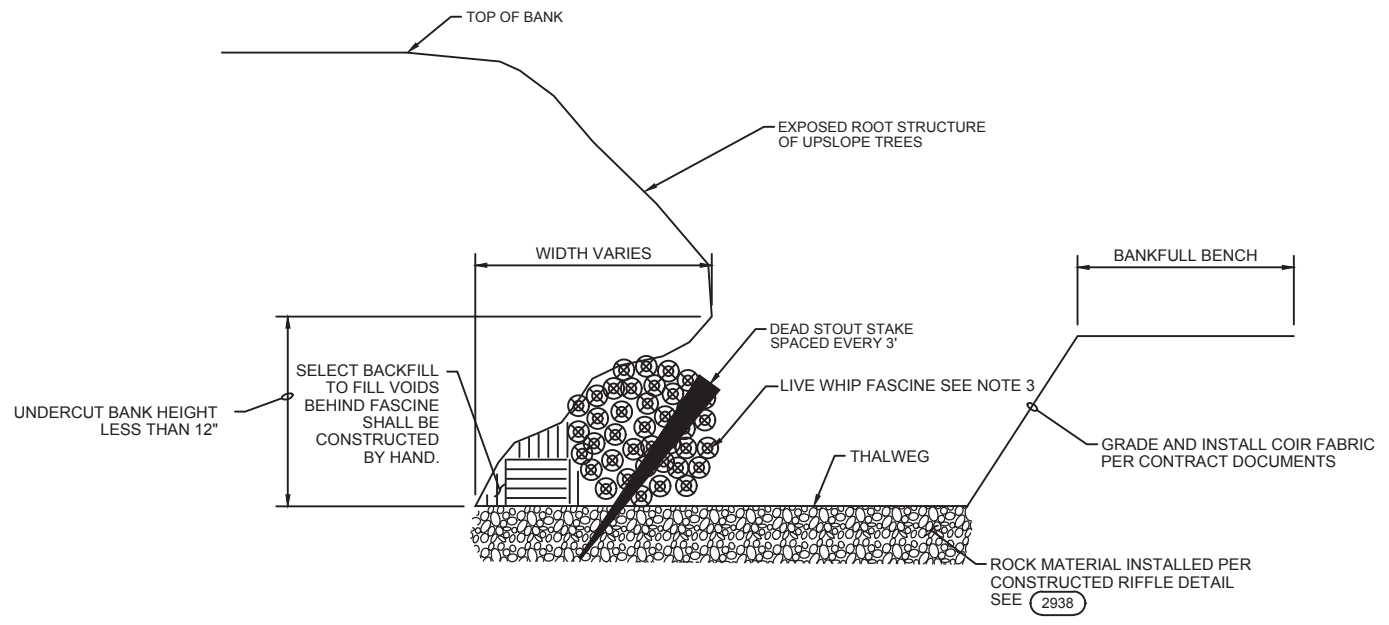
GWINNETT COUNTY  
DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

ROOT WAD REVETMENT

DATE: MAY 2014 SHEET: 2946



**A** SECTION - UNDERCUT BANK GREATER THAN 12"  
NTS



**B** SECTION - UNDERCUT BANK LESS THAN 12"  
NTS

BANK STABILIZATION DIMENSION TABLE

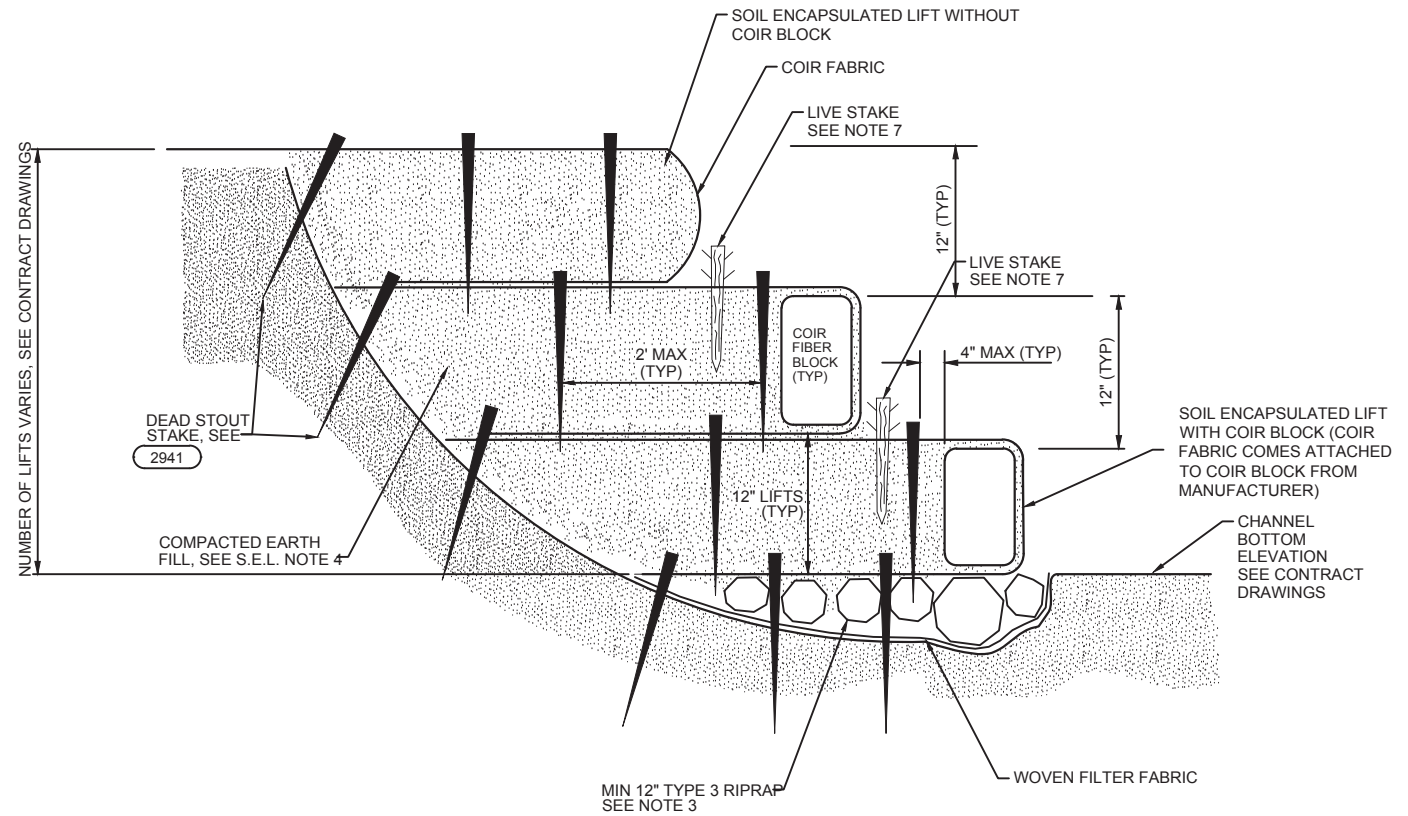
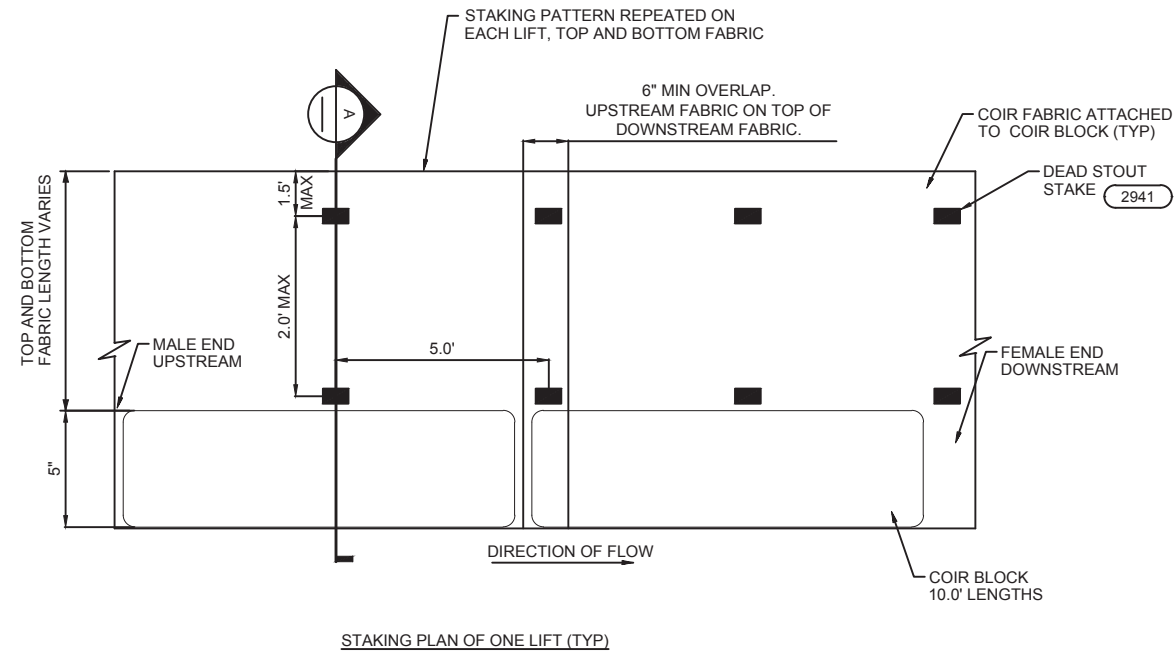
UNDERCUT BANK TYPE	APPROX. START STATION	APPROX. END STATION	TOTAL LENGTH (LF)
UNDERCUT BANK GREATER THAN 12"	##+##	##+##	##
UNDERCUT BANK LESS THAN 12"	##+##	##+##	##

NOTES:

1. INSTALL WRAPPED EARTH LIFT PER S.E.L. DETAIL (2952). SHALL BE CONSTRUCTED BY HAND.
2. FASCINE BANK STABILIZATION SHALL BE PERFORMED TO PRESERVE THE EXPOSED ROOT STRUCTURE OF UPSLOPE TREES.
3. FASCINE TO BE BUNDLED WITH 4 - 6 FOOT LENGTHS OF LIVE WHIPS. FASCINE BUNDLES SHALL BE 9" - 12" IN DIAMETER AND WRAPPED WITH TWINE. SHALL BE INSTALLED BY HAND.

**1** FASCINE BANK STABILIZATION DETAILS  
NTS





**A SECTION**  
NTS

**STAKING PLAN NOTES:**

1. STAKES WILL BE SPACED ACROSS THE LENGTH OF COIR BLOCK. LEAVE AT LEAST 2" OF THE DEAD STAKE ABOVE GROUND.
2. INSERT MALE END OF SECOND COIR BLOCK INTO FEMALE END (DOWNSTREAM END) OF COIR BLOCK AND DRIVE STAKES THROUGH OVERLAPPING FABRICS AS SHOWN. ADD ADDITIONAL BLOCKS UNTIL THE DESIGN LENGTH IS ACHIEVED.
3. BACKFILL BOTTOM AND BACK OF COIR BLOCKS AND COMPACT PER INSTALLATION NOTES.
4. REPEAT STEPS AS NECESSARY UNTIL DESIRED HEIGHT IS ACHIEVED.

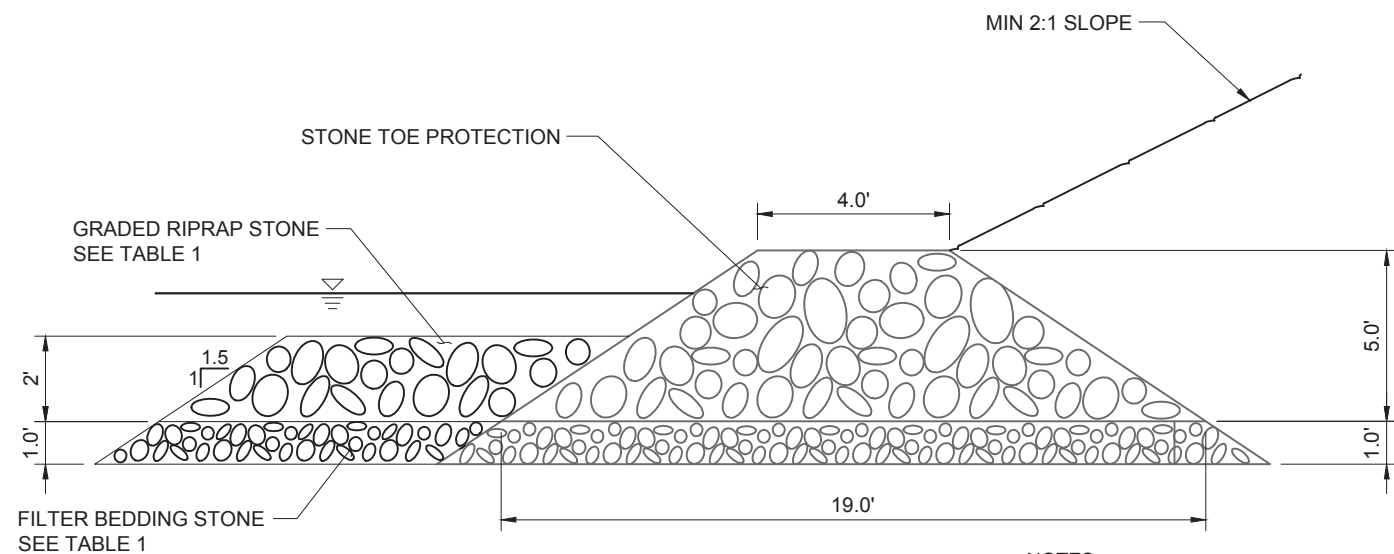
**S.E.L. INSTALLATION NOTES:**

1. S.E.L. ARE TO BE CONSTRUCTED WITH A PREFABRICATED COIR BLOCKS TO MATCH DESIGN SLOPE AND TO PROVIDE OVERLAP OF FABRIC FOR PROPER INSTALLATION OF STAKES OR AS DIRECTED BY GCDWR. SEE STAKING PLAN OF LIFT. BEFORE INSTALLING S.E.L., CLEAN AND GRADE BASE OF PROPOSED BANK. INSTALLATION SHALL BE PER MANUFACTURER'S RECOMMENDATIONS
2. THE S.E.L. IS INSTALLED IN A SERIES OF INDIVIDUAL LIFTS (12" HIGH) WITH EACH SUCCESSIVE LIFT INSTALLED DIRECTLY ON TOP OF AND OFFSET LANDWARD FROM THE PREVIOUS LIFT. EACH SUCCESSIVE LIFT WILL BE INSTALLED DIRECTLY ON TOP OF AND OFFSET LANDWARD FROM THE PREVIOUS LIFT AS SHOWN.
3. TYPE 3 RIP-RAP WILL BE USED TO STABILIZE UNCONSOLIDATED AND/OR WET SOILS UNDERNEATH THE LOWEST LIFT. RIP-RAP WILL BE PUSHED INTO THE FILTER FABRIC AND SOIL WITH THE BOTTOM OF THE BACKHOE BUCKET. RIPRAP AND FILTER FABRIC SHALL NOT EXTEND ABOVE CHANNEL BOTTOM ELEVATION.
4. COMPACT EACH LAYER OF BACKFILL, IN 6" MAXIMUM LIFTS, TO 90% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D-698) AND / OR FILTER FABRIC.
5. SOIL ENCAPSULATED LIFTS SHALL BE INSTALLED WITH COIR BLOCK UNLESS OTHERWISE NOTED IN CONTRACT DRAWINGS OR DIRECTED BY GCDWR..
6. AFTER EACH LIFT HAS BEEN COMPACTED, BUT PRIOR TO COVERING WITH COIR FABRIC ATTACHED TO BLOCK, BROADCAST APPLY A LAYER OF SEED OVER THE EXPOSED FACE OF THE S.E.L., INCLUDING THE COIR BLOCK. AFTER SEEDING, COVER WITH COIR FABRIC AND STAKE AS SHOWN. SEE CONTRACT DRAWINGS FOR PLANTING SCHEDULE
7. PLACE LIVE STAKES IN S.E.L. ACCORDING TO PLANTING SCHEDULES IN CONTRACT DRAWINGS.

**S.E.L DIMENSION TABLE**

CHANNEL BANK	APPROXIMATE UPSTREAM STATION	APPROXIMATE DOWNSTREAM STATION	APPROXIMATE NO. OF LIFTS		APPROXIMATE S.E.L. LENGTH (LF)
			S.E.L. WITH COIR BLOCK	S.E.L. WITHOUT COIR BLOCK	





**NOTES:**

1. BENDWAY WEIRS SHALL BE INSTALLED AS SHOWN IN CONTRACT DRAWINGS.
2. BENDWAY WEIRS SHALL BE CONSTRUCTED USING 1' DEPTH OF FILTER BEDDING STONE AND 2' DEPTH OF WELL GRADED RIPRAP AS DETAILED IN TABLE 1 AND WITH A D100 OF 2'.
3. THE CREST OF EACH BENDWAY WEIR SHALL BE 4' IN WIDTH WITH 1.5:1 SIDE SLOPES.
4. ANGLE OF BENDWAY WEIRS WITH RESPECT TO THE STONE TOE PROTECTION SHALL BE PER THE CONTRACT DRAWINGS AS DIRECTED BY GCDWR.
5. LIVE WHIPS AND LIVE POLES TO BE INSTALLED WITH STONE KEY AND STONE TOE PROTECTION PER THE CONTRACT DRAWINGS OR AS DIRECTED BY GCDWR.

**STONE TOE PROTECTION**

**STONE KEY NOTES:**

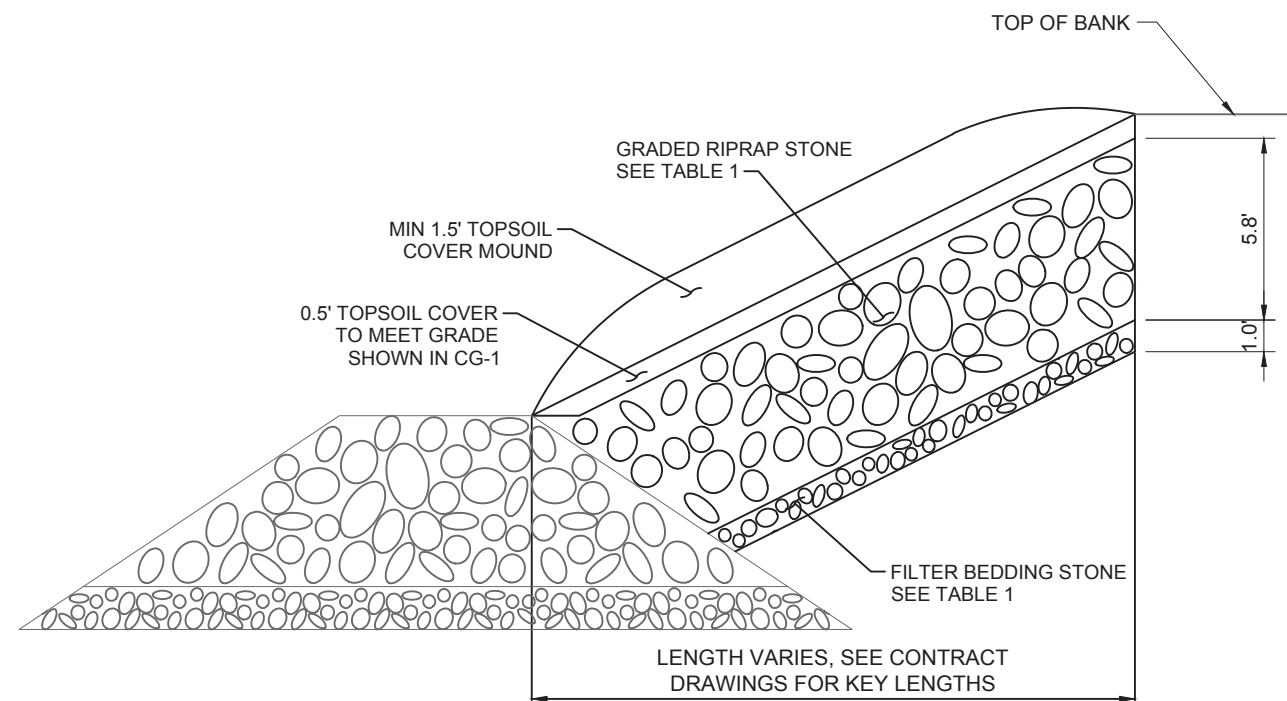
1. VOIDS IN GRADED RIPRAP SHALL BE FILLED WITH FILTER BEDDING STONE THEN FILLED WITH SOIL.
2. COIR FIBER MATTING SHALL BE USED AS GROUND COVER FOR STONE KEYS OR AS INDICATED IN THE CONTRACT DRAWINGS. COIR FABRIC SHALL BE KEYED IN VERTICALLY A MINIMUM OF 1' ON SIDES OF KEY TRENCH.
3. EXTEND TOP SOIL COVER MOUND ON BOTH SIDES OF THE STONE KEY, A MINIMUM OF 3% TO DIRECT SHEET FLOW AWAY FROM STONE KEY.

**STONE TOE PROTECTION NOTES:**

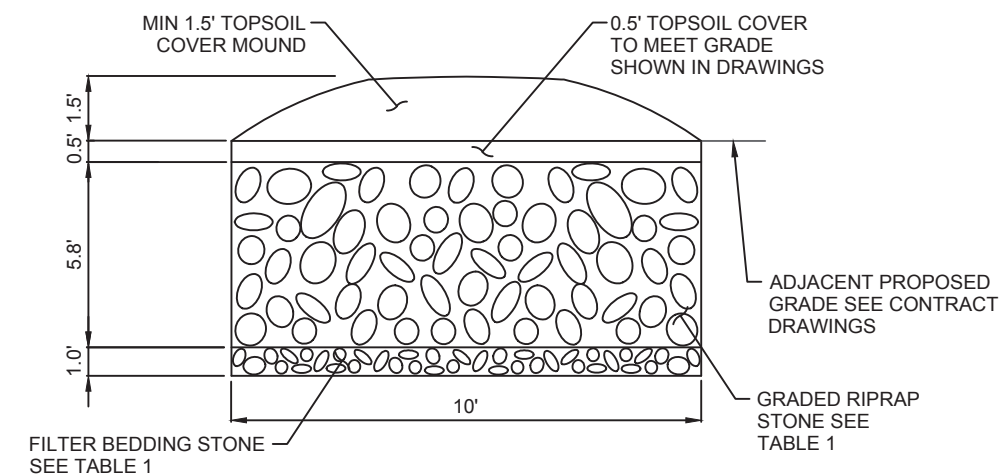
1. ALL STONE USED SHALL BE WELL GRADED, WASHED CLEAN MATERIAL. DENSITY OF ALL STONE SHALL BE 165 LB / CU FT OR AS APPROVED BY GCDWR.
2. ALL STONES SHALL HAVE WIDTH GREATER THAN 1/3 THE LENGTH.
3. CONTRACTOR SHALL SUBMIT INFORMATION FOR STONE MATERIAL SUPPLIER, STONE GRADATION CURVES, AND TEST RESULTS FOR MATERIAL DENSITY FOR GCDWR APPROVAL PRIOR TO DELIVERING MATERIAL TO SITE.
4. STONE TOE PROTECTION SHALL CONSIST OF APPROXIMATELY 60 CUBIC FEET OF GRADED RIPRAP PER LINEAR FOOT OF BANK. IF NECESSARY TO ALTER STONE TOE PROTECTION DIMENSIONS, COORDINATE WITH GCDWR TO PRESERVE STONE VOLUME PER LINEAR FOOT.

**TABLE 1: STONE GRADATIONS**

PERCENT BY VOLUME	GRADED RIPRAP	FILTER BEDDING STONE
50	TYPE 1 RIPRAP	NSA R-2 STONE
50	TYPE 3 RIPRAP	NO. 57 STONE



**STONE KEY - PROFILE VIEW**



**STONE KEY - SECTION VIEW**

**STONE TOE PROTECTION, STONE KEY AND BENDWAY WEIR DETAILS**

NTS

(REVERSE FOR OPPOSITE BANK)

2953

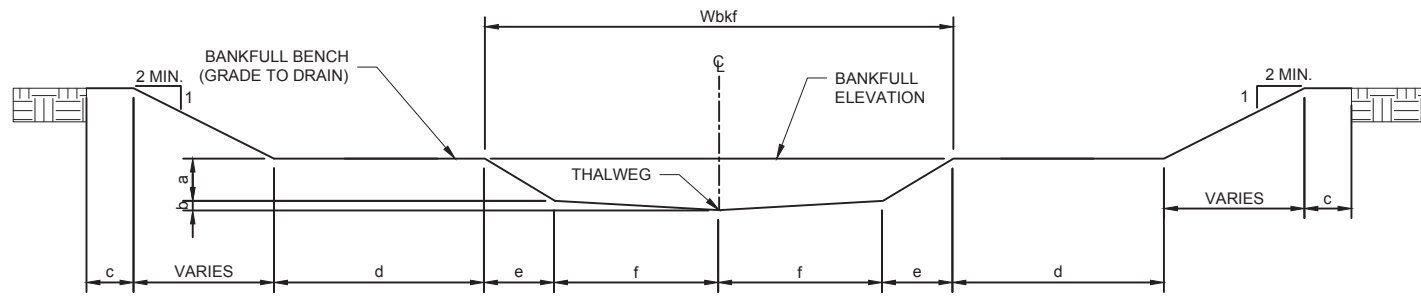


GWINNETT COUNTY  
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STANDARD DRAWING

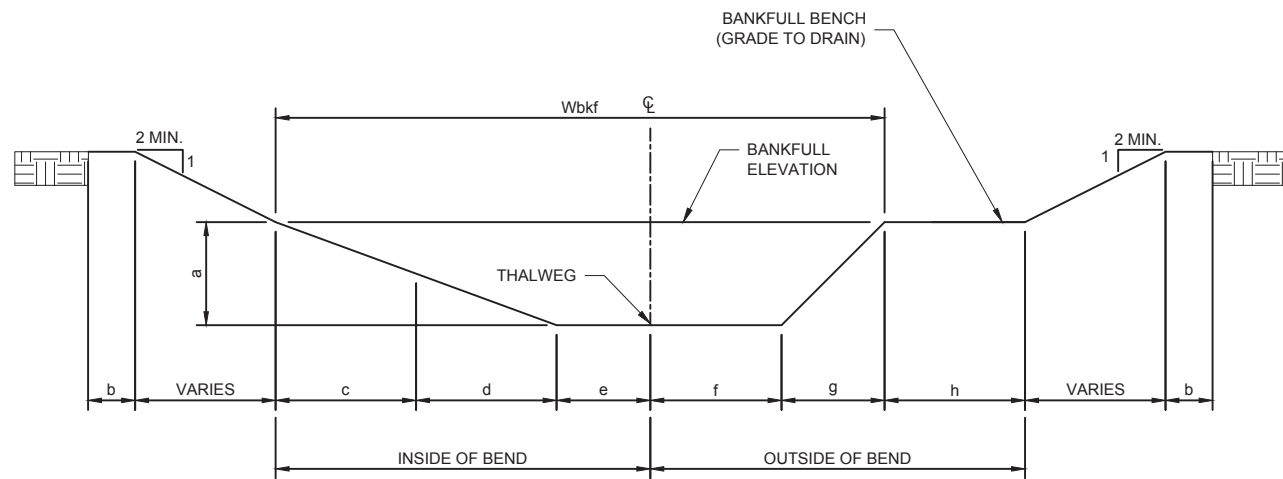
**STONE TOE PROTECTION / BENDWAY WEIR**

DATE: MAY 2014 SHEET: 2953

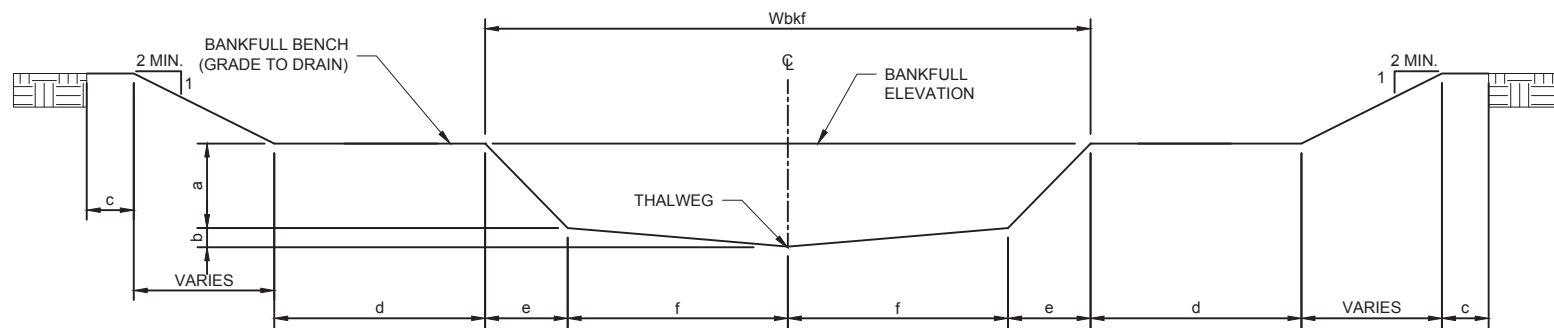




**1** TYPICAL RIFFLE CROSS SECTION  
NTS



**2** TYPICAL SKEWED POOL CROSS SECTION  
NTS (RIGHT SKEW SHOWN. LEFT SKEW ROTATED ABOUT CL)



**3** TYPICAL CENTER POOL CROSS SECTION  
NTS

**NOTES:**

1. TYPICAL CROSS SECTION VERTICAL CONTROL SHALL BE ABOUT THE THALWEG POINT PER THE STREAM PROFILE.
2. TYPICAL CROSS SECTION VIEWS ARE ORIENTATED AS IF LOOKING DOWNSTREAM.
3. TYPICAL RIFFLE SECTIONS SHALL BE LOCATED AT "R" STATIONS, TYPICAL RUN SECTIONS SHALL BE LOCATED AT "N" STATIONS AND TYPICAL POOL SECTIONS SHALL BE LOCATED AT THE "P" STATIONS AS SHOWN IN THE CONTRACT DRAWINGS.
4. CONTRACTOR SHALL MAKE SMOOTH TRANSITIONS BETWEEN ALL SECTIONS.
5. GRADING ABOVE BANKFULL BENCH SHALL BE CONDUCTED AS SHOWN IN THE CONTRACT DRAWINGS. SLOPES EXTENDING TO EXISTING GRADE BEYOND THE BANKFULL BENCH SHALL BE NO STEEPER THAN 2H:1V UNLESS INDICATED IN THE CONTRACT DRAWINGS TO BE STABILIZED WITH S.E.L.

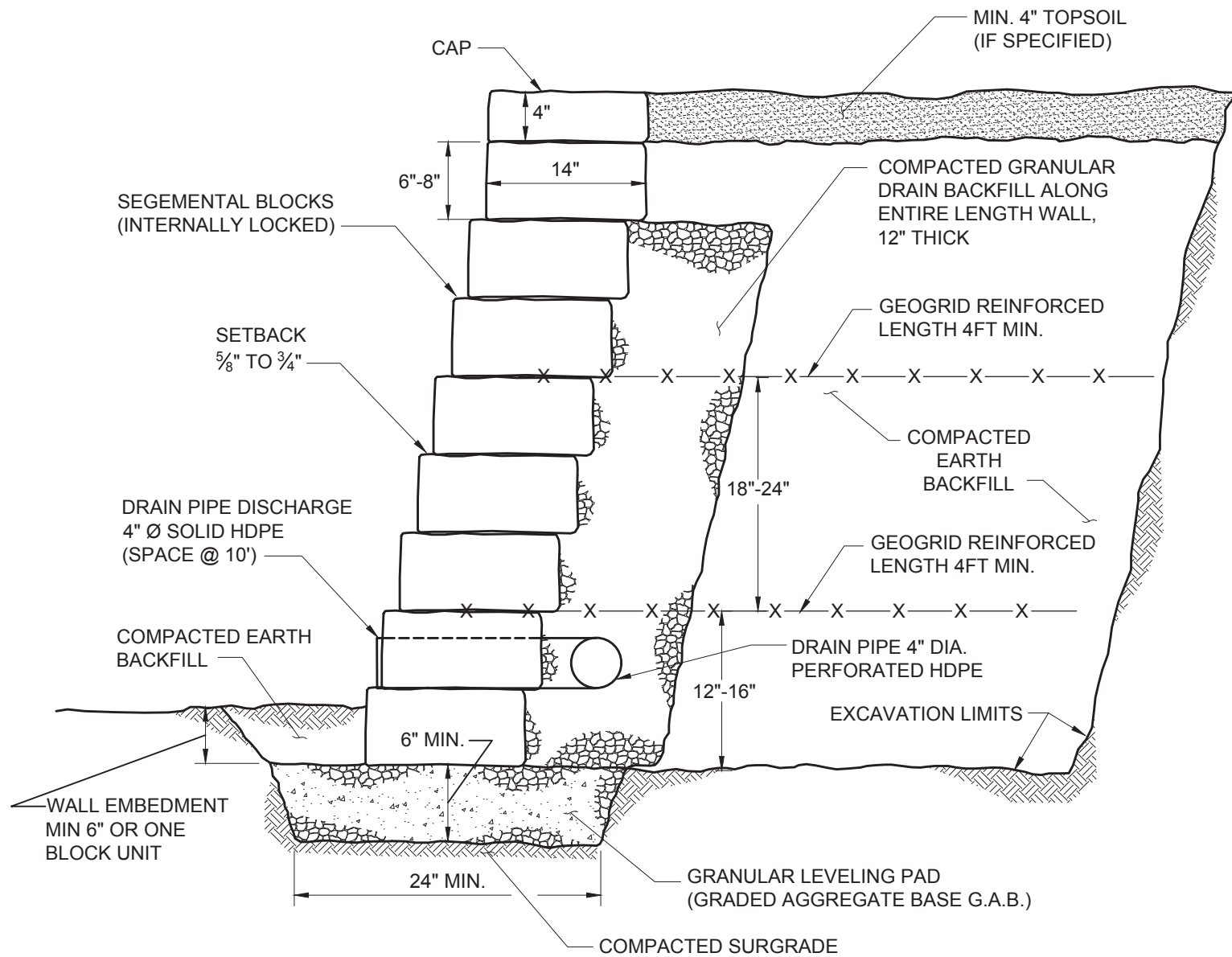
CROSS SECTION	Wbkf	a	b	c	d	e	f	g	h
1									
2									
3									



GWINNETT COUNTY  
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STANDARD DRAWING

**TYPICAL CHANNEL CROSS SECTION**

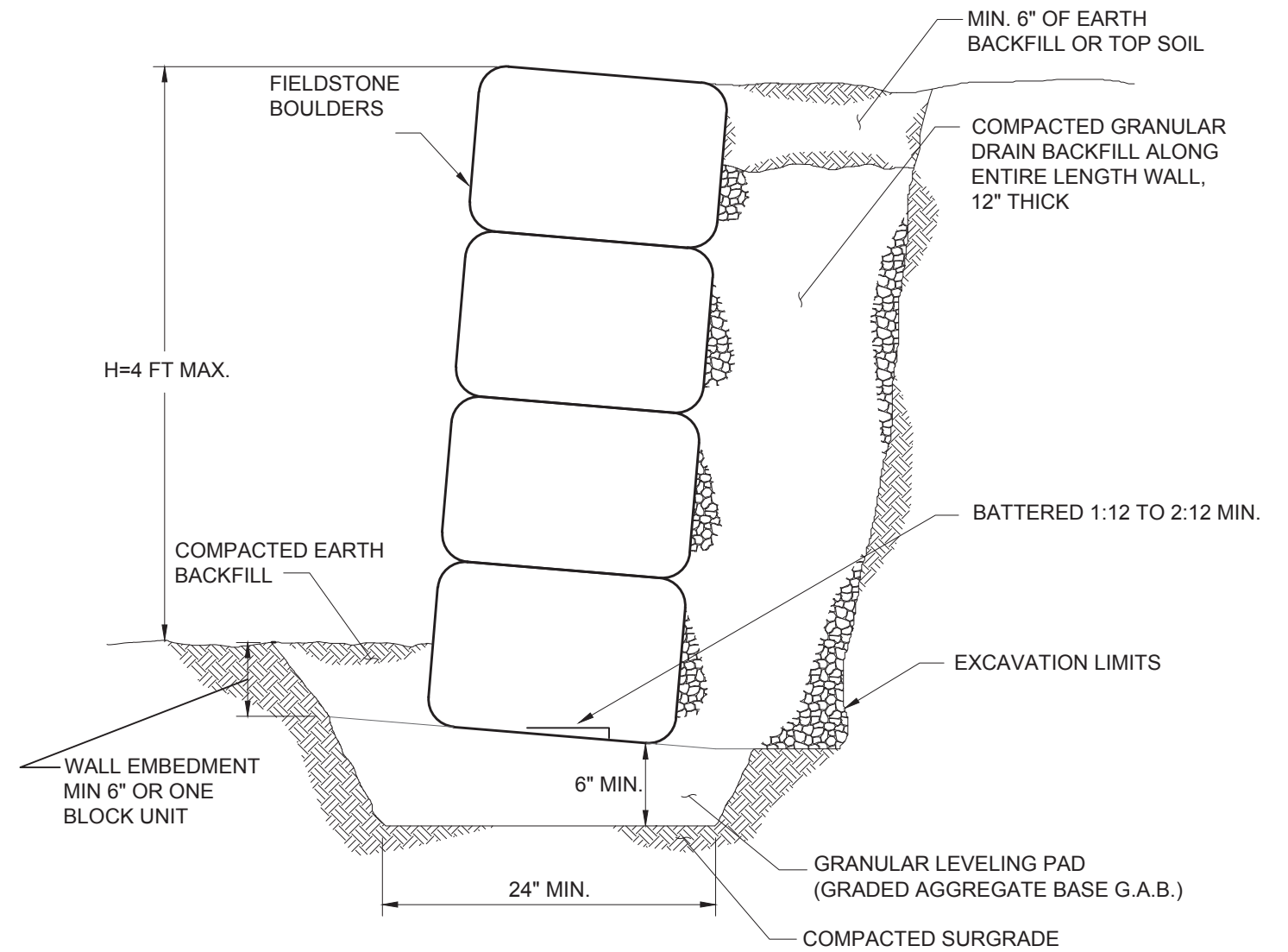
DATE: MAY 2014 SHEET: 2954



**NOTES:**

1. FOR PRODUCTS, MATERIALS, AND CONSTRUCTION SPECIFICATION REFER TO SECTION 32 32 23, SEGMENTAL WALL.
2. FOR WALLS OVER 3 FEET HIGH INSTALL PERFORATED DRAIN PIPE ALONG ENTIRE LENGTH WITH SOLID DISCHARGE PIPES SPACED AT EVERY 10FT.
3. FOR WALLS OVER 3 FEET HIGH INSTALL TWO LEVELS OF GEOGRID REINFORCING.

**MODULAR BLOCKS WALL**  
NTS



**NOTES:**

1. FOR PRODUCTS, MATERIALS, AND CONSTRUCTION SPECIFICATION REFER TO SECTION 32 32 23, SEGMENTAL WALL.

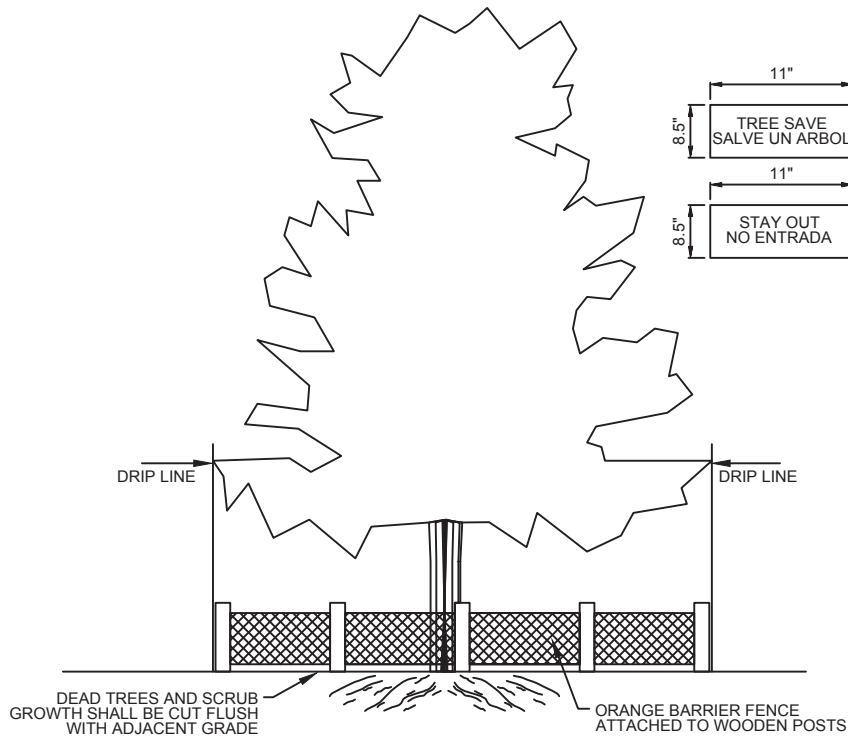
**FIELDSTONE BOULDERS GRAVITY WALL**  
NTS



GWINNETT COUNTY  
DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

**SEGMENTAL WALL**

DATE: MAY 2014 SHEET: 2960



NOTES:

1. NO SOIL DISTURBANCE OR COMPACTION, CONSTRUCTION MATERIALS, TRAFFIC, TRENCHING, BURIAL PITS OR OTHER LAND DISTURBING ACTIVITY ARE ALLOWED IN THE TREE PROTECTION ZONE.
2. ORANGE BARRIER FENCE SHALL EXTEND AROUND THE TREES WITH A RADIUS EQUAL TO OR GREATER THAN THE DRIP LINE.
3. TYPICAL DRIP LINE DIAMETER IS 1 FOOT PER 1 INCH TREE DIAMETER (I.E. TREE DIAMETER = 12 IN, DRIP LINE DIAMETER = 12 FT)
3. ALL ORANGE BARRIER FENCE SHALL BE INSTALLED PRIOR TO ANY GRADING, CONSTRUCTION OR OTHER LAND-DISTURBING ACTIVITY. THEY SHALL BE CONSTRUCTED USING ORANGE SAFETY FENCING ON WOODEN POSTS.
4. FENCING MAY BE PLASTIC OR FABRIC.
5. LAMINATED SIGNS TO BE SECURELY ATTACHED TO ORANGE BARRIER FENCE AS DIRECTED BY GCDWR. REPLACE IF NEEDED.
6. REMOVE ALL PROTECTION FENCING UPON COMPLETION OF THE PROJECT.
7. GRUBBING SHALL NOT BE ALLOWED UNDER INSIDE THE PROTECTION FENCE.

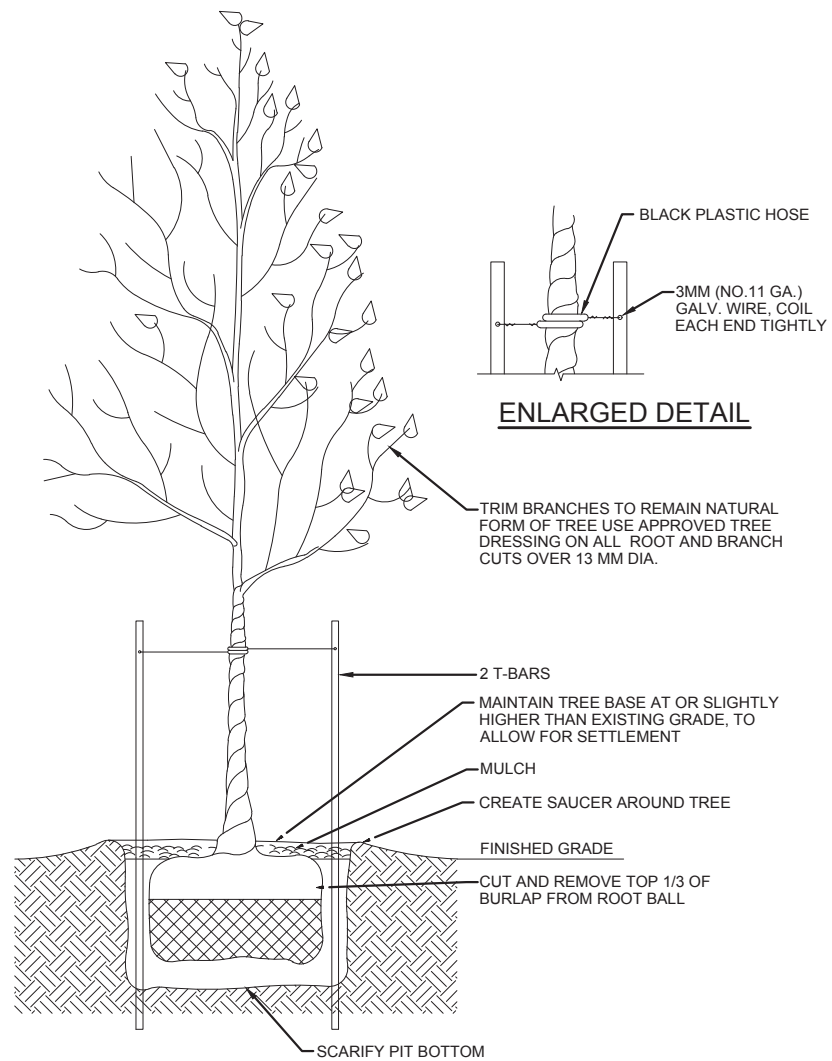

**TREE PROTECTION FENCE**  
 NTS



GWINNETT COUNTY  
 DEPARTMENT OF WATER RESOURCES  
 STANDARD DRAWING

**TREE PROTECTION FENCE**

DATE: MAY 2014 SHEET: 2970



## TYPICAL TREE PLANTING DETAIL

NTS

**NOTES:**

1. EXCAVATE PLANT PIT TO 2 TO 3 TIMES THE WIDTH OF THE ROOT BALL DIAMETER AND AS DEEP AS THE CONTAINER DEPTH.
2. PLANT PITS SHALL BE DUG TO PRODUCE TAPERED SIDES THAT ARE ROUGH AND SOFT WITH FLAT, UNCOMPACTED BOTTOMS. WHEN PITS ARE DUG WITH AN AUGER AND THE SIDES OF THE PIT BECOME GLAZED, THE GLAZED SURFACE SHALL BE SCARIFIED SO THE PLANT PIT SIDES ARE ROUGH AND SOFT.
3. REMOVE PLANT FROM CONTAINER WITHOUT DISTURBING THE ROOT BALL. IF THE PLANT HAS BECOME ROOTBOUND, SCORE THE ROOTS IN 3 TO 4 PLACES WITH A KNIFE. SET PLANT IN THE PIT, CRADLING AND SUPPORTING THE ROOT BALL.
4. BACKFILL PIT WITH AMENDED SOIL A FEW INCHES AT A TIME, FIRING THE SOIL AFTER EACH ADDITION FORM A RIDGE AROUND THE EDGE OF THE PIT TO HOLD WATER. WHEN PLANT IS SET AND BACKFILL HAS BEEN WATER-SETTLED, THE TOP OF THE ROOT BALL SHOULD BE LEVEL WITH FINISH GRADE.
5. APPLY WOOD MULCH IMMEDIATELY AFTER PLANTING.
6. SECURE COIR OR OCF FABRIC AROUND INSTALLED PLANT PER SPECIFICATIONS.

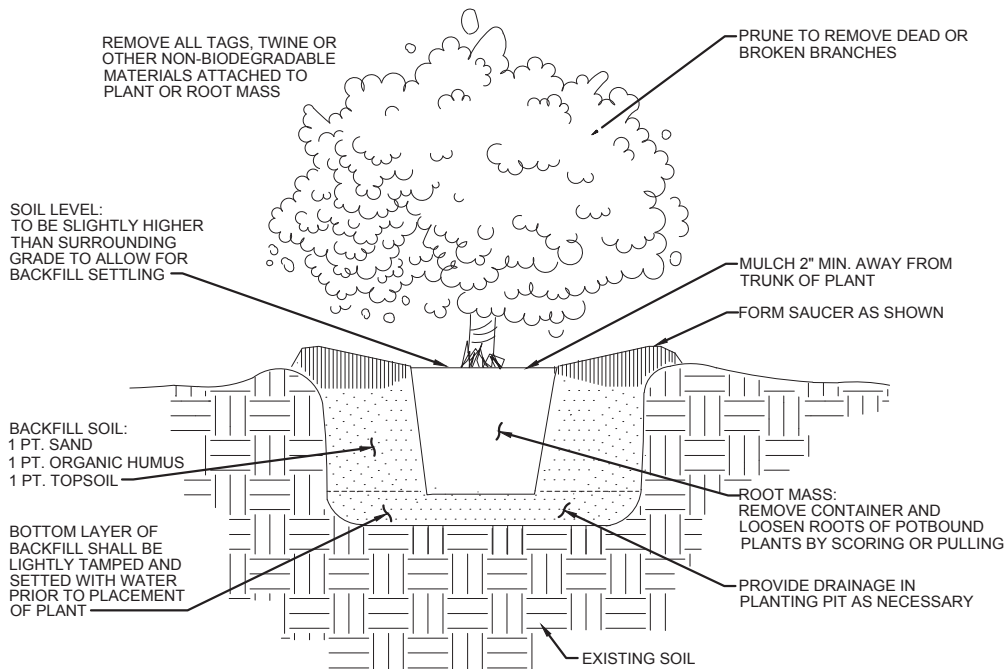


GWINNETT COUNTY  
DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

**CONTAINER GROWN TREE**

DATE: MAY 2014      SHEET: 2971





## TYPICAL SHRUB PLANTING DETAIL

NTS

### NOTES:

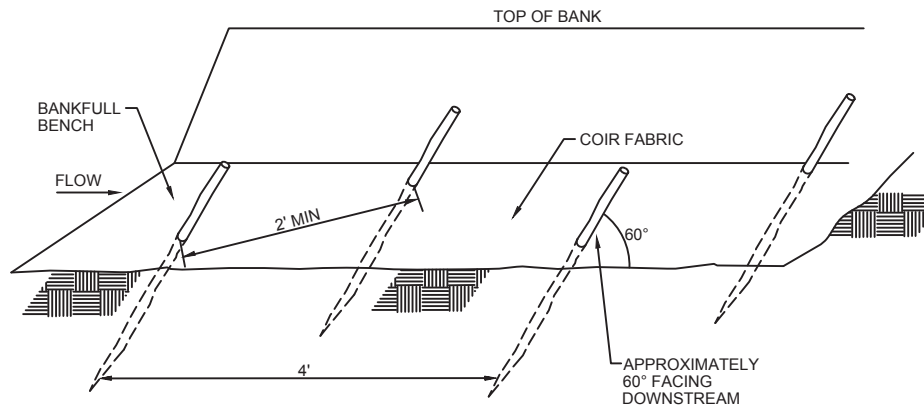
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5. APPLY WOOD MULCH IMMEDIATELY AFTER PLANTING.
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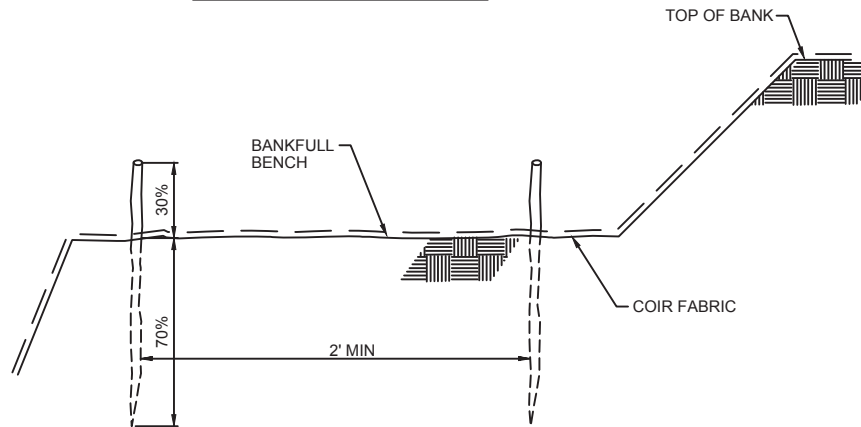
GWINNETT COUNTY  
DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

### **CONTAINER GROWN SHRUB**

DATE: MAY 2014      SHEET: 2972



**FRONT SECTION VIEW**



**CROSS-SECTION VIEW**

**GENERAL NOTES:**

1. LIVE PLANTINGS INVOLVE THE INSERTION OF LIVE, VEGETATIVE CUTTINGS INTO THE GROUND IN A MANNER THAT ALLOWS THE CUTTING TO TAKE ROOT AND GROWN. LIVE PLANTINGS INCLUDE LIVE STAKES, LIVE WHIPS AND LIVE POLES.
2. LIVE PLANTINGS SHOULD BE CUT WITH AN ANGLE ON THE BOTTOM AND FLUSH ON TOP, WITH BUDS ORIENTED UPWARD.
3. INSTALL LIVE PLANTINGS SO THAT 70% OF THE LIVE STAKE IS BELOW THE GROUND AND AT LEAST TWO BUDS REMAIN ABOVE GROUND.

**LIVE STAKES:**

1. LIVE STAKES SHOULD RANGE FROM 1/2" TO 2" DIAMETER AND 2' TO 3' LONG.
2. DRIVE LIVE STAKES INTO THE GROUND WITH A RUBBER Mallet OR MAKE A PILOT HOLE AND INSERT LIVE STAKES INTO IT.
3. INSTALL LIVE STAKES AT A 60° ANGLE WITH THE ANGLE FACING DOWNSTREAM.

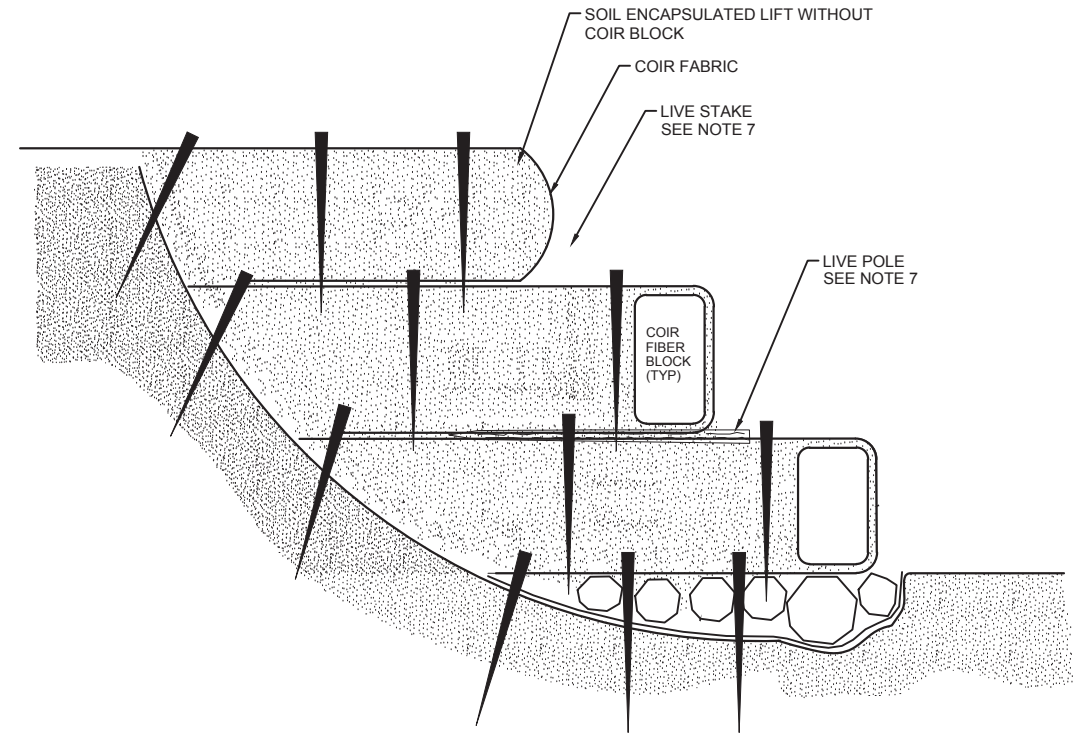
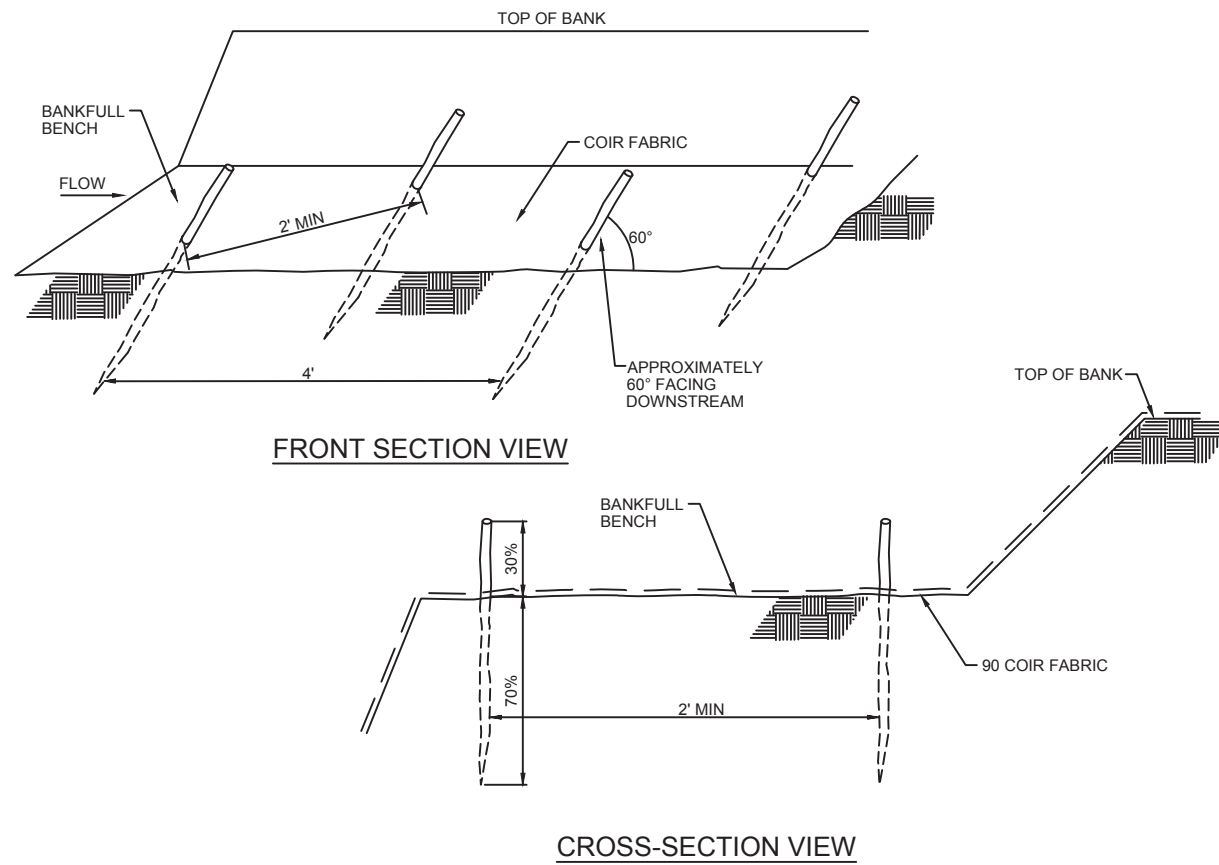
**LIVE POLES:**

1. LIVE POLES SHOULD RANGE FROM 2" TO 3" DIAMETER AND 4' TO 6' LONG.
2. LIVE POLES SHALL BE LAID ANGLED ON THE LANDWARD SLOPE OF STONE TOE PROTECTION AND ANGLED UPRIGHT ON BOTH SIDES OF THE TRENCH EXCAVATED FOR THE STONE TOE PROTECTION KEYS OR AS DIRECTED BY GCDWR.
3. PRIOR TO BACKFILLING AROUND LIVE POLES, A MUD SLURRY SHALL BE USED TO BACKFILL IN THE IMMEDIATE 6" OF EACH LIVE POLE TO ELIMINATE AIR POCKETS AROUND THE BURIED END OF THE LIVE POLE.

**LIVE WHIPS:**

1. LIVE WHIPS SHOULD RANGE FROM 1/2" TO 1" DIAMETER AND 2' TO 3' LONG.
2. LIVE WHIPS SHALL BE LAID ANGLED ON THE LANDWARD SLOPE OF A SOIL ENCAPSULATED LIFT OR AS DIRECTED BY GCDWR.
3. PRIOR TO BACKFILLING AROUND LIVE WHIPS, A MUD SLURRY SHALL BE USED TO BACKFILL IN THE IMMEDIATE 6" OF EACH LIVE WHIP TO ELIMINATE AIR POCKETS AROUND THE BURIED END OF THE LIVE WHIP.





**A** SECTION  
NTS

GENERAL NOTES:

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**TYPICAL LIVE PLANTING**

NTS 2973



GWINNETT COUNTY  
DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

**TYPICAL LIVE STAKING**

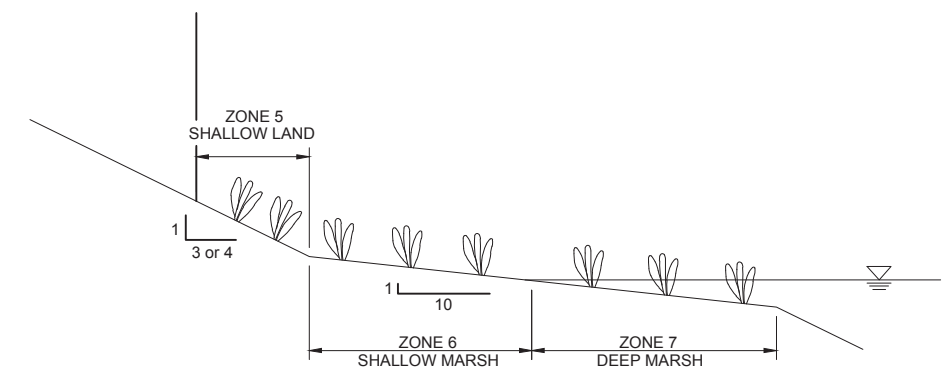
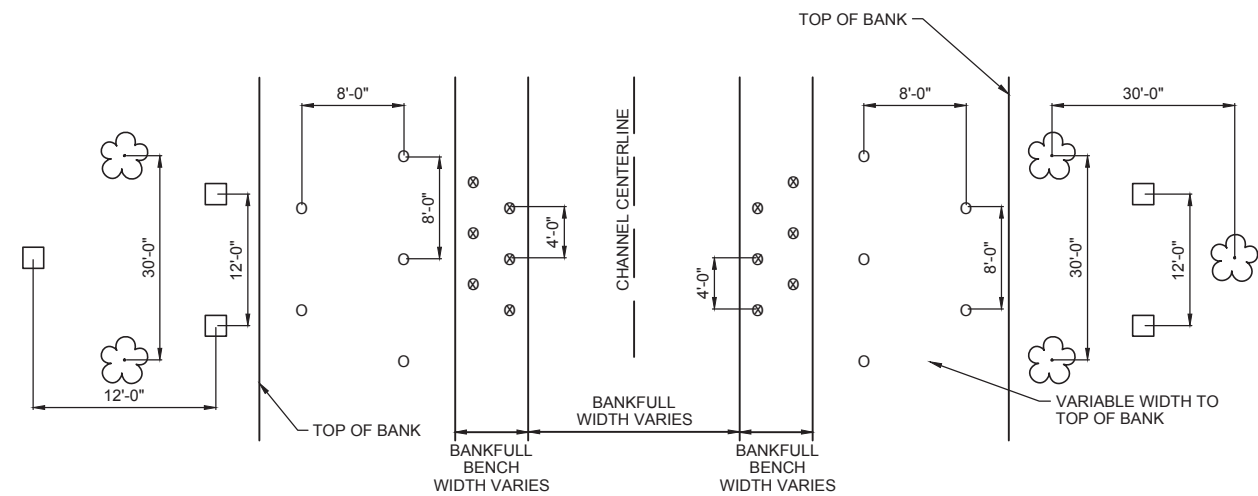
DATE: MAY 2014 SHEET: 2973

**NOTES:**

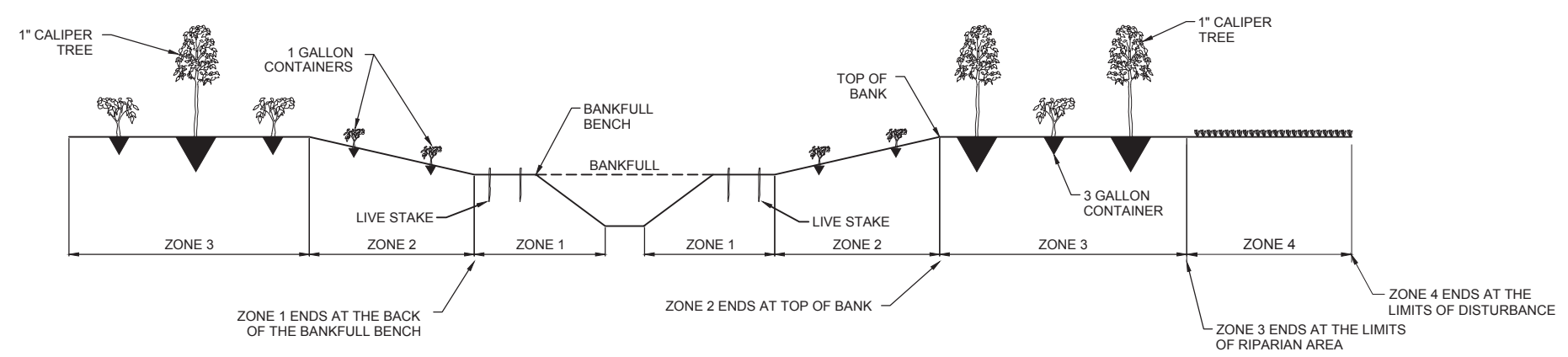
1. ALL SYMBOLS AND PATTERNS ARE APPROXIMATE AND NOT TO SCALE.
2. SEE CONTRACT DRAWINGS FOR PLANTING ZONE BOUNDARIES.
3. WITHIN ZONE 1, LIVE STAKES ARE PLANTED ONLY ON THE BANKFULL BENCH. THE SEED IS SEWN TO THE INNER LIMITS OF THE COIR FABRIC.
4. INSTALL LIVE STAKES ON BANKFULL BENCH IN 2 ROWS, STARTING WITH THE ROW ALONG THE FRONT (INSIDE) EDGE OF THE BENCH. INSTALL THE BACK ROW SO IT IS STAGGERED OFFSET FROM THE FRONT ROW.

**LEGEND**

- O - 1 GALLON CONTAINER
- - 3 GALLON CONTAINER
- 🌱 - 2" PLUG
- ⊗ - LIVE STAKE
- 🌳 - 1" OR 2" CALIPER TREE



**2** TYPICAL STREAM POND DETAIL  
NTS



**1** TYPICAL STREAM PLANTING DETAIL  
NTS



GWINNETT COUNTY  
DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

**TYPICAL PLANTING DETAILS**

DATE: MAY 2014 SHEET: 2974

RIPARIAN BUFFER MIX - ERNMX 178				
COMMON NAME	BOTANICAL NAME	PERCENT	TYPE	QTY
VIRGINIA WILDRYE	ELYMUS VIRGINICUS, PA ECOTYPE	20.0%		
INDIANGRASS	SORGHASTRUM NUTANS, PA ECOTYPE	15.0%		
BIG BLUESTEM	ANDROPOGON GERARDII, 'NIAGARA'	15.0%		
DEERTONGUE	PANICUM CLANDESTINUM	10.0%		
SWITCHGRASS	PANICUM VIRGATUM, 'CARTHAGE', NC ECOTYPE	9.0%		
PARTRIDGE PEA	CHAMAECRISTA FASCICULATA	6.0%		
AUTUMN BENTGRASS	AGROSTIS PERENNANS, PA ECOTYPE	4.0%		
BLUE VERVAIN	VERBENA HASTATA, PA ECOTYPE	4.0%		
OXEYE SUNFLOWER	HELIOPSIS HELIANTHOIDES, PA ECOTYPE	3.0%		
BLACKEYED SUSAN	RUDBECKIA HIRTA, COASTAL PLAIN NC ECOTYPE	3.0%		
BONESET	EUPATORIUM PERFOLIATUM, PA ECOTYPE	2.0%		
GIANT IRONWEED	VERNONIA GIGANTEA	2.0%		
SOFT RUSH	JUNCUS EFFUSUS	2.0%		
COMMON SNEEZEWEED	HELENIUM AUTUMNALE, PA ECOTYPE	1.5%		
BLUE FALSE INDIGO	BAPTISIA AUSTRALIS, SOUTHERN WV ECOTYPE	1.0%		
JOE PYE WEED	EUPATORIUM FISTULOSUM, PA ECOTYPE	1.0%		
GREAT BLUE LOBELIA	LOBELIA SIPHILITICA, PA ECOTYPE	1.0%		
WILD BERGAMOT	MONARDA FISTULOSA, PA ECOTYPE	0.5%		
<b>ZONE 1 - BANKFULL BENCH</b>				
COMMON NAME	BOTANICAL NAME	PLANTING RATE	TYPE	QTY
RIPARIAN BUFFER MIX SEED	ERNMX-178	20 LBS/AC	SQUARE YARDS	
BLACK WILLOW	SALIX NIGRA	4' OC	LIVE STAKE	
SILKY DOGWOOD	CORNUS AMOMUM	4' OC	LIVE STAKE	
ELDERBERRY	SAMBUCUS CANADENSIS	4' OC	LIVE STAKE	
SOFT RUSH	JUNCUS EFFUSUS	1.5' O.C.	2" PLUG	
<b>ZONE 2 - BACK OF BANKFULL BENCH TO TOP OF BANK</b>				
COMMON NAME	BOTANICAL NAME	PLANTING RATE	TYPE	QTY
RIPARIAN BUFFER MIX SEED	ERNMX-178	20 LBS/AC	SQUARE YARDS	
AMERICAN BEAUTYBERRY	CALLICARPA AMERICANA	8' OC	1 GALLON CONTAINER	
MUSCLEWOOD	CARPINUS CAROLINIANA	8' OC	1 GALLON CONTAINER	
SILKY DOGWOOD	CORNUS AMOMUM	8' OC	1 GALLON CONTAINER	
POSSUMHAW	ILEX DECIDUAS	8' OC	1 GALLON CONTAINER	
WINTERBERRY	ILEX VERTICILLATA	8' OC	1 GALLON CONTAINER	
SWEETSPIRE, VIRGINIA	ITEA VIRGINICA	8' OC	1 GALLON CONTAINER	
NORTHERN SPICEBUSH	LINDERA BENZOIN	8' OC	1 GALLON CONTAINER	
ARROWWOOD	VIBURNUM DENTATUM	8' OC	1 GALLON CONTAINER	

ZONE 3 - TOP OF BANK TO LIMITS OF DISTURBANCE				
COMMON NAME	BOTANICAL NAME	PLANTING RATE	TYPE	QTY
TALL FESCUE	SCHEDONORUS PHOENIX	80 LBS/AC	SQUARE YARDS	
SWEETSHRUB	CALYCANTHUS FLORIDUS	12' OC	3 GALLON CONTAINER	
AMERICAN HOLLY	ILEX OPACA	12' OC	3 GALLON CONTAINER	
HIGHBUSH BLUEBERRY	VACCINIUM CORYMBOSUM	12' OC	3 GALLON CONTAINER	
WAX MYRTLE	MORELLA CERIFERA	12' OC	3 GALLON CONTAINER	
RED MAPLE	ACER RUBRUM	30' OC	2" CALIPER TREE	
MUSCLEWOOD	CARPINUS CAROLINIANA	30' OC	2" CALIPER TREE	
EASTERN REDBUD	CERCIS CANADENSIS	30' OC	2" CALIPER TREE	
FLOWERING DOGWOOD	CORNUS FLORIDA	30' OC	2" CALIPER TREE	
<b>ZONE 4 - LAWN GRASS, SEED</b>				
COMMON NAME	BOTANICAL NAME	PLANTING RATE	TYPE	QTY
TALL FESCUE, SEED	SCHEDONORUS PHOENIX	80 LBS/AC	SQUARE YARDS	
<b>ZONE 5 - POND, SHALLOW LAND</b>				
COMMON NAME	BOTANICAL NAME	PLANTING RATE	TYPE	QTY
SWAMP MILKWEED	ACSCLEPIAS INCARNATA	1.5' OC	2" PLUG	
SHALLOW SEDGE	CAREX LURIDA	1.5' OC	2" PLUG	
ROSE MALLOW	HIBISCUS MOSCHEUTOS	1.5' OC	2" PLUG	
LEATHERY RUSH	JUNCUS CORIACEUS	1.5' OC	2" PLUG	
CARDINAL FLOWER	LOBELIA CARDINALIS	1.5' OC	2" PLUG	
<b>ZONE 6 - SHALLOW MARSH</b>				
COMMON NAME	BOTANICAL NAME	PLANTING RATE	TYPE	QTY
FOX SEDGE	CAREX CULPINOIDEA	1.5' OC	2" PLUG	
SOUTHERN BLUE FLAG IRIS	IRIS VIRGINICA	1.5' OC	2" PLUG	
COMMON RUSH	JUNCUS EFFUSUS	1.5' OC	2" PLUG	
SOFTSTEM BULLRUSH	SCHOENOPLECTUS TABERNAEMONTCINI	1.5' OC	2" PLUG	
WOOLGRASS	SCIRPUS CYPERINUS (L.) KUNTH	1.5' OC	2" PLUG	
<b>ZONE 7 - DEEP MARSH</b>				
COMMON NAME	BOTANICAL NAME	PLANTING RATE	TYPE	QTY
ARROW ARUM	PELTANDRA VIRGINICA	1.5' OC	2" PLUG	
PICKERELWEED	PONTERDERIA CORDATA	1.5' OC	2" PLUG	
DUCK POTATO	SAGITTARIA LATIFOLIA	1.5' OC	2" PLUG	

**GENERAL PLANTING NOTES**

1. CONTRACTOR SHALL OBTAIN LATEST EDITION OF THE FOLLOWING DOCUMENTS:

- A. "GUIDELINES FOR RIPARIAN BUFFER RESTORATION", NCDENR-NCEEP ([WWW.NCEEP.NET/NEWS/REPORTS/BUFFERS.PDF](http://WWW.NCEEP.NET/NEWS/REPORTS/BUFFERS.PDF))
- B. "LANDSCAPING WITH NATIVE PLANTS IN THE GEORGIA PIEDMONT" ([WWW.GPS.ORG/PDF/GNPSIS.PDF](http://WWW.GPS.ORG/PDF/GNPSIS.PDF))
- C. "NONNATIVE INVASIVE PLANTS OF SOUTHERN FORESTS" ([WWW.SRS.FS.USDA.GOV/PUBS/VIEWPUB.JSP?INDEX=5424](http://WWW.SRS.FS.USDA.GOV/PUBS/VIEWPUB.JSP?INDEX=5424))
- D. "INVASIVE PLANTS OF GEORGIA'S FORESTS" ([WWW.GAINVASIVES.ORG/PUBS/GFCNEW.PDF](http://WWW.GAINVASIVES.ORG/PUBS/GFCNEW.PDF))

ALL PLANTS SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THESE DOCUMENTS.

- 2. CONTRACTOR SHALL SUBMIT A PLANTING PLAN WITH A RECOMMENDED PLANT LIST TO GCDWR FOR REVIEW PRIOR TO COMMENCING PLANTING. PREFERRED PLANTS ARE SHOWN IN THE PLANTING SCHEDULES. CONTRACTOR SHALL REFER TO "GUIDELINES FOR RIPARIAN BUFFER RESTORATION", AND "LANDSCAPING WITH NATIVE PLANTS IN THE GEORGIA PIEDMONT" FOR PREPARING PLAN. CONTRACTOR MAY SUBSTITUTE OTHER SPECIES FOR THOSE LISTED IN THE PLANTING SCHEDULES IN COORDINATION WITH AND SUBJECT TO REVIEW BY THE GCDWR.
- 3. PLANT DENSITIES, QUANTITIES, AND AREAS SHOWN IN PLANTING SCHEDULES ARE FOR CONVENIENCE ONLY AND MAY NOT BE ACCURATE WITH AS-BUILT CONDITIONS. CONTRACTOR SHALL SUBMIT ESTIMATES FOR PLANT DENSITIES AND PLANTING AREAS IN THE PLANTING PLAN.
- 4. CONTRACTOR SHALL STAKE OUT PLANTING ZONES FOR REVIEW BY GCDWR PRIOR TO INSTALLING PLANTS.
- 5. SEED SHALL BE INSTALLED ON SCARIFIED, BARE GROUND. SEED PER ZONE IS SPECIFIED IN THE PLANTING SCHEDULES.



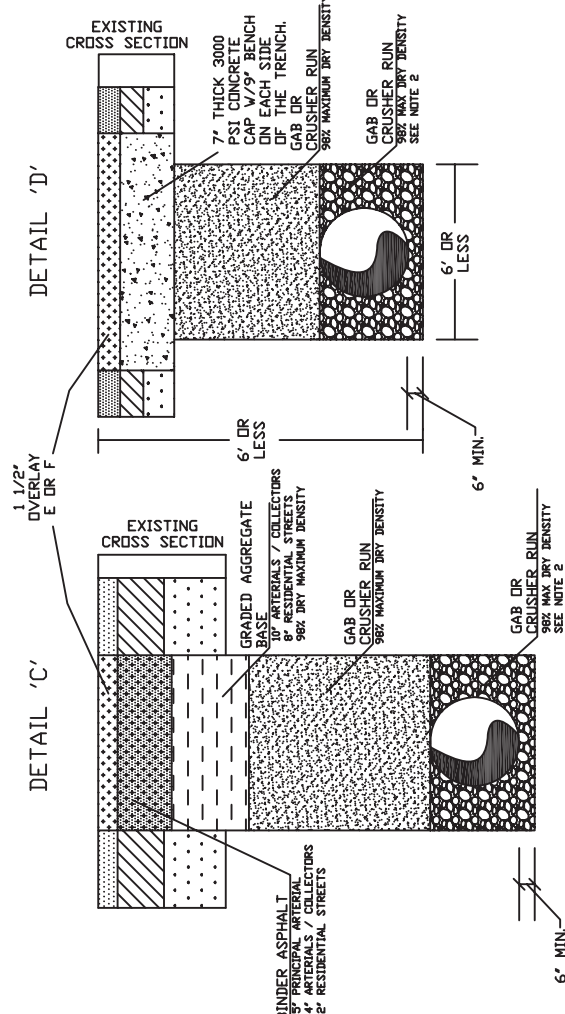
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DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

**TYPICAL PLANTING SCHEDULE**

DATE: MAY 2014 SHEET: 2975



# GWINNETT COUNTY D.O.T. UTILITY CUT DETAILS

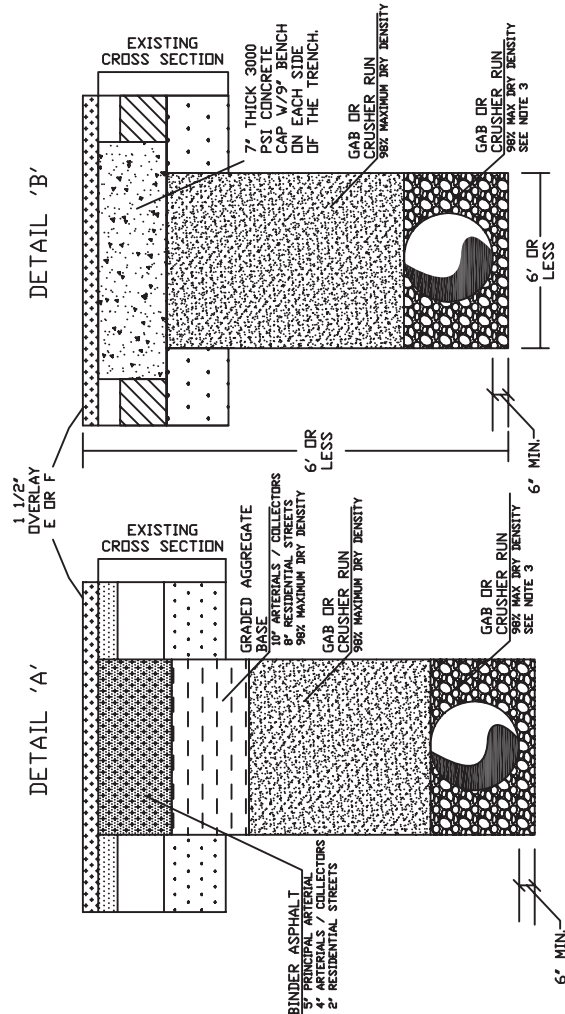


**PERPENDICULAR CUT**  
 GREATER THAN 6 FOOT DEPTH  
 GREATER THAN 6 FOOT WIDTH TRENCH

**PERPENDICULAR CUT**  
 6 FOOT OR LESS DEPTH  
 6 FOOT OR LESS WIDTH TRENCH

- NOTES:**
- 1) ALL EDGES WILL BE SAW CUT AND TACKED ON REPAVING
  - 2) GAB DR CRUSHER RUN FOUNDATION MATERIAL TO BE INCLUDED IN THE PRICE OF THE PIPE.

## PERPENDICULAR ROAD CUTS



**LONGITUDINAL CUT**  
 GREATER THAN 6 FOOT DEPTH  
 GREATER THAN 6 FOOT WIDTH TRENCH

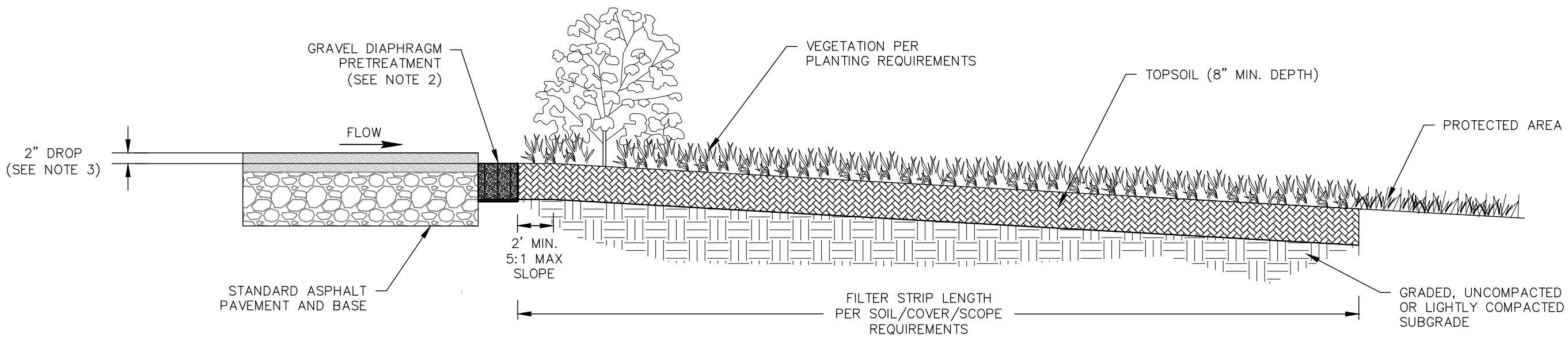
**LONGITUDINAL CUT**  
 6 FOOT OR LESS DEPTH  
 6 FOOT OR LESS WIDTH TRENCH

- NOTES:**
- 1) ON MULTILANE ROADS (MORE THAN TWO) THE LANE THAT WILL BE USED FOR THE LONGITUDINAL CUT WILL BE MILLED 1 1/2 INCHES TO ACCOMMODATE THE OVERLAY
  - 2) ALL EDGES WILL BE SAW CUT AND TACKED ON REPAVING
  - 3) GAB DR CRUSHER RUN FOUNDATION MATERIAL TO BE INCLUDED IN THE PRICE OF THE PIPE.

## LONGITUDINAL ROAD CUTS

<b>GWINNETT COUNTY DWR BMP DETAILS – SHEET LIST</b>		
<b>SHEET NUMBER</b>	<b>DETAIL NUMBER</b>	<b>SHEET TITLE</b>
01	4.0.1	FILTER STRIP
02	4.0.2	GRAVEL DIAPHRAGM
03	4.0.3	DOME GRATE OVERFLOW STRUCTURE
04	4.0.4	UNDERDRAIN CLEANOUT
05	4.0.5	UPTURNED UNDERDRAIN
06	4.0.6	INTERNAL ORIFICE PROTECTION
07	4.0.7A	CHECK DAMS
08	4.0.7B	CHECK DAMS – CONCRETE
09	4.0.7C	CHECK DAMS – LUMBER/WOOD
10	4.0.7D	CHECK DAMS – STONE
11	4.0.8	SUBSURFACE CHECK DAMS
12	4.0.9	OBSERVATION WELL
13	4.0.10	SPLASH BLOCK ENERGY DISSIPATER
14	4.0.11	STILLING BASIN ENERGY DISSIPATER
15	4.0.12A	CURB CUT INLETS
16	4.0.12B	CURB CUT INLETS
17	4.0.12C	CURB CUT INLETS
18	4.0.13	OUTLET CONTROL STRUCTURE - DRY PONDS & DRY EXTENDED DETENTION
19	4.0.14	OUTLET CONTROL STRUCTURE - WET PONDS & STORMWATER WETLANDS
20	4.0.15	TRASH RACK PROTECTION FOR LOW FLOW ORIFICE
21	4.2.3	BIORETENTION WITH UNDERDRAIN
22	4.5.1	DRY DETENTION BASIN
23	4.6.1	DRY EXTENDED DETENTION
24	4.8.1	DRY ENHANCED SWALE WITH UNDERDRAIN
25	4.20.1A	REGENERATIVE STORMWATER CONVEYANCE
26	4.20.1B	REGENERATIVE STORMWATER CONVEYANCE
27	4.26.1	STORMWATER WETLANDS (LEVEL 1) WITH EXTENDED DETENTION

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- NOTES:**
1. FILTER STRIP PRACTICE CAN BE USED AS PRETREATMENT OR AN INDEPENDENT PRACTICE.
  2. A GRAVEL DIAPHRAGM (DETAIL 4.0.2), LEVEL SPREADER, OR EQUIVALENT PRETREATMENT IS REQUIRED FOR CONCENTRATED FLOW.
  3. A 2" DROP IS REQUIRED WHEN TRANSITIONING FROM A PAVED SURFACE TO A FILTER STRIP.

No.	REVISION	DATE



GWINNETT COUNTY DATE: AUGUST 2021

**DEPARTMENT OF WATER RESOURCES**  
STANDARD DRAWING

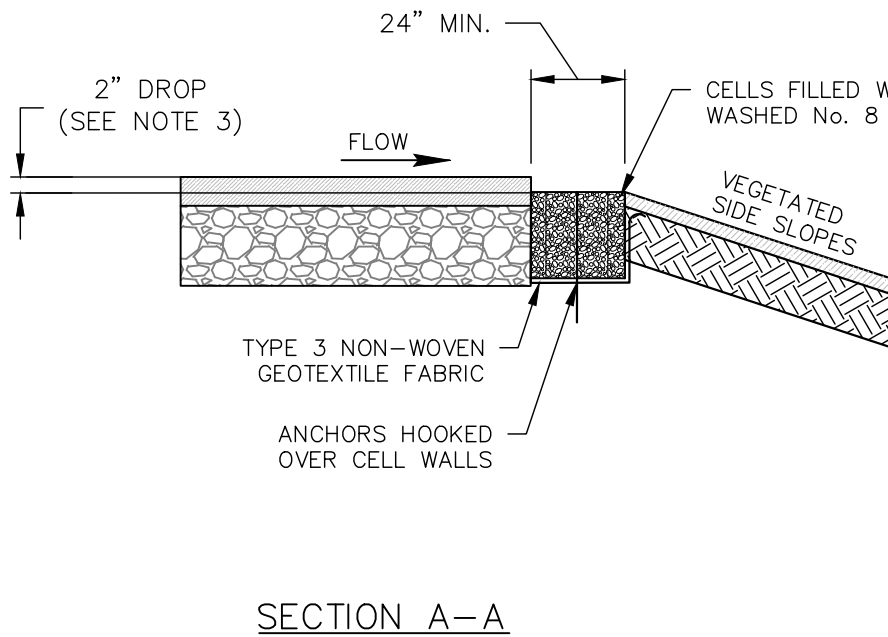
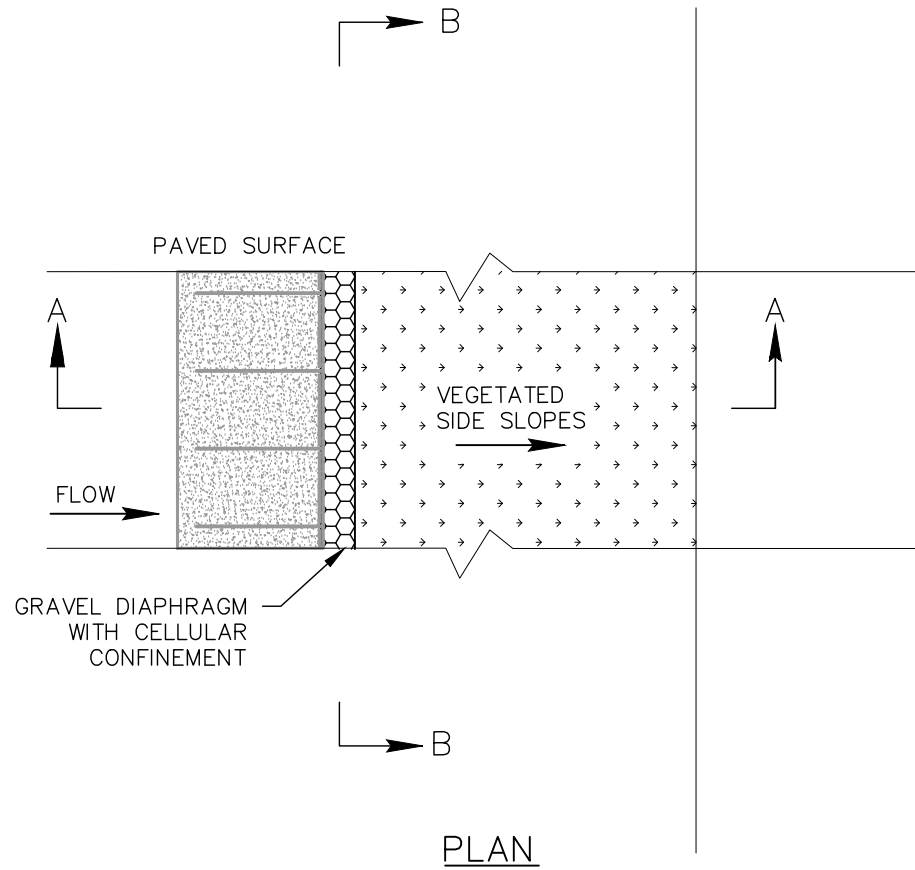
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**FILTER STRIP**

DETAIL No. 4.0.1 SCALE: N.T.S SHEET No. 01

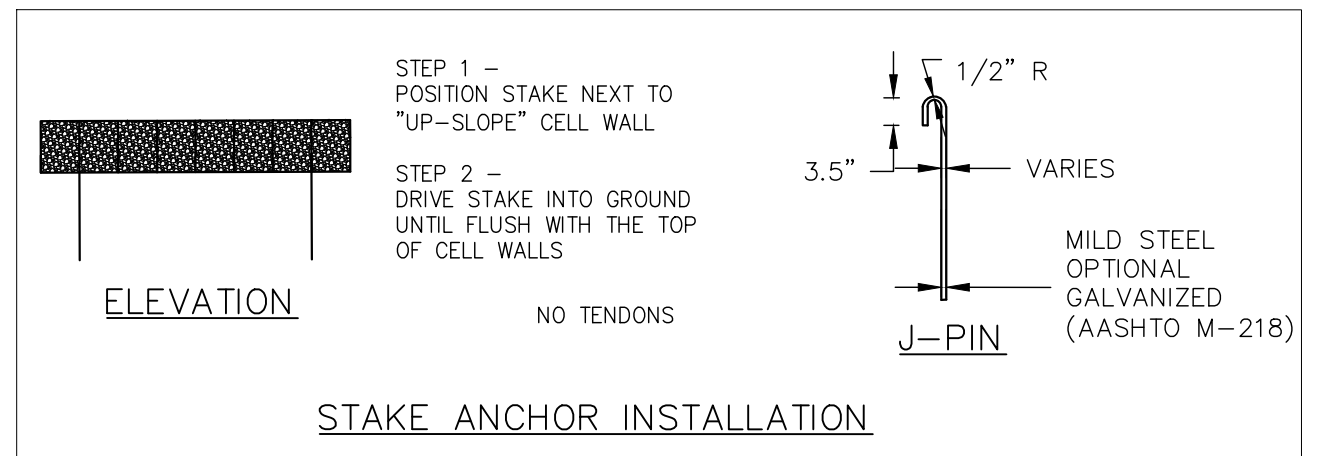
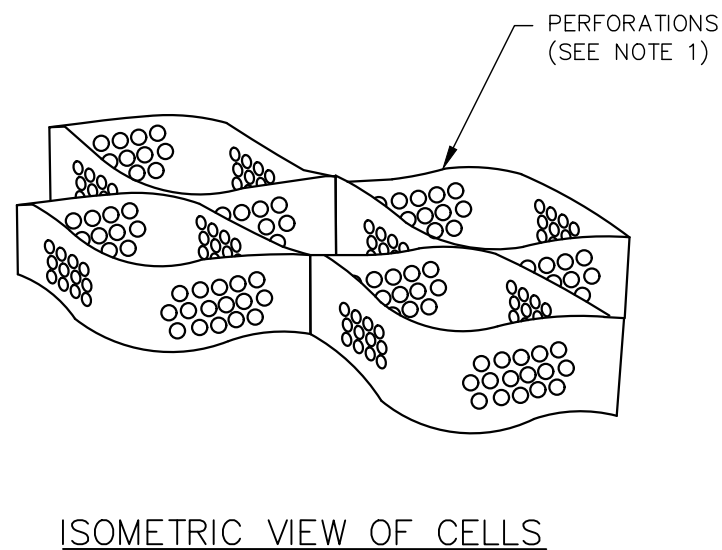
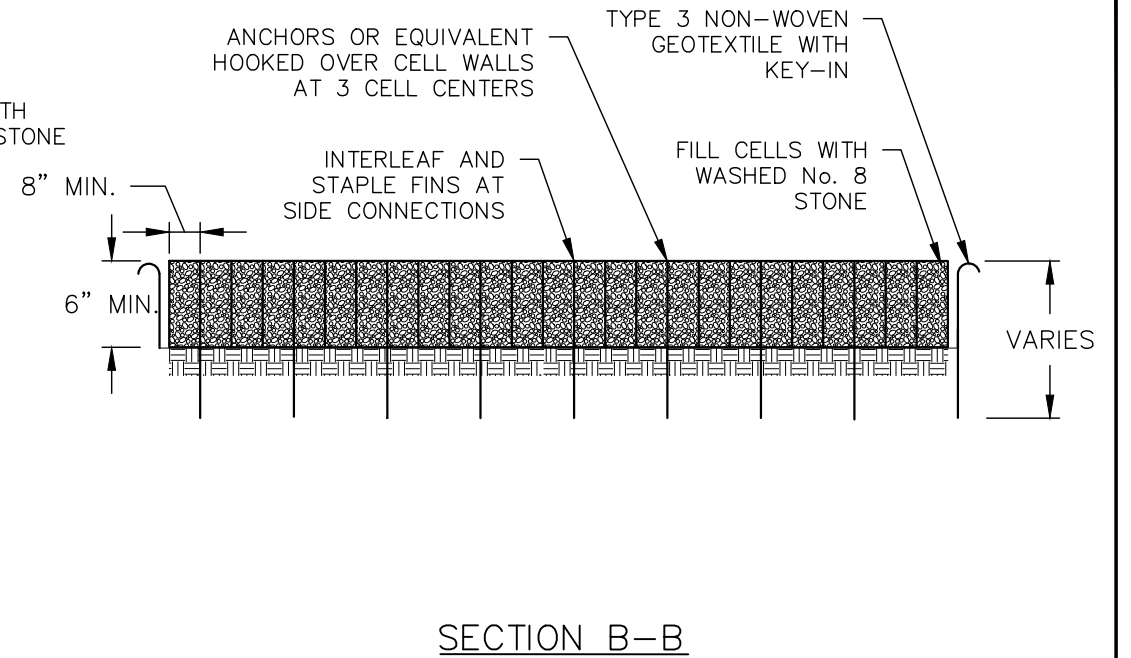


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**NOTES:**

1. CELLS SHALL BE HDPE OR APPROVED EQUIVALENT, AND PERFORATED WITH HOLES NO LARGER THAN 0.4" DIAMETER.
2. THIS PRACTICE IS TO BE USED AS PRETREATMENT TO AN INDEPENDENT PRACTICE.
3. A 2" DROP IS REQUIRED WHEN TRANSITIONING FROM A PAVED SURFACE TO A GRAVEL DIAPHRAGM.



No.	REVISION	DATE

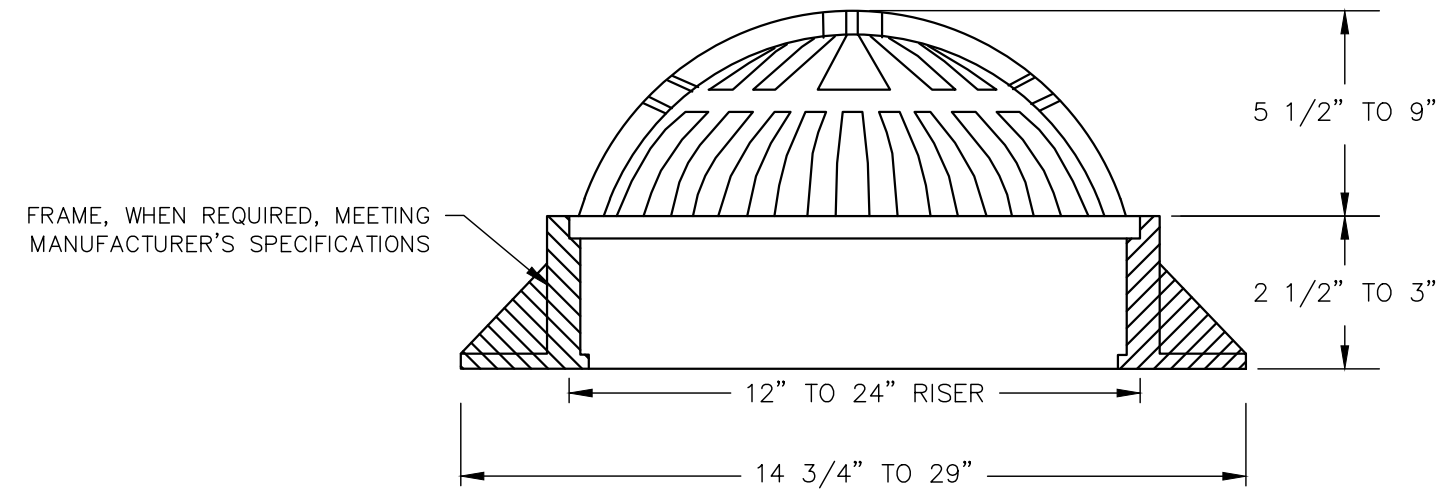
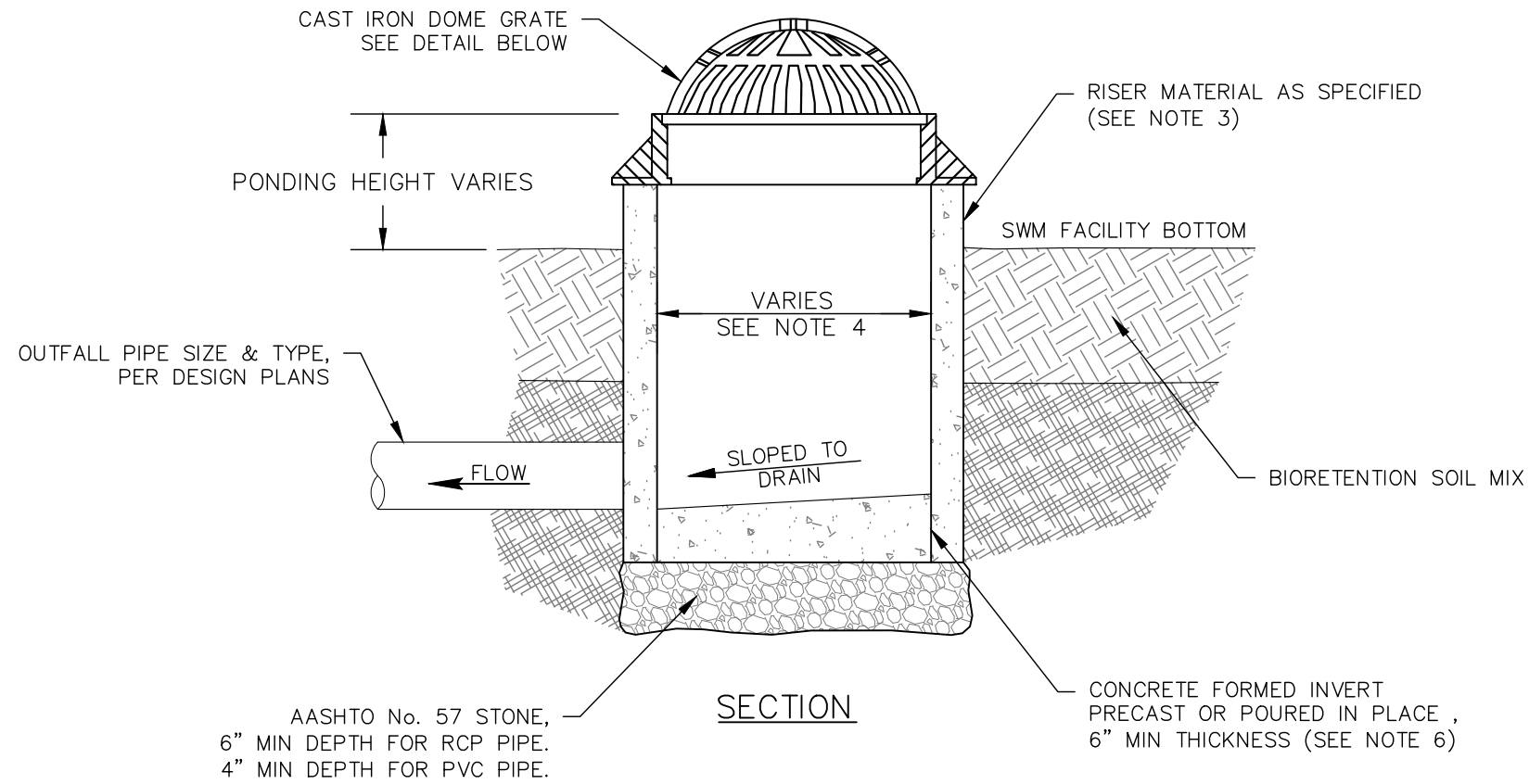


GWINNETT COUNTY DATE: AUGUST 2021

DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

GRAVEL DIAPHRAGM

DETAIL No. 4.0.2 SCALE: N.T.S SHEET No. 02



CAST IRON DOME GRATE DETAIL

NOTES:

1. MINIMUM OPENING SIZE IN GRATE SHALL BE 1-1/4 " INCHES.
2. SIZE OF GRATE SHALL MATCH SIZE OF THE RISER, PER PLANS, SHALL FIT SNUG AND WATERTIGHT, AND SHALL BE REMOVABLE FOR MAINTENANCE PURPOSES.
3. DETAIL SHOWS OVERFLOW STRUCTURE WITH CONCRETE RISER AND CAST IRON DOME GRATE. ALTERNATE MATERIALS INCLUDING PVC OR HDPE RISER, DUCTILE IRON PIPE, ETC. SHALL BE PER MANUFACTURER SPECIFICATIONS AND APPROVED BY DWR.
4. OVERFLOW STRUCTURE SHALL BE SIZED BY THE ENGINEER.
5. CONCRETE DROP STRUCTURES REQUIRING A PVC TIE-IN SHALL BE DESIGNED TO HAVE A FLEXIBLE WATERTIGHT MANHOLE CONNECTOR INLAID IN THE DROP STRUCTURE FORM PRIOR TO CAST OR PRODUCTION. THIS IS TO PROPERLY TIE-IN PVC PIPE AND PREVENT LEAKAGE.
6. THE FORMED CONCRETE INVERT SHALL SLOPE TO THE INVERT ELEVATION OF THE OUTLET PIPE AND IS INCIDENTAL TO THE STRUCTURE.
7. DESIGNER SHALL SPECIFY STRUCTURES FOR A MINIMUM FACTOR OF SAFETY AGAINST FLOTATION OF 1.5. CALCULATIONS SHALL BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF GEORGIA.

No.	REVISION	DATE

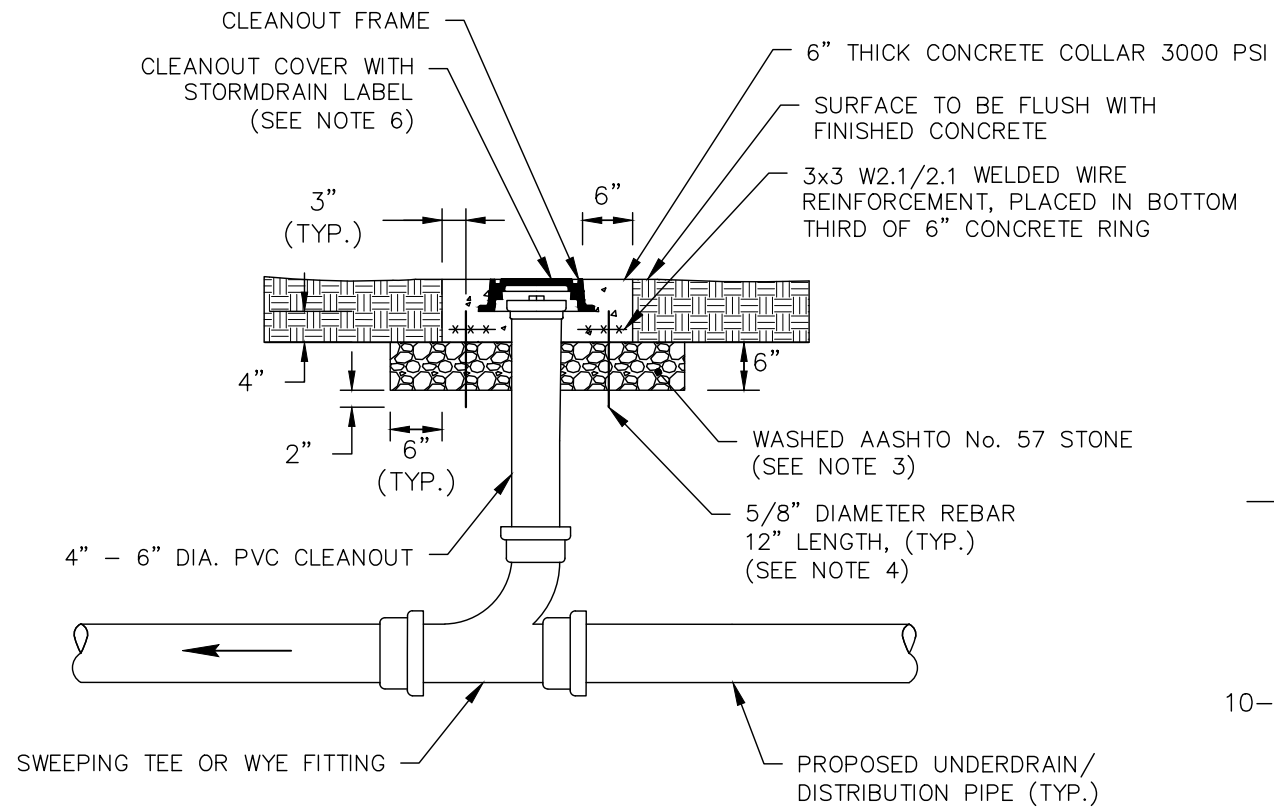


GWINNETT COUNTY DATE: AUGUST 2021

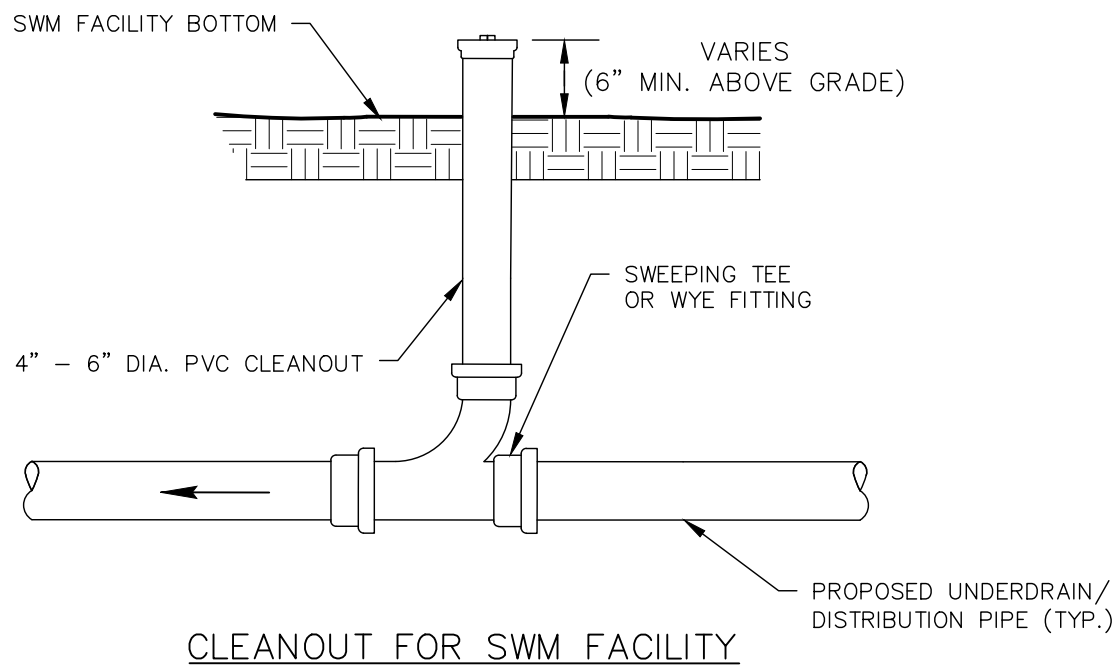
DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

DOME GRATE OVERFLOW STRUCTURE

DETAIL No. 4.0.3 SCALE: N.T.S SHEET No. 03



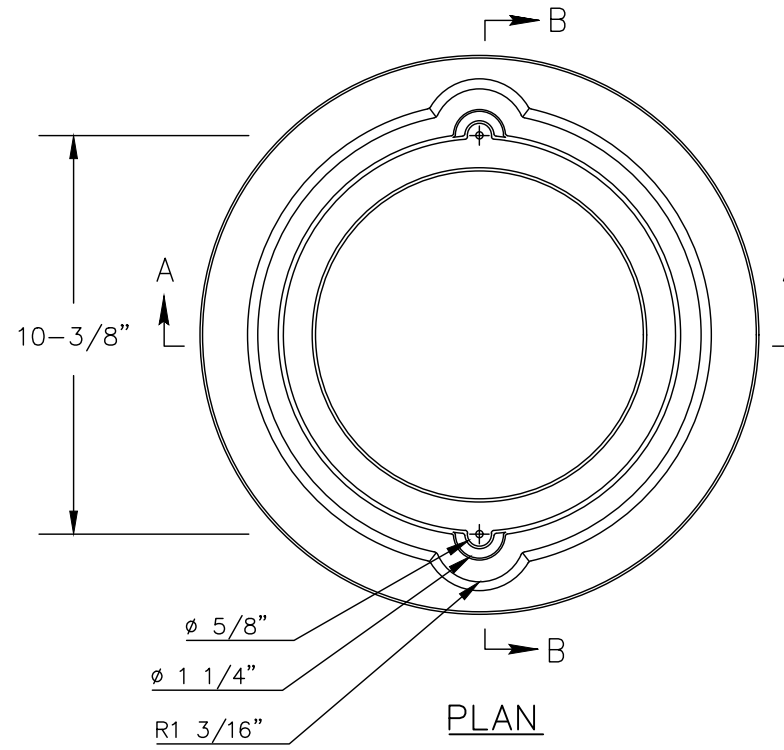
CLEANOUT WITH CONCRETE COLLAR AND COVER



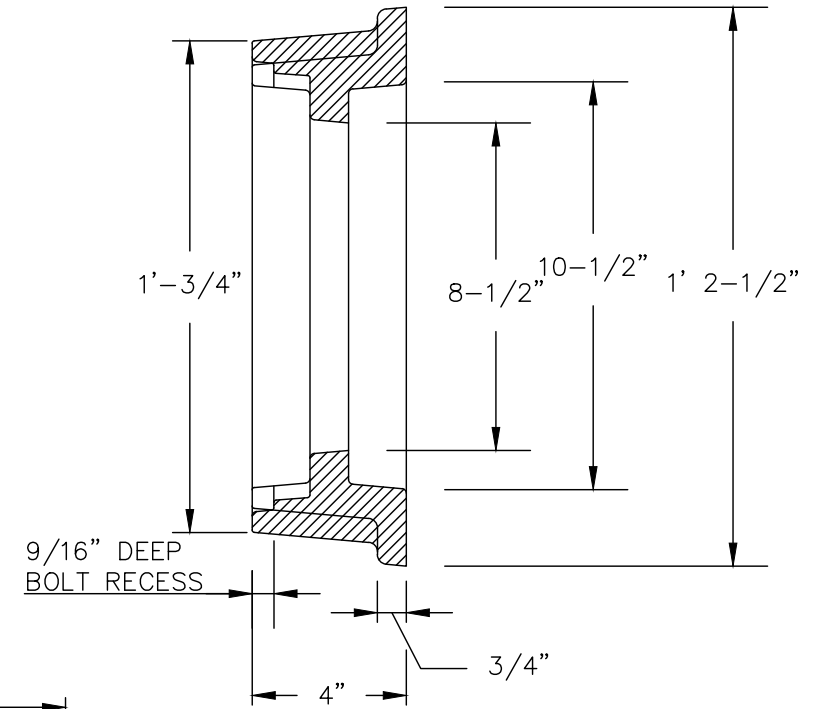
CLEANOUT FOR SWM FACILITY

**NOTES:**

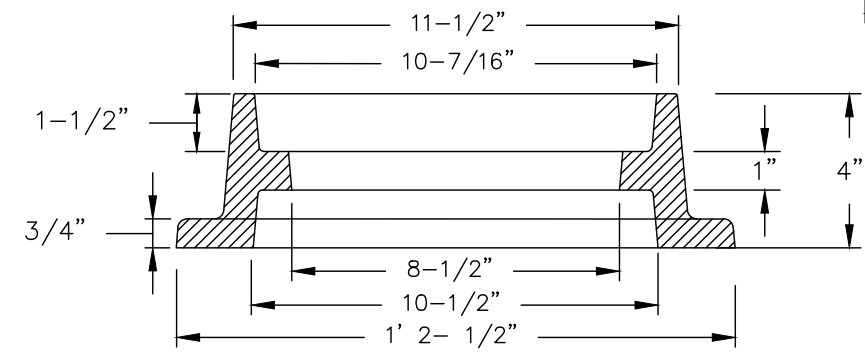
1. PVC WYE JOINT FOR INLINE SECTION OR 45° BEND FOR END SECTION.
2. CONCRETE COLLAR TO BE POURED SINGULARLY IN SOIL / GRASS OR MONOLITHICALLY WITH SOIL SURROUNDING CONCRETE. THE CONCRETE COLLAR MUST HAVE STONE FOOTING. EXPANSION JOINT OR CAULK MAY BE USED.
3. MATERIAL SURROUNDING CLEANOUT RISER MUST BE COMPACTED TO ENSURE NO LATERAL MOVEMENT PRIOR TO PLACEMENT OF CONCRETE COLLAR.
4. PLACE THREE (3) LENGTHS OF REBAR EVENLY SPACED AROUND COLLAR, AND 3" FROM OUTER EDGE.
5. CLEANOUT RISERS MAY BE LATERALLY OFFSET FROM UNDERDRAIN PIPE SO CLEANOUT DAYLIGHTS AT FACILITY SIDE SLOPES. CLEANOUT STICKUPS SHOULD BE VISIBLE OR OTHERWISE DESIGNED TO BE PROTECTED AGAINST DAMAGE.
6. CLEANOUT COVERS SHALL BE STAMPED "CO" OR "STORM" OR BE STENCILED WITH LANGUAGE AND PATTERNS AS APPROVED BY DWR. (SEE PLANNING AND DEVELOPMENT STD. DWG 611).
7. ANY REQUIRED REDUCING COUPLINGS OR HUBS SHALL BE CONNECTED TO THE STANDPIPE. REDUCING FITTINGS SHALL NOT BE USED IN THE DIRECTION OF FLOW.



PLAN



SECTION B-B



SECTION A-A CLEANOUT FRAME

No.	REVISION	DATE



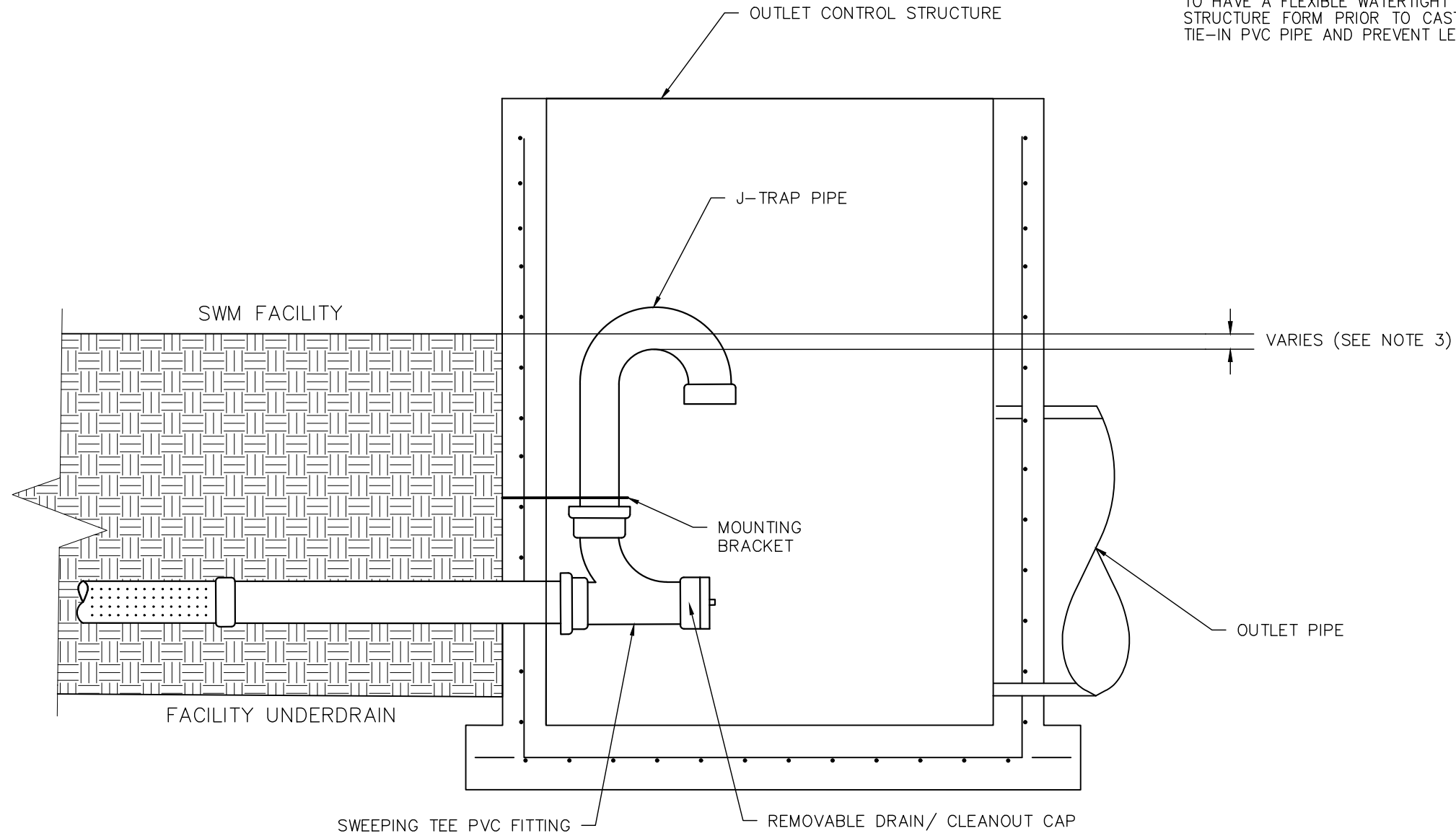
GWINNETT COUNTY DATE: AUGUST 2021

**DEPARTMENT OF WATER RESOURCES**  
**STANDARD DRAWING**

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**UNDERDRAIN CLEANOUT**

DETAIL No. 4.0.4 SCALE: N.T.S. SHEET No. 04



**NOTES:**

1. ALTERNATIVE CONFIGURATIONS SHALL BE ALLOWED AS APPROVED BY DWR.
2. ALL PIPE MATERIAL SHALL BE SCHEDULE 40 OR SDR PVC OR SOLID WALL HDPE.
3. CONFIGURATION OF J-TRAP AND UPTURNED INVERT SHALL BE DETERMINED BY THE ENGINEER.
4. CONCRETE DROP STRUCTURES REQUIRING A PVC TIE-IN SHALL BE DESIGNED TO HAVE A FLEXIBLE WATERTIGHT MANHOLE CONNECTOR INLAID IN THE DROP STRUCTURE FORM PRIOR TO CAST OR PRODUCTION. THIS IS TO PROPERLY TIE-IN PVC PIPE AND PREVENT LEAKAGE.

No.	REVISION	DATE

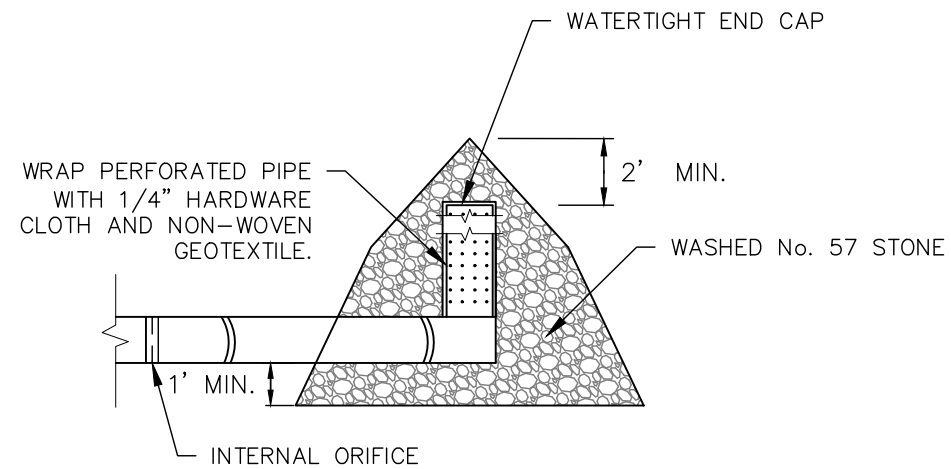


GWINNETT COUNTY DATE: AUGUST 2021

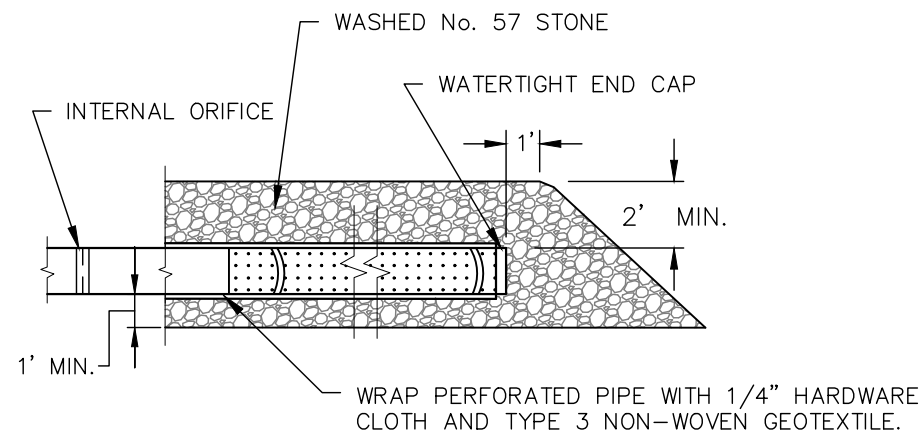
DEPARTMENT OF WATER RESOURCES  
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**UPTURNED UNDERDRAIN**

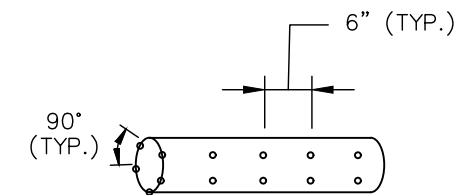
DETAIL No. 4.0.5 SCALE: N.T.S SHEET No. 04



VERTICAL APPLICATION



HORIZONTAL APPLICATION



PERFORATION SPACING

NOTES

1. LOW-FLOW TRASH RACK OPTION MAY BE USED FOR SMALLER ORIFICES AS APPROPRIATE (DETAIL 4.0.15).
2. PERFORATE PIPE DRAWDOWN DEVICE SHALL HAVE 1 INCH DIAMETER PERFORATIONS SPACED 6 INCHES APART LONGITUDINALLY AND RADially OR IN ACCORDANCE WITH APPROVED PLAN.
3. DO NOT EXTEND PERFORATIONS IN THE DRAWDOWN DEVICE INTO WET STORAGE.
4. WRAP THE PERFORATED PORTION OF THE DRAWDOWN DEVICE FIRST WITH 1/4 INCH GALVANIZED HARDWARE CLOTH, THEN WITH TYPE 3 NON-WOVEN GEOTEXTILE. USE NON-WOVEN GEOTEXTILE AS SPECIFIED IN SECTION 31 32 19.16 OF THE GWINNETT COUNTY STORMWATER INFRASTRUCTURE REPLACEMENT SPECIFICATIONS. DO NOT WRAP WITH MORE THAN ONE LAYER OF GEOTEXTILE.
5. MAINTAIN WATER TIGHT CONNECTIONS. REPLACE GEOTEXTILE AROUND PERFORATED RISER IF DRY STORAGE VOLUME DOES NOT DRAWDOWN WITHIN DESIGN DRAWDOWN TIME.
6. ALTERNATE: STEEL ANCHORS MAY BE USED IN LIEU OF STONE AS APPROVED BY THE ENGINEER.

No.	REVISION	DATE



GWINNETT COUNTY DATE: AUGUST 2021

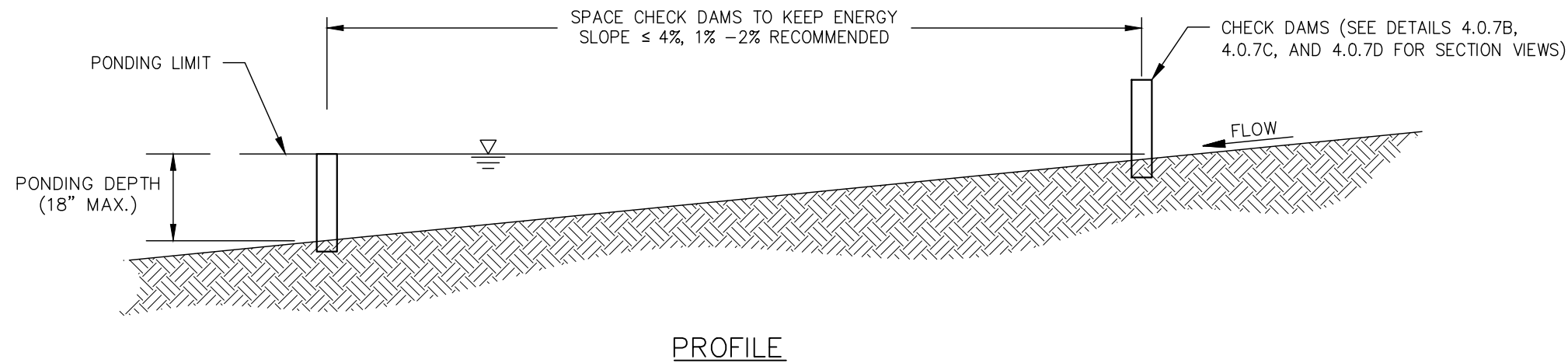
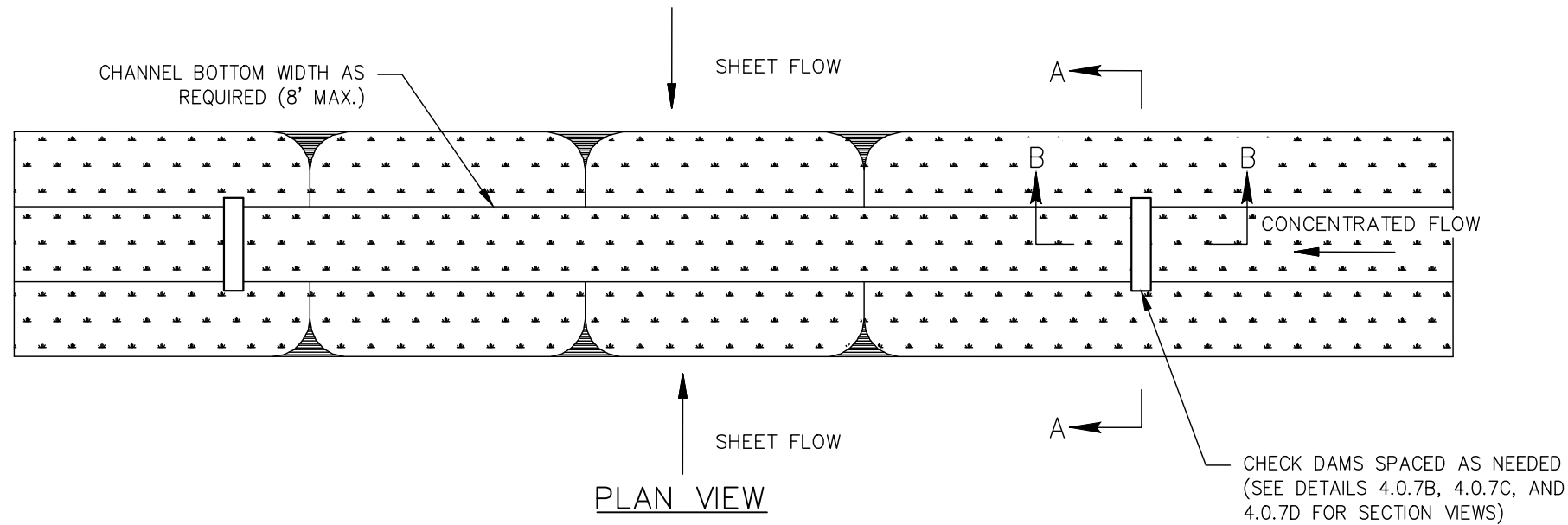
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**INTERNAL ORIFICE PROTECTION**

DETAIL No. 4.0.6 SCALE: N.T.S SHEET No. 06



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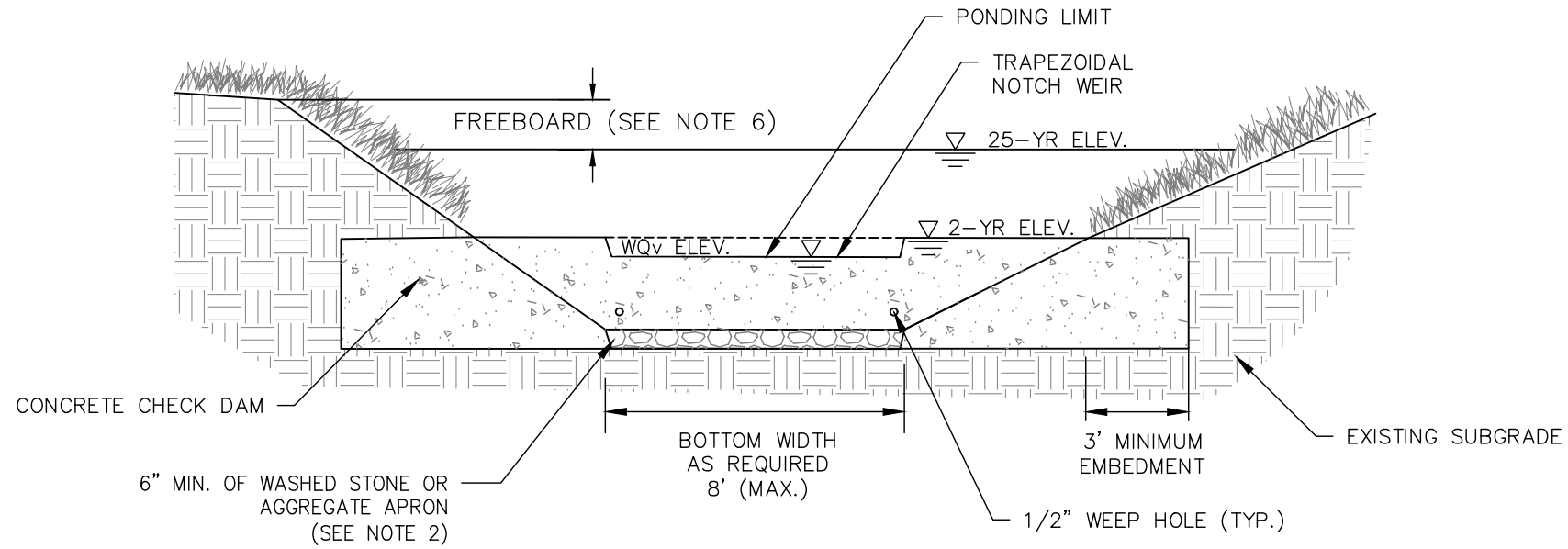
**NOTES:**

1. VELOCITY CALCULATIONS ARE TO BE BASED ON THE 25-YEAR, 24-HOUR FREQUENCY STORM EVENT.
2. LOCATE CHECK DAM(S) TO PROVIDE MAX. VELOCITY REDUCTION, CONSIDERING THE VOLUME OF RUNOFF, THE DRAINAGE AREA TO THE SLOPE. PLACE CHECK DAMS IN REASONABLY STRAIGHT SECTIONS OF THE FLOW CHANNEL TO MINIMIZE THE POTENTIAL FOR EROSION IN THE CHANNEL BED.
3. THE HEIGHT OF THE OUTLET WEIR CREST MUST NOT EXCEED ONE-HALF THE DEPTH OF THE SWALE. ADDITIONALLY, THE MAX. HEIGHT TO THE WEIR CREST MUST NOT EXCEED 2-FEET TO PREVENT SCOUR AT THE TOE OF THE DAM. THE CHECK DAM MUST EXTEND FROM BANK TO BANK OF THE SWALE WITH THE WEIR SECTION LENGTH IN THE CENTER OF THE DAM. IF THESE PROVISIONS CANNOT BE MET, AN ENGINEERING ANALYSIS MUST BE CONDUCTED.
4. THE NUMBER OF CHECK DAMS WILL DEPEND ON THE LENGTH AND SLOPE OF THE SWALE. THE DISTANCE BETWEEN THE STONE CHECK DAMS WILL VARY WITH THE LONGITUDINAL SLOPE.
5. CHECK DAMS TO EXTEND AT LEAST 6" INTO SUBGRADE IF PLACED ON A SLOPE GREATER THAN 5%.
6. CHECK DAMS SHALL BE DESIGNED TO ENSURE CHANNEL FLOW MEETS CONVEYANCE AND VELOCITY REQUIREMENTS, PER GCSMM.

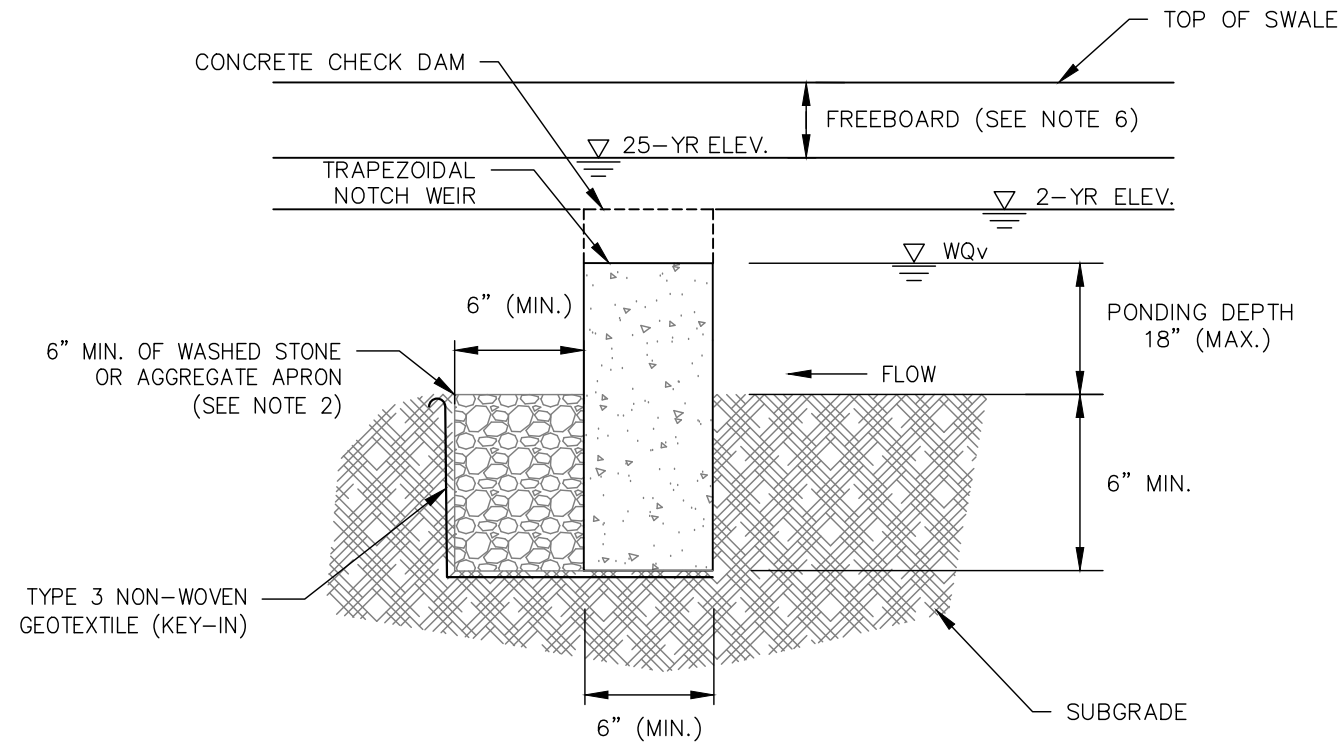
No.	REVISION	DATE



GWINNETT COUNTY	DATE: AUGUST 2021
DEPARTMENT OF WATER RESOURCES STANDARD DRAWING	
<b>CHECK DAMS</b>	
DETAIL No. 4.07A	SCALE: N.T.S SHEET No. 07



CONCRETE CHECK DAM - TYPICAL SECTION A-A



CONCRETE CHECK DAM - TYPICAL SECTION B-B

**NOTES:**

1. LOCATIONS, HEIGHTS, AND WIDTHS OF CHECK DAMS TO BE SPECIFIED IN THE DESIGN PLANS.
2. SIZE OF STONE OR AGGREGATE APRON TO BE SIZED FOR STABILITY.
3. CONCRETE CHECK DAM SHALL BE CONTINUOUS (NO JOINTS).
4. DEPTH OF CHECK DAM VARIES DEPENDING FACILITY TYPE.
5. CHECK DAMS TO EXTEND AT LEAST 6" INTO CHANNEL BOTTOM.
6. FREEBOARD FOR ENHANCED SWALE BMPS SHALL BE A MIN. 6" ABOVE THE 25-YEAR DESIGN ELEVATION. FOR OPEN CHANNEL SYSTEMS, FREEBOARD SHALL BE A MINIMUM OF 20% OF THE DESIGN FLOW DEPTH FOR THE 25-YEAR STORM.
7. WEIR CENTER NOTCH SHALL BE SIZED TO PASS 2-YEAR STORM PEAK FLOW.
8. WEEP HOLES OR SIMILAR DRAINAGE FEATURES SHALL BE INSTALLED IN CHECK DAM AS REQUIRED TO ALLOW FOR DEWATERING AND MEET DRAINAGE REQUIREMENTS.
9. WQV PONDING DEPTH SHALL NOT EXCEED 18" AT THE UPSTREAM END OF THE CHECK DAM. MAX 12" AVERAGE PONDING DEPTH SHALL BE MAINTAINED BETWEEN CHECK DAMS.
10. DESIGN REQUIREMENTS FOR CONCRETE CHECK DAM APPLICATIONS WILL VARY BY SITE. ALL REQUISITE STRUCTURAL AND REINFORCEMENT DESIGN SHALL BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF GEORGIA.
11. COMPACT THE UPPER 8 INCHES OF SUBGRADE BELOW CHECK DAM. TO MINIMUM OF 90 PERCENT RELATIVE DENSITY AS DETERMINED IN ACCORDANCE WITH ASTM D698.
12. ARMOR SIDE SLOPES AROUND CHECK DAM, AS NECESSARY, UP TO THE 25-YEAR ELEVATION TO PREVENT EROSION.

No.	REVISION	DATE



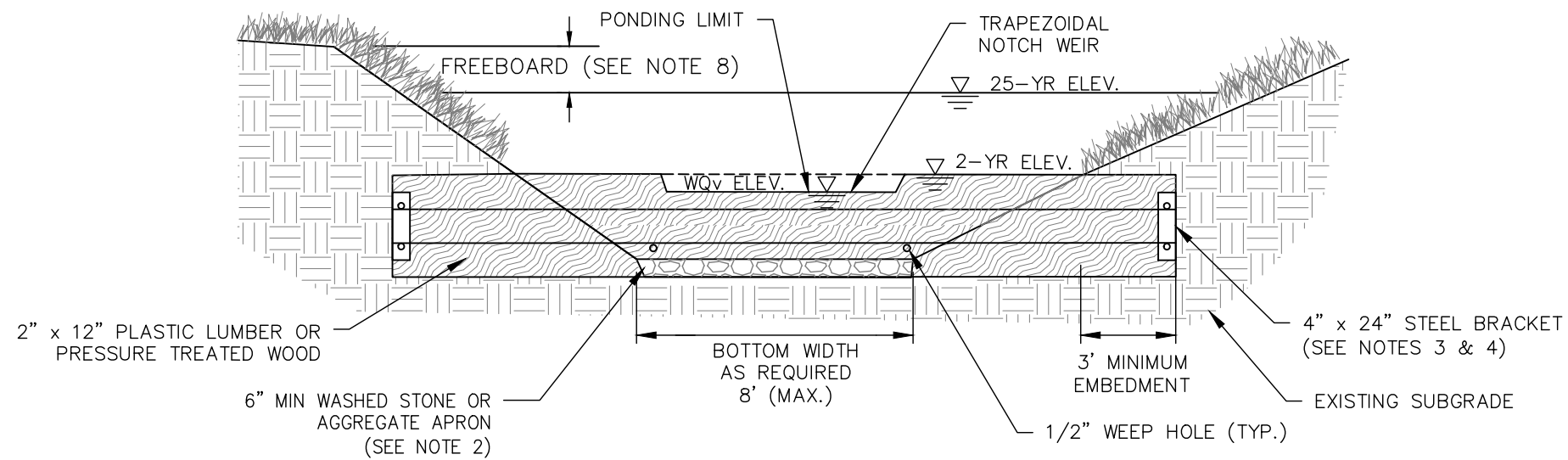
GWINNETT COUNTY DATE: AUGUST 2021

DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

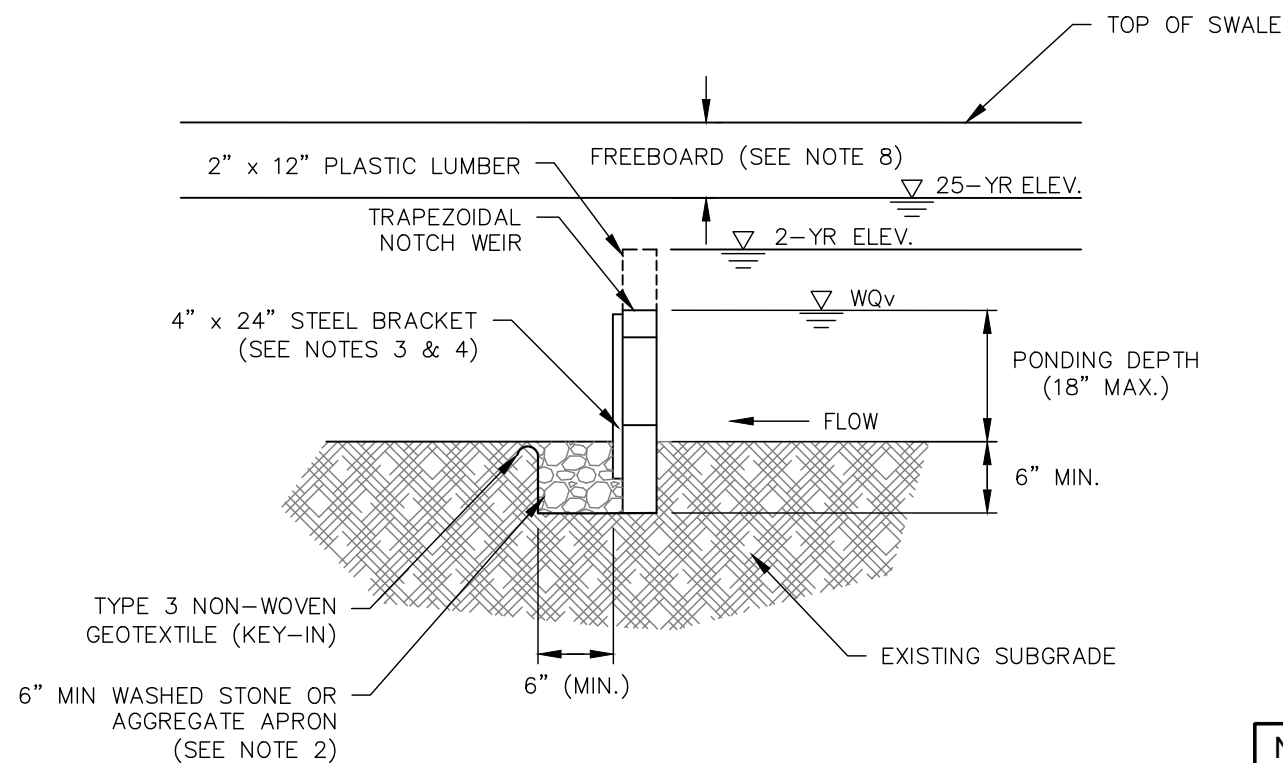
CHECK DAMS - CONCRETE

DETAIL No. 4.07B SCALE: N.T.S SHEET No. 08

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LUMBER WOOD CHECK DAM – TYPICAL SECTION A-A



LUMBER WOOD CHECK DAM – TYPICAL SECTION B-B

**NOTES:**

1. LOCATIONS, HEIGHTS, AND WIDTHS OF CHECK DAMS TO BE SPECIFIED IN THE DESIGN PLANS.
2. BOARDS TO BE PLASTIC LUMBER OR PRESSURE TREATED WOOD AND CONTINUOUS ALONG ITS LENGTH.
3. ALL FASTENERS TO BE STAINLESS STEEL OR GALVANIZED. BOLTS TO BE 5/16" DIAMETER.
4. A STEEL BRACKET IS REQUIRED WHERE MULTIPLE LENGTHS OF WOOD ARE NEEDED TO ESTABLISH DESIGN DIMENSIONS. BRACKET TO BE MADE OF 3/16" MIN. STEEL.
5. THIS CHECK DAM MAY BE USED IN BIORETENTION PLANTERS OR ENHANCED DRY SWALES.
6. DEPTH OF CHECK DAM VARIES DEPENDING ON DEPTH OF FACILITY.
7. CHECK DAMS TO EXTEND AT LEAST 6" INTO CHANNEL BOTTOM.
8. FREEBOARD FOR ENHANCED SWALE BMPS SHALL BE A MIN. 6" ABOVE THE 25-YEAR DESIGN ELEVATION. FOR OPEN CHANNEL SYSTEMS, FREEBOARD SHALL BE A MINIMUM OF 20% OF THE DESIGN FLOW DEPTH FOR THE 25-YEAR STORM.
9. WEIR CENTER NOTCH SHALL BE SIZED TO PASS 2-YEAR STORM PEAK FLOW.
10. WQV PONDING DEPTH SHALL NOT EXCEED 18" AT THE UPSTREAM END OF THE CHECK DAM. MAX 12" AVERAGE PONDING DEPTH SHALL BE MAINTAINED BETWEEN CHECK DAMS.
11. COMPACT THE UPPER 8 INCHES OF SUBGRADE BELOW CHECK DAM. TO MINIMUM OF 90 PERCENT RELATIVE DENSITY AS DETERMINED IN ACCORDANCE WITH ASTM D698.
12. ARMOR SIDE SLOPES AROUND CHECK DAM, AS NECESSARY, UP TO THE 25-YEAR ELEVATION TO PREVENT EROSION.

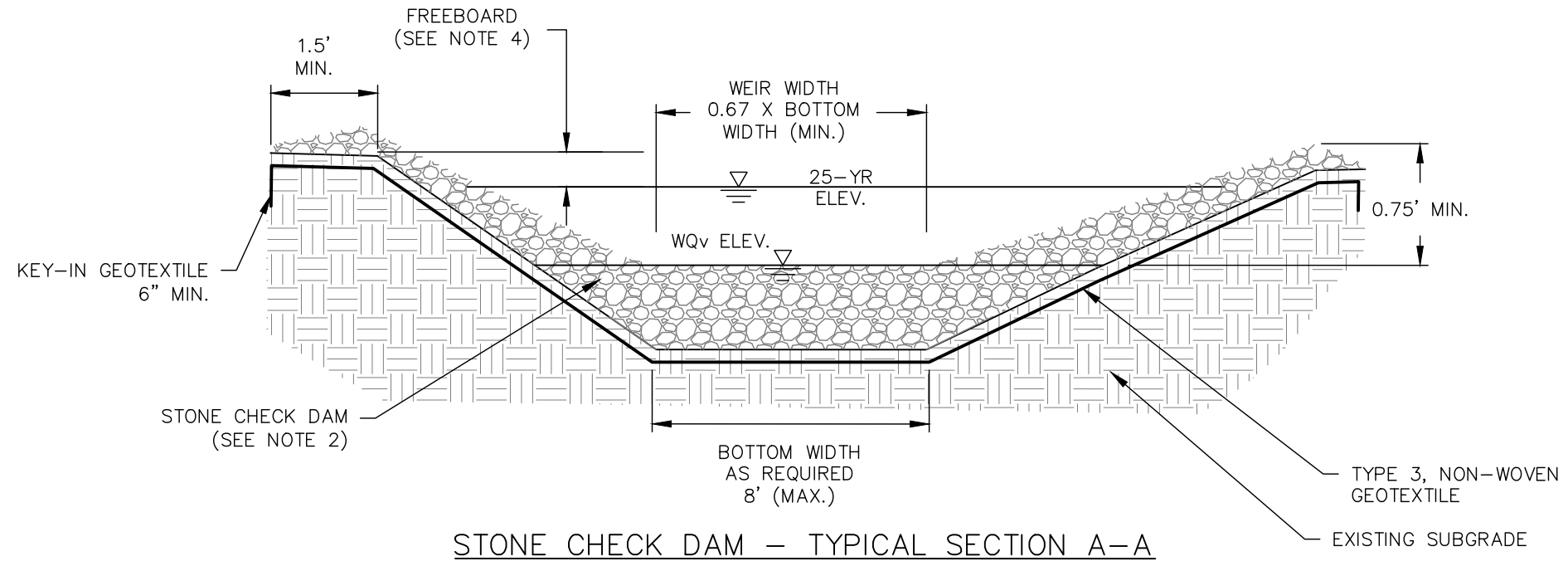
No.	REVISION	DATE



GWINNETT COUNTY	DATE: AUGUST 2021
<b>DEPARTMENT OF WATER RESOURCES</b>	
<b>STANDARD DRAWING</b>	
<b>CHECK DAMS - LUMBER/WOOD</b>	
DETAIL No. 4.07C	SCALE: N.T.S SHEET No. 09



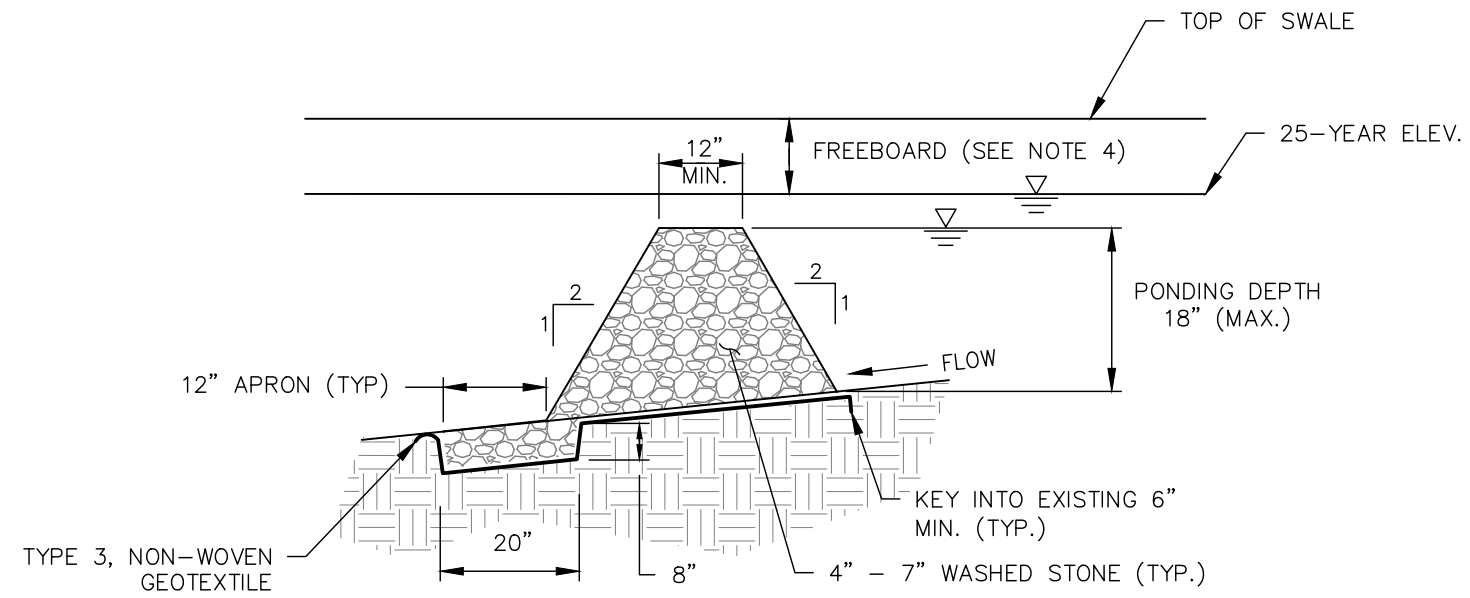
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STONE CHECK DAM - TYPICAL SECTION A-A

**NOTES:**

1. LOCATIONS, HEIGHTS, AND WIDTHS OF CHECK DAMS TO BE SPECIFIED IN THE DESIGN PLANS.
2. ALL STONE SHALL BE WASHED. SIZE OF STONE OR AGGREGATE APRON TO BE SPECIFIED IN THE DESIGN PLANS.
3. DEPTH OF CHECK DAM VARIES DEPENDING ON DEPTH OF FACILITY.
4. FREEBOARD FOR ENHANCED SWALE BMPS SHALL BE A MIN. 6" ABOVE THE 25-YEAR DESIGN ELEVATION. FOR OPEN CHANNEL SYSTEMS, FREEBOARD SHALL BE A MINIMUM OF 20% OF THE DESIGN FLOW DEPTH FOR THE 25-YEAR STORM.
5. WQV PONDING DEPTH SHALL NOT EXCEED 18" AT THE UPSTREAM END OF THE CHECK DAM. MAX 12" AVERAGE PONDING DEPTH SHALL BE MAINTAINED BETWEEN CHECK DAMS.



STONE CHECK DAM - TYPICAL SECTION B-B

No.	REVISION	DATE

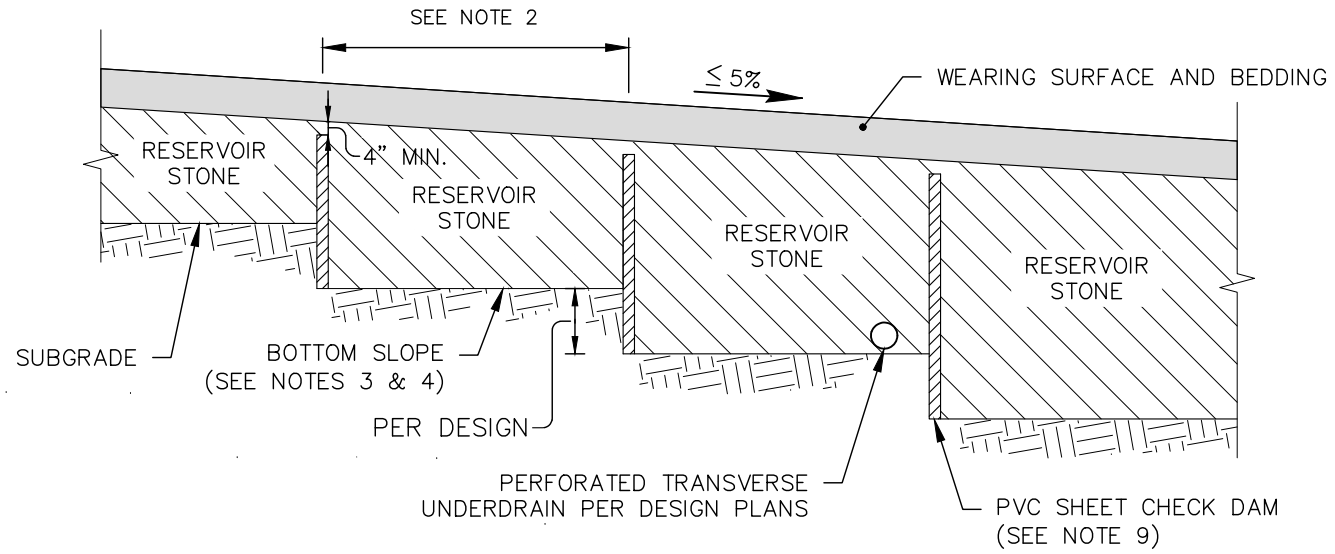


GWINNETT COUNTY DATE: AUGUST 2021

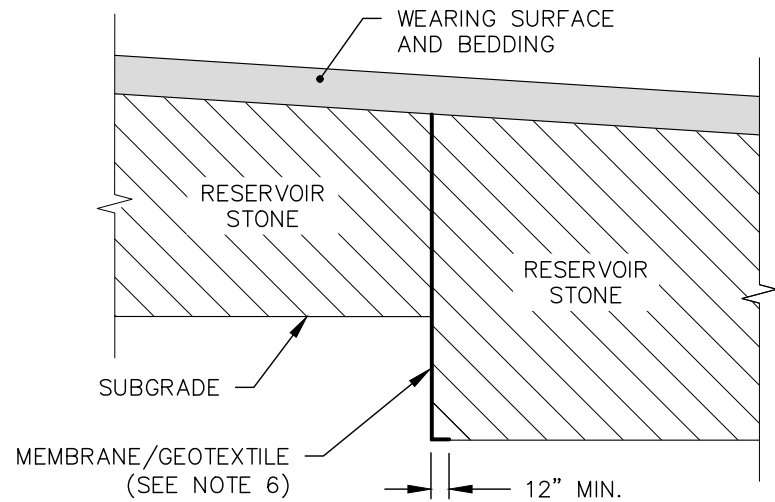
DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

**CHECK DAMS - STONE**

DETAIL No. 4.07D SCALE: N.T.S SHEET No. 10



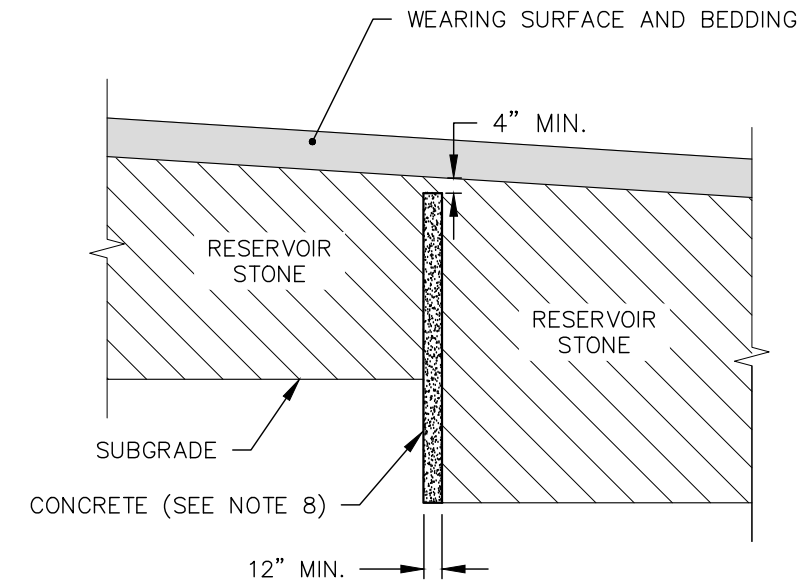
PVC SHEET - CHECK DAM



MEMBRANE / GEOTEXTILE - CHECK DAM

NOTES:

1. CHECK DAMS TO BE USED FOR INSTALLATION WITH BOTTOM SLOPES GREATER THAN 2% LONGITUDINALLY AS SHOWN IN THE CONTRACT DOCUMENTS.
2. DISTANCE BETWEEN STEPS IS DETERMINED BY THE SLOPE OF THE PAVEMENT TO ACHIEVE A STEP NO MORE THAN 12" TALL.
3. BOTTOM SLOPE = 0% TO 5% BUT NO STEEPER THAN TOP SLOPE, PER DESIGN PLANS. ENGINEER TO DESIGN SYSTEM TO ACHIEVE STORAGE, DRAW-DOWN, AND STRUCTURAL REQUIREMENTS. BOTTOM SLOPE DOES NOT HAVE TO BE PARALLEL TO TOP SLOPE.
4. FOR FACILITIES WITH WATERPROOF MEMBRANE, MINIMUM BOTTOM SLOPE SHALL BE 2% TO DRAIN DRY.
5. TRANSVERSE BOTTOM SLOPES AND CROSS SLOPES SHALL BE <3%.
6. WATERPROOF MEMBRANE OR LOW PERMEABILITY GEOTEXTILE (PERMITTIVITY OF 0.05 SEC<sup>-1</sup> OR LESS).
7. SHEET TO BE 3/8" PVC SHEET TYPE 1, GRAY.
8. CONCRETE CHECK DAM SHALL BE 3000 PSI, POURED CONTINUOUSLY (NO JOINTS).
9. PVC SHEETS SHALL BE BONDED IN ACCORDANCE WITH MANUFACTURER SPECS TO PROVIDE A WATERTIGHT SEAL.
10. ALL STRUCTURAL AND REINFORCEMENT DESIGN SHALL BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF GEORGIA.



CONCRETE - CHECK DAM

No.	REVISION	DATE

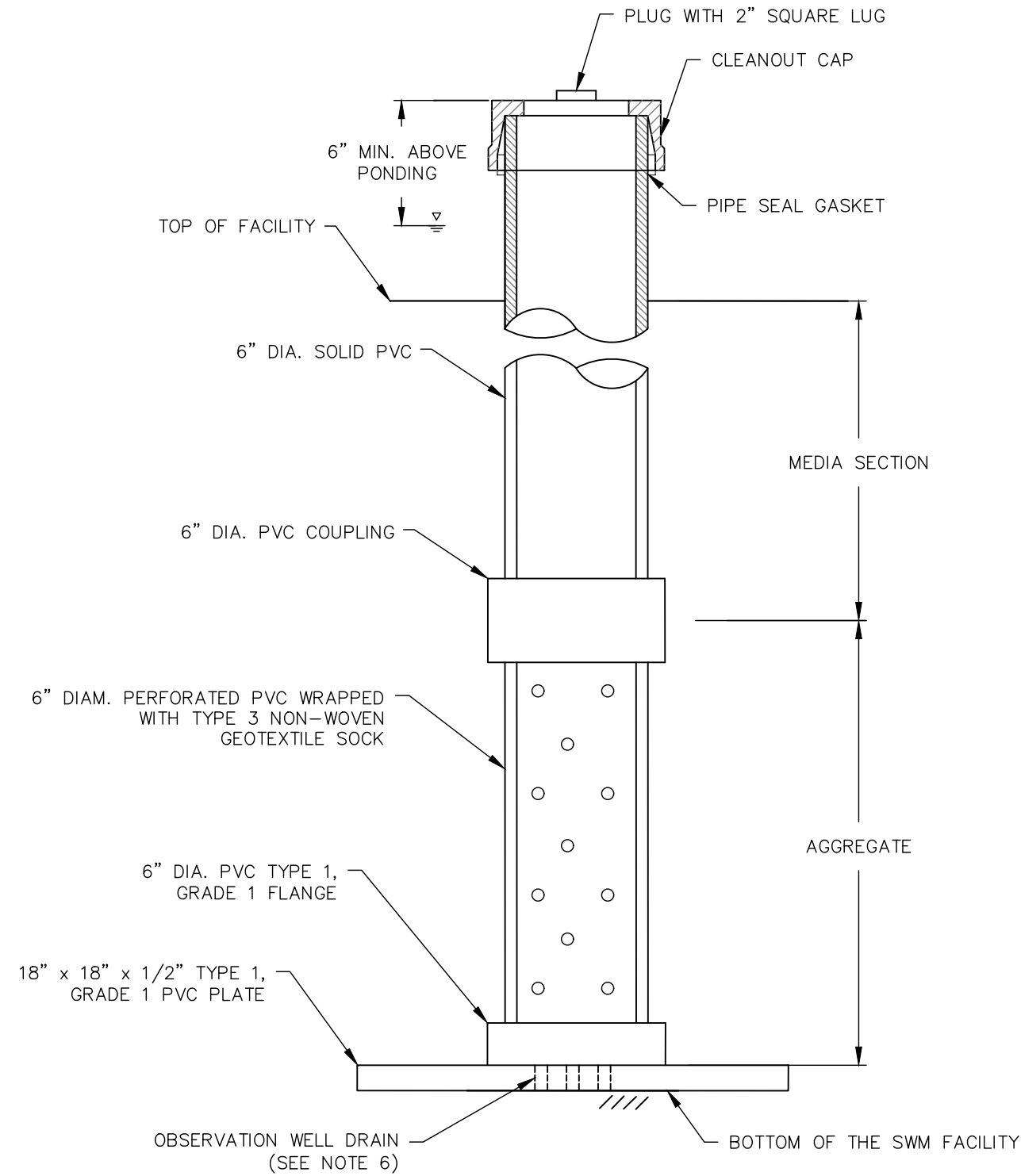


GWINNETT COUNTY DATE: AUGUST 2021

DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

SUBSURFACE CHECK DAMS

DETAIL No. 4.0.8 SCALE: N.T.S SHEET No. 11



**NOTES:**

1. OBSERVATION WELLS (6" PVC SCH. 40 PIPE) SHALL BE PLACED IN STORMWATER BMP FACILITIES AS SPECIFIED IN PLANS.
2. THE WELL IS TO BE CAPPED USING A THREADED PVC FITTING AND SEWER CAP WITH A 2 INCH SQUARE LUG. THE DEPTH OF THE FACILITY IS TO BE MARKED ON THE CAP.
3. ENTIRE BARREL OF OBSERVATION WELL IS TO BE ENTIRELY WRAPPED IN TYPE 3 NON-WOVEN GEOTEXTILE.
4. OBSERVATION WELL ACCESS WILL VARY BASED ON FACILITY TYPE AND DESIGN. SEE CLEANOUT DETAIL 4.0.4 FOR APPLICABLE SURFACE CONDITIONS FOR OBSERVATION WELLS.
5. PERFORATIONS SHALL BE 3/8" DIA. AT MINIMUM 6" O/C EVERY 90 DEGREES AROUND PIPE.
6. THREE 1" HOLES SHALL BE DRILLED IN BOTTOM PLATE BELOW OBSERVATION WELL BASE TO ALLOW WATER TO DRAIN FROM THE OBSERVATION WELL.
7. WELLS ARE TO BE CAPPED USING A REMOVABLE WATER TIGHT PVC CAP.
8. PVC PIPE SHALL BE ATTACHED TO THE FLANGE WITH SOLVENT CEMENT PER THE MANUFACTURER SPECIFICATIONS.

No.	REVISION	DATE



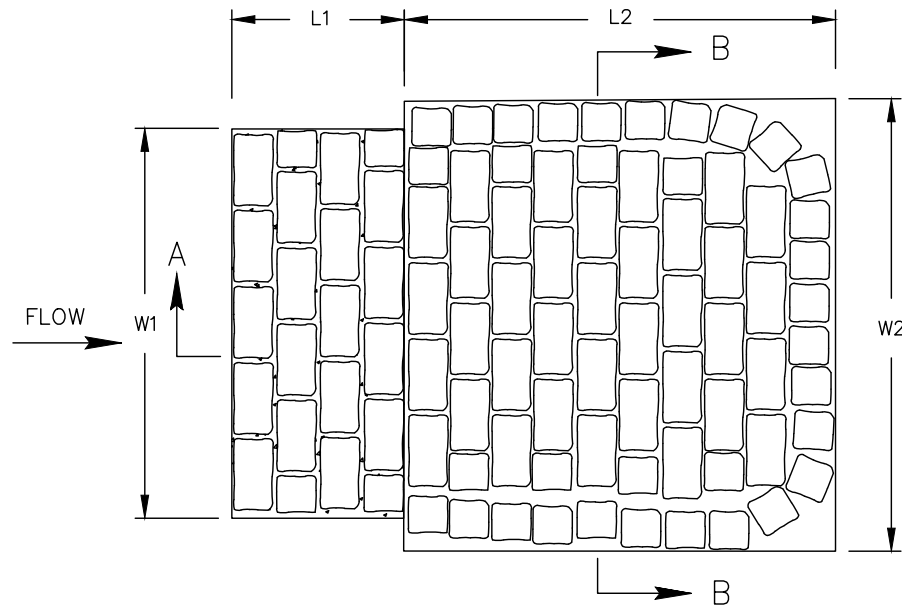
GWINNETT COUNTY DATE: AUGUST 2021

DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

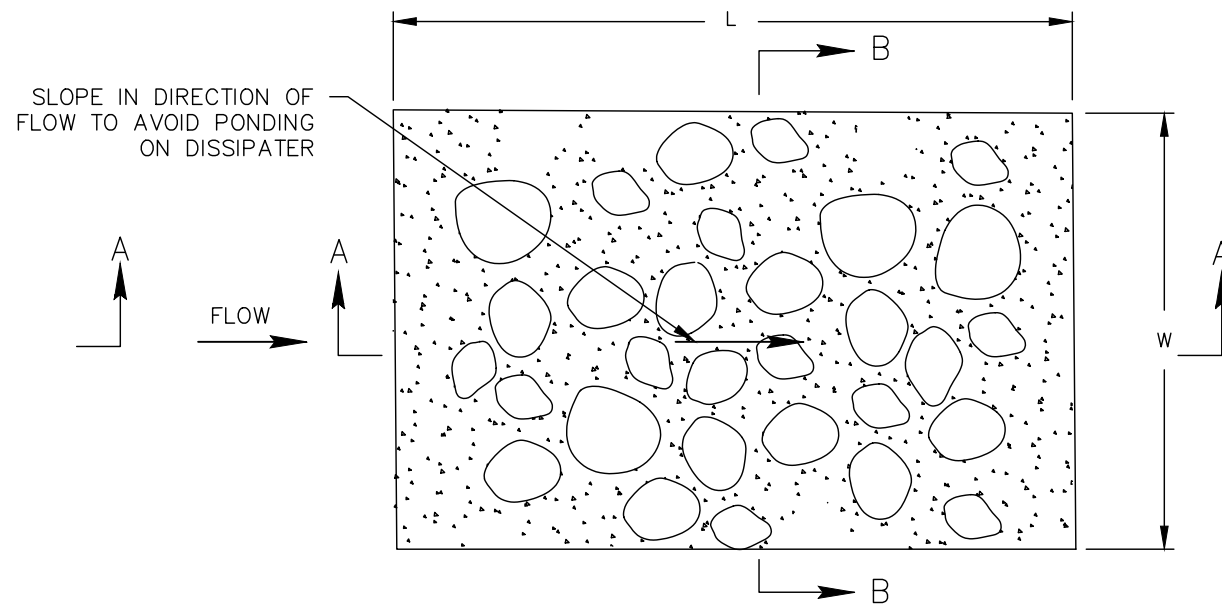
**OBSERVATION WELL**

DETAIL No. 4.0.9 SCALE: N.T.S SHEET No. 12

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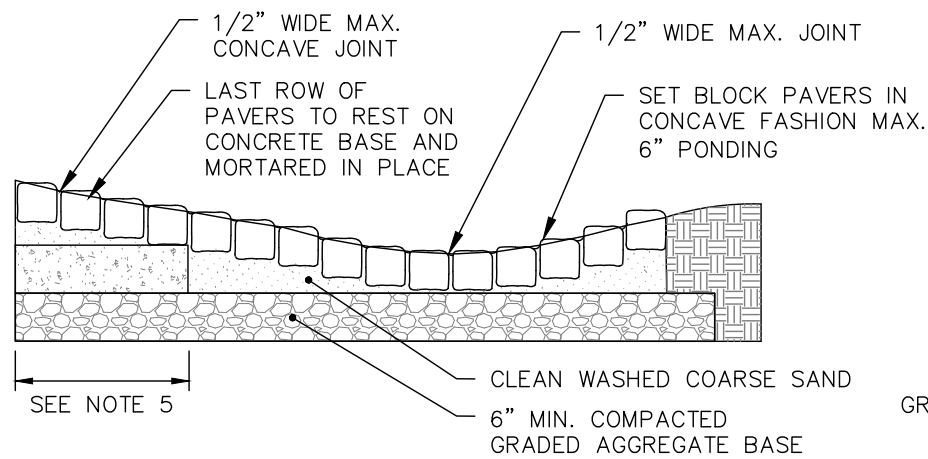
**BLOCK PAVERS – PLAN VIEW**



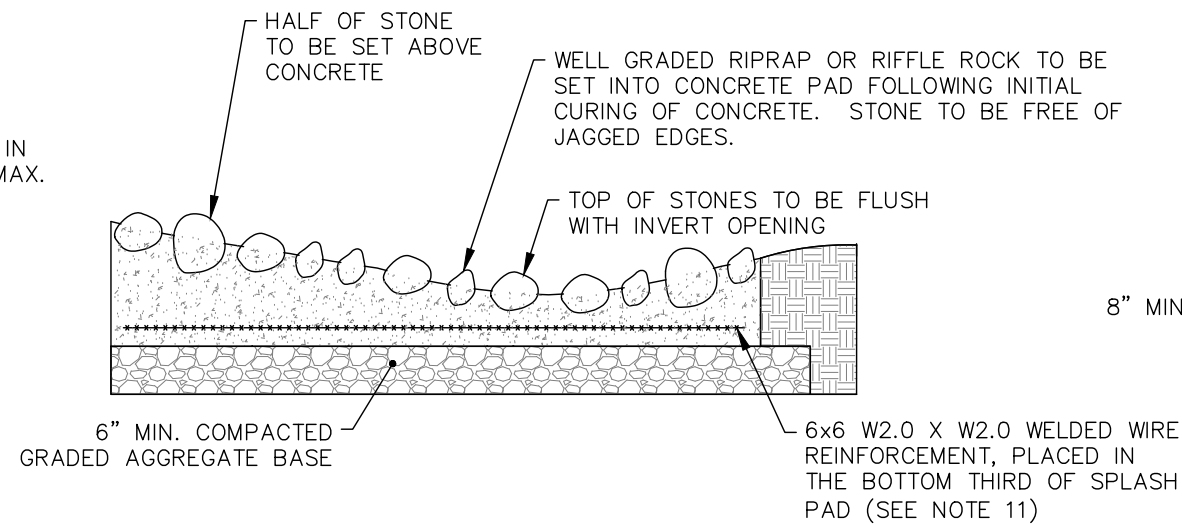
**GROUTED STONE – PLAN VIEW**

**NOTES:**

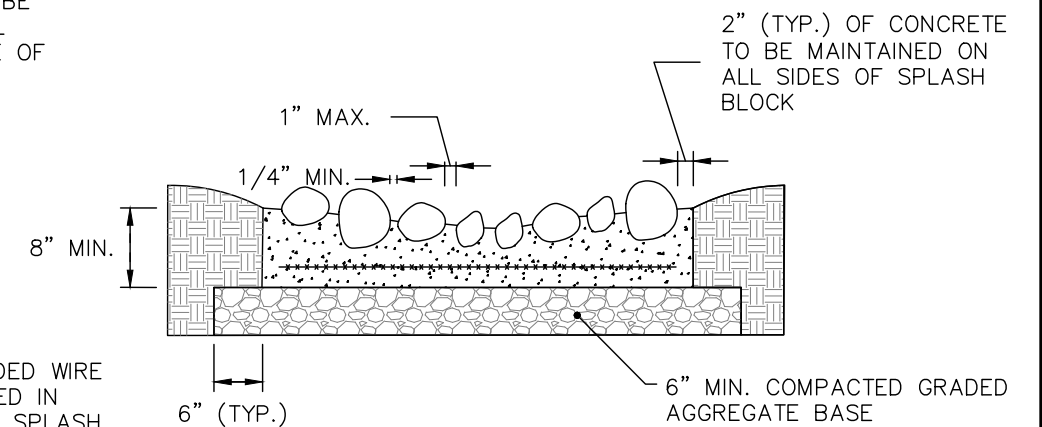
1. MORTARED JOINTS SHALL BE A CONCAVE TOOLED JOINT SET NO MORE THAN 1-4" BELOW FINISHED SURFACE.
2. 5"x 5"x 9" (NOM.) BLOCK DIMENSIONS.
3. BLOCKS MUST BE A MINIMUM OF 4" INCHES LENGTH.
4. BLOCK PAVERS MAY CONSIST OF STONE, CONCRETE, OR ARTICULATED CONCRETE BLOCKS.
5. CONCRETE BASE SHALL BE 6" THICK AND EXTEND A MINIMUM OF FOUR (4) BLOCK ROWS BEYOND POINT OF INFLOW. FIRST THREE COURSES TO BE MORTARED IN PLACE WITH GROUT AND 1/2" WIDE CONCAVE JOINT.
6. DIMENSIONS OF SPLASH PADS SHALL BE SIZED BY THE ENGINEER.
7. ROCKS SHALL BE ARRANGED IN PATTERN THAT PREVENTS LINEAR FLOW PATHS THROUGH THE SPLASH BLOCKS.
8. ENSURE THAT SOIL BENEATH SPLASH BLOCKS IS STABLE AND WILL NOT SETTLE OVER TIME.
9. MAKE SIDES SLIGHTLY HIGHER THAN MIDDLE TO CHANNEL FLOW DOWN FULL LENGTH OF SPLASH BLOCKS.
10. ALL ENERGY DISSIPATERS SHALL BE SIZED AND DESIGNED IN ACCORDANCE WITH HEC-14.
11. ALTERNATIVE REINFORCEMENT DESIGN MAY BE USED IN LIEU OF WELDED WIRE REINFORCEMENT (WWR) AS APPROVED BY THE ENGINEER.



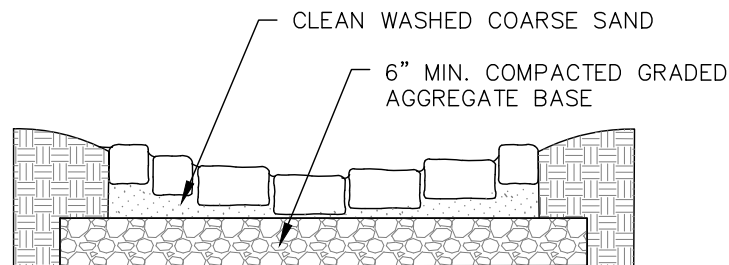
**BLOCK PAVERS – SECTION A-A**



**GROUTED STONE – SECTION A-A**



**GROUTED STONE – SECTION B-B**



**BLOCK PAVERS – SECTION B-B**

No.	REVISION	DATE



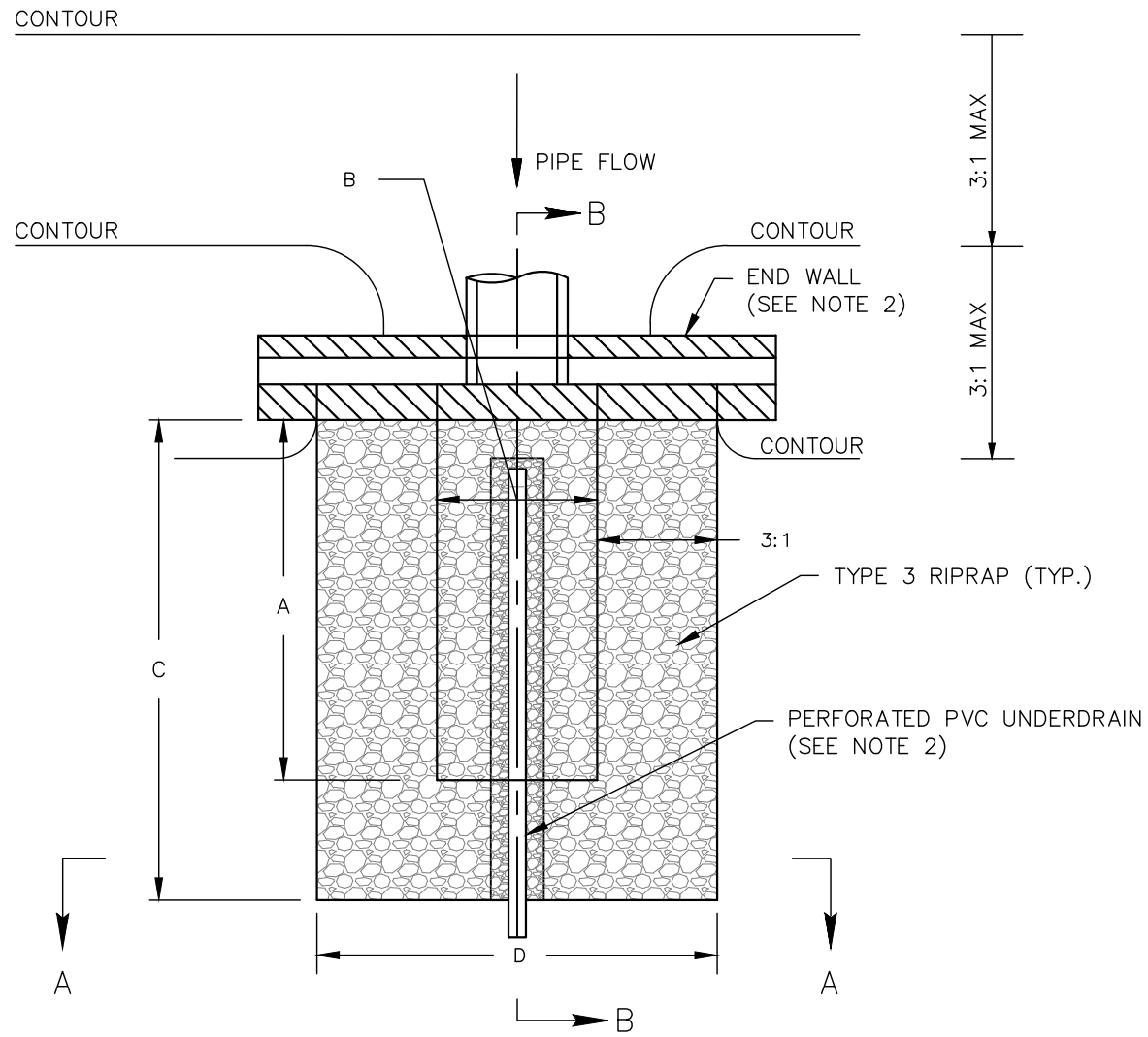
GWINNETT COUNTY DATE: AUGUST 2021

DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

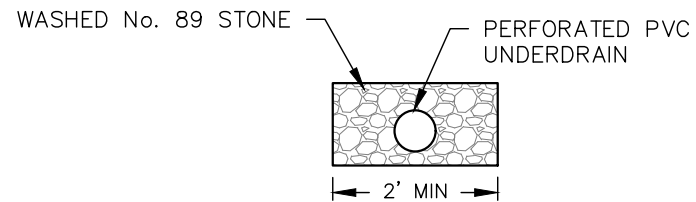
**SPLASH BLOCK ENERGY DISSIPATER**

DETAIL No. 4.0.10 SCALE: N.T.S SHEET No. 13

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ENERGY DISSIPATER - PLAN VIEW

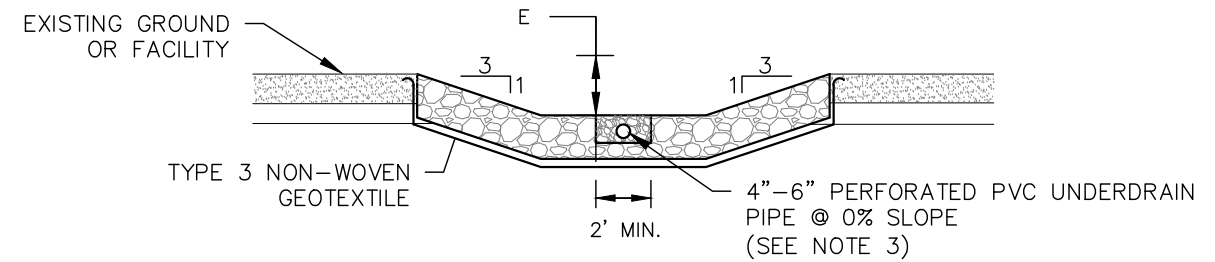


UNDERDRAIN TRENCH

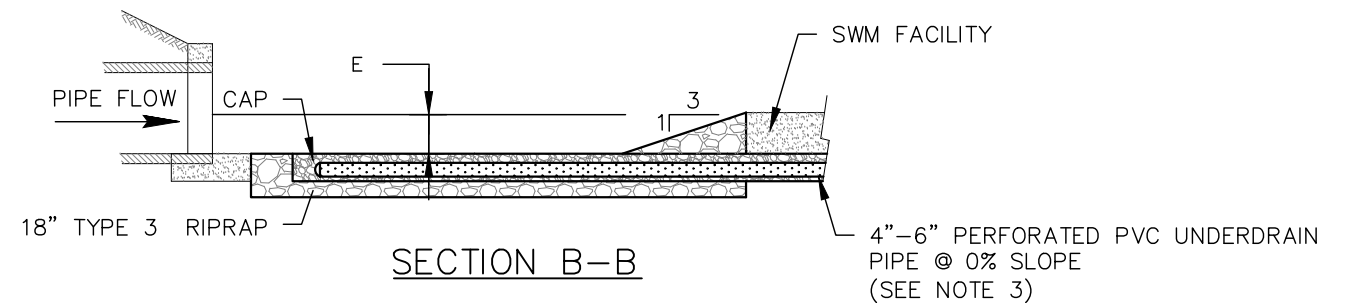
NOTES:

1. ENERGY DISSIPATER IS TO BE USED FOR CONCENTRATED FLOW INTO A SWM FACILITY ONLY.
2. PIPE ENDWALL / OUTFALL CONFIGURATIONS MAY VARY FROM WHAT IS SHOWN.
3. FOR INFILTRATION PRACTICES THE UNDERDRAIN CAN OUTLET INTO THE FACILITY MEDIA. FOR NON INFILTRATION PRACTICES THE UNDERDRAIN SHALL DISCHARGE AT AN OUTLET STRUCTURE OR BE DAYLIGHTED TO PROVIDE POSITIVE DRAINAGE.

PIPE DIA. (IN.)	"A" (FT.)	"B" (FT.)	"C" (FT.)	"D" (FT.)	"E" (FT.)
12"	4.53	2.00	6.00	5.00	0.5
15"	5.64	2.50	7.50	6.28	0.63
18"	6.75	3.00	9.00	7.50	0.75
21"	7.89	3.50	10.50	8.78	0.88
24"	9.00	4.00	12.00	10.00	1.00
27"	10.14	4.50	13.50	11.28	1.13
30"	11.25	5.00	15.00	12.50	1.25



SECTION A-A



SECTION B-B

No.	REVISION	DATE



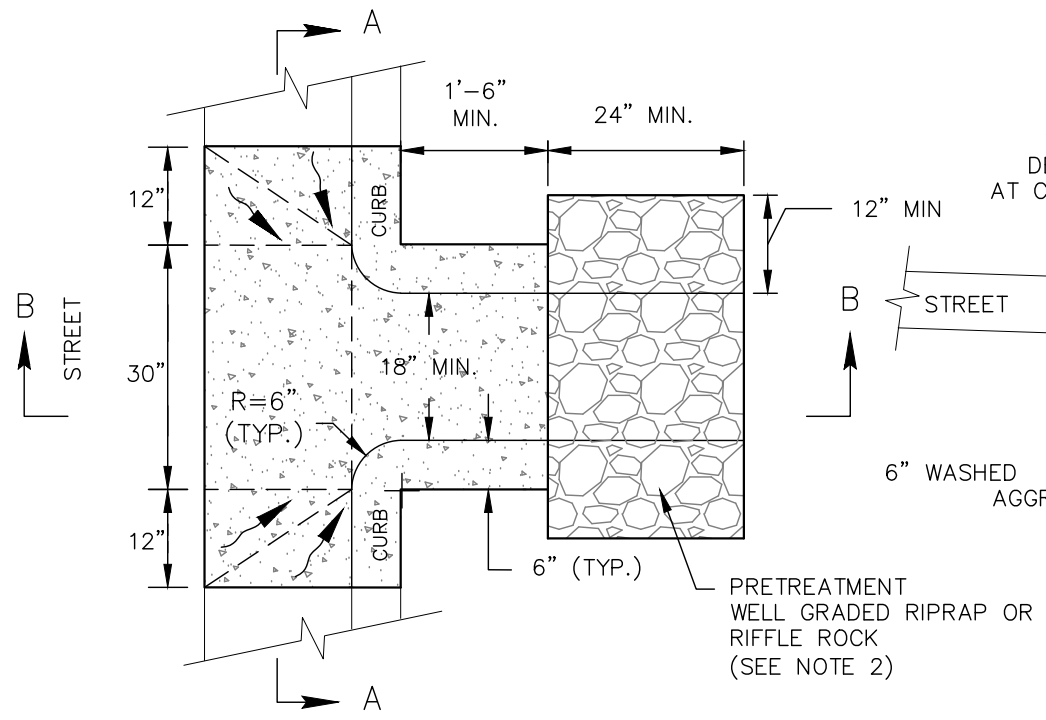
GWINNETT COUNTY DATE: AUGUST 2021

DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

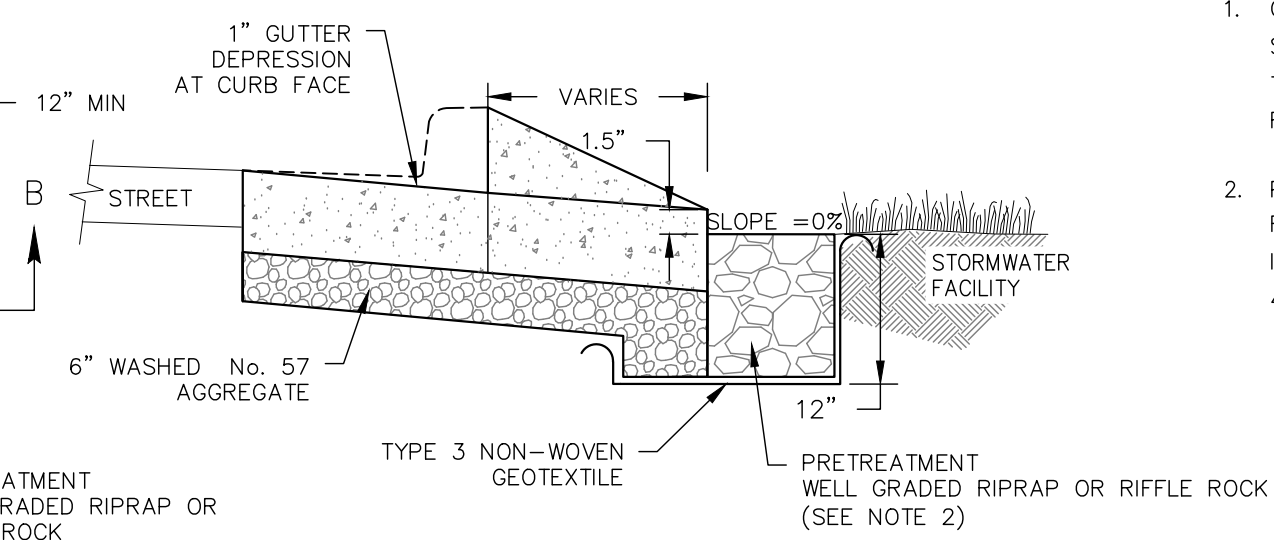
STILLING BASIN ENERGY DISSIPATER

DETAIL No. 4.0.11 SCALE: N.T.S SHEET No. 14





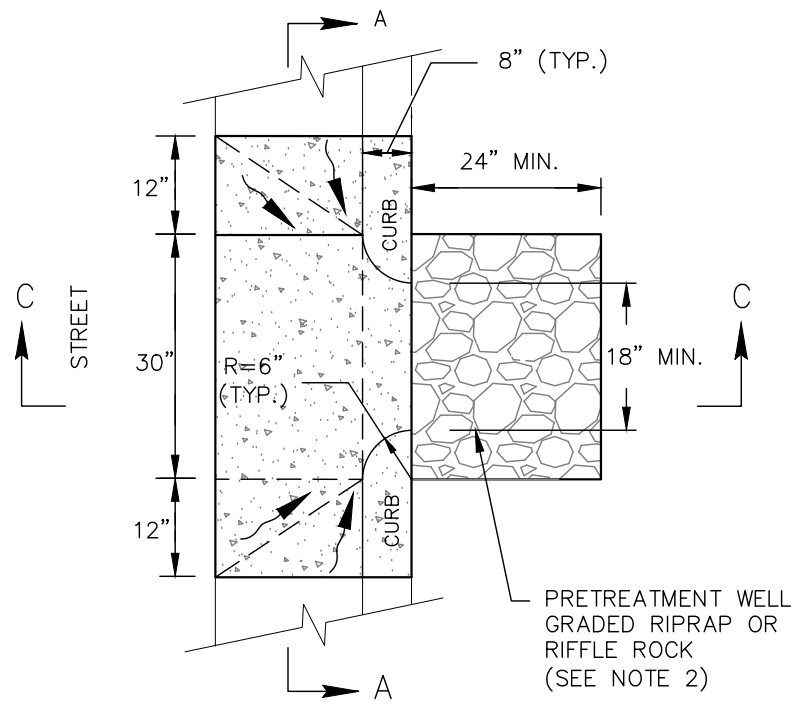
DETAIL A: CURB CUT INLET WITH WING WALLS



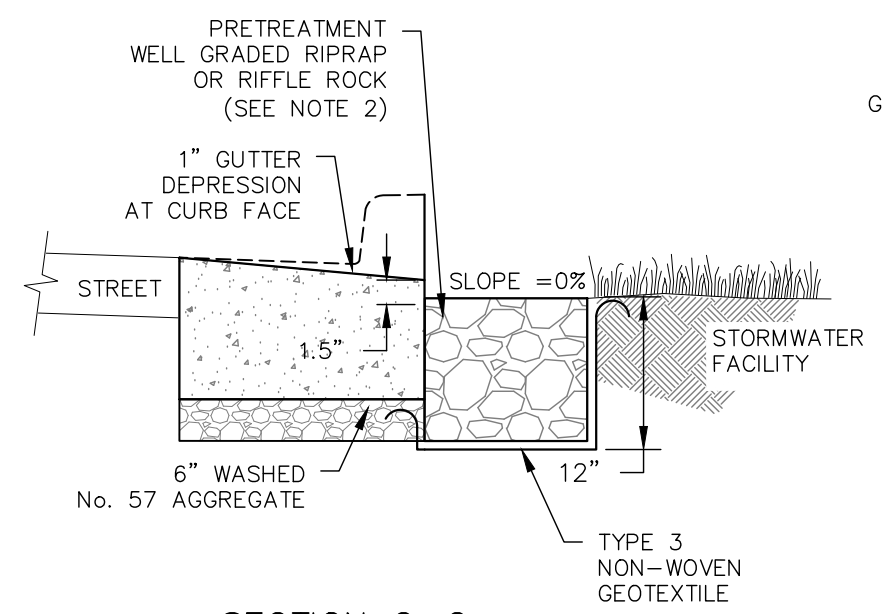
SECTION B-B

NOTES:

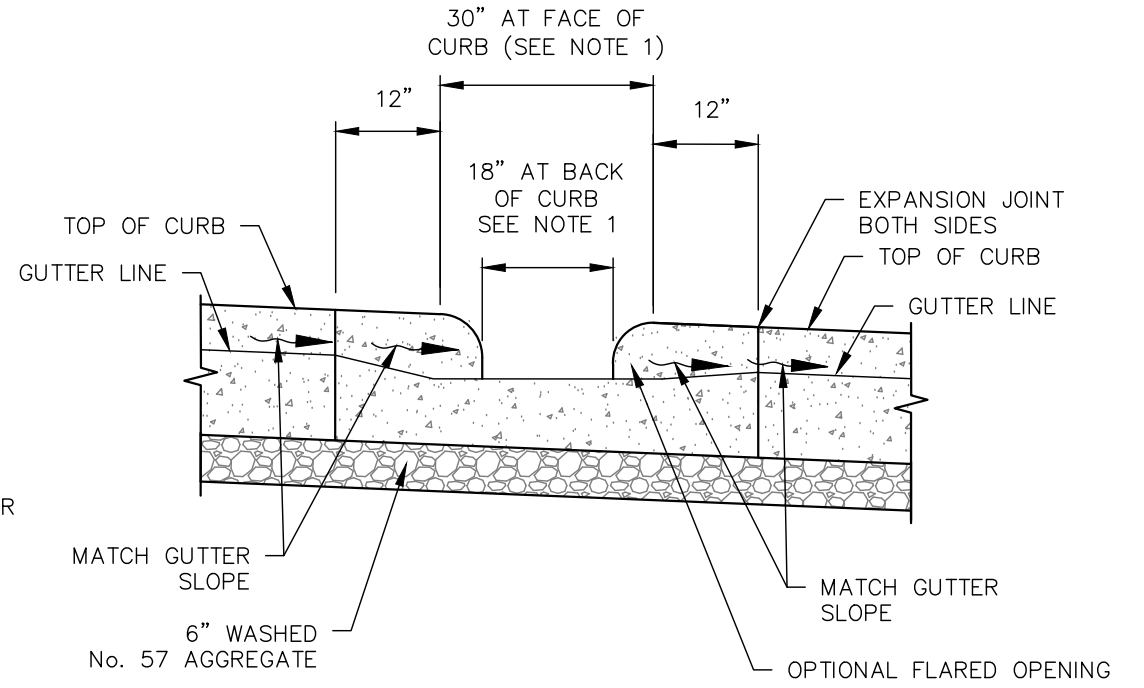
1. CURB OPENING DIMENSION SHOWN IS A MINIMUM, CURB CUT SHALL BE SIZED BY THE ENGINEER TO CONVEY 1.2-INCH RAINFALL (OFFLINE) OR TO CONTROL SPREAD IN THE GUTTER PAN (ONLINE) PER GCSMM REQUIREMENTS.
2. PRETREATMENT IS REQUIRED PRIOR TO DISCHARGING CONCENTRATED FLOW ONTO ERODIBLE AREAS. ALTERNATIVE PRETREATMENT OPTIONS INCLUDE SPLASH BLOCK (DETAIL 4.0.10), GRAVEL DIAPHRAGM (DETAIL 4.0.2), FOREBAY, OR APPROVED EQUIVALENT.



DETAIL B: CURB CUT WITHOUT WING WALLS



SECTION C-C



SECTION A-A

No.	REVISION	DATE

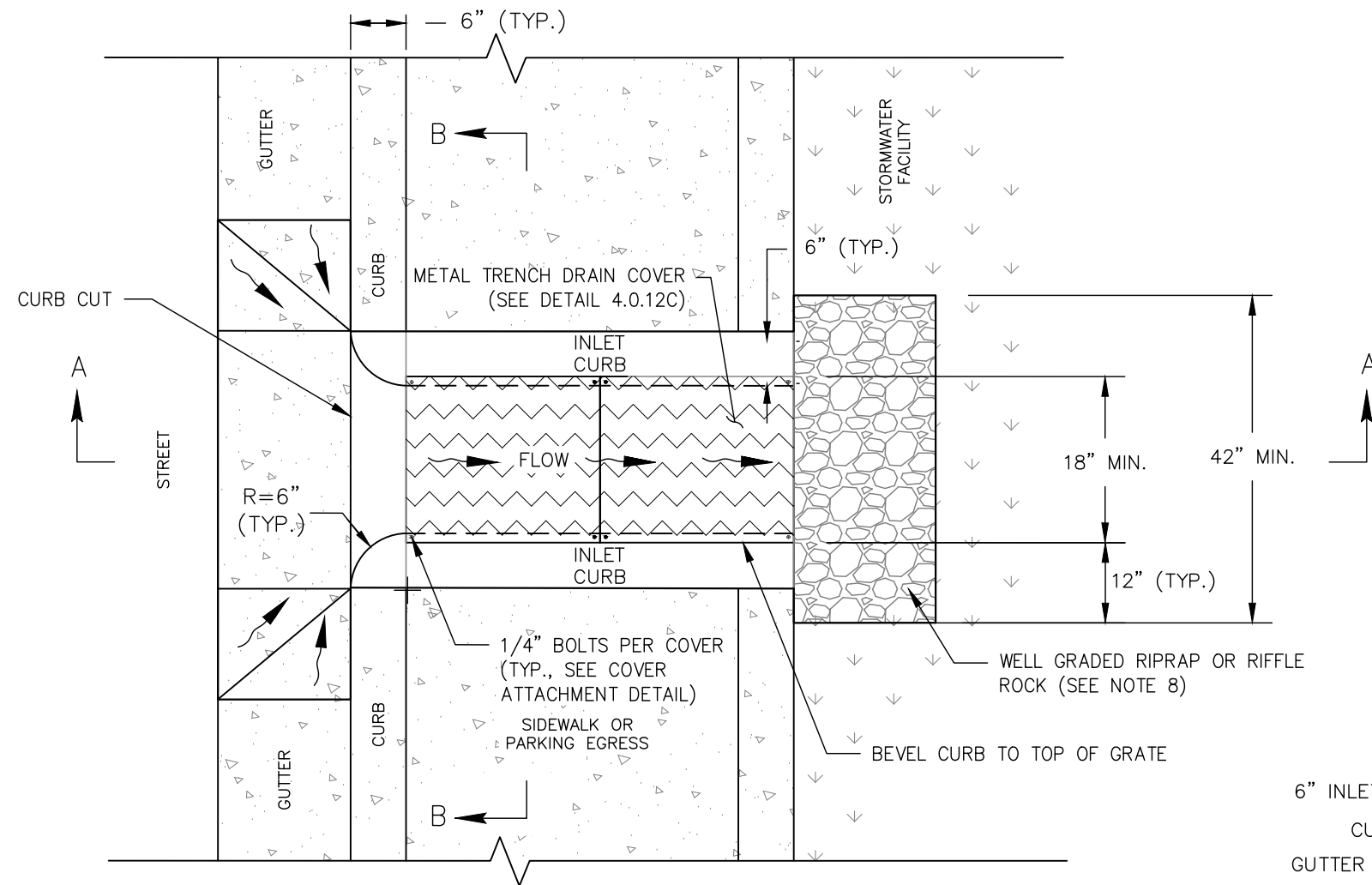


GWINNETT COUNTY DATE: AUGUST 2021

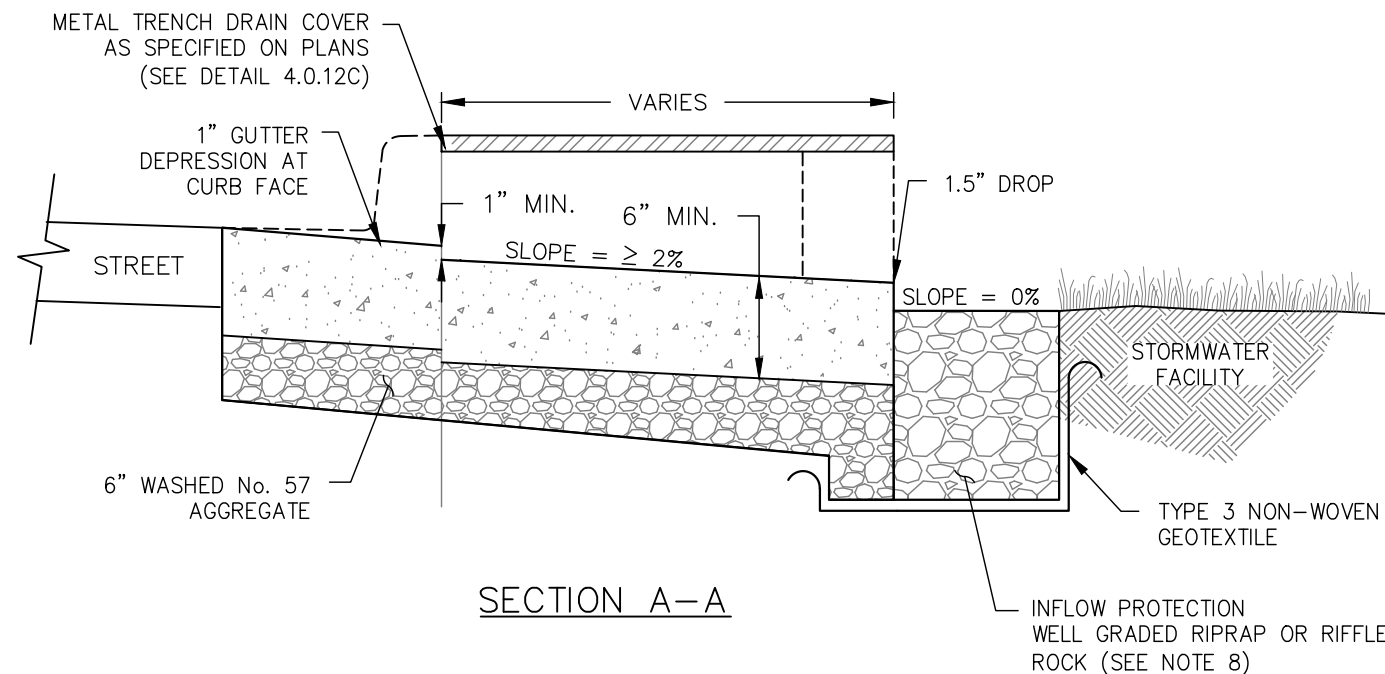
DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

**CURB CUT INLETS**

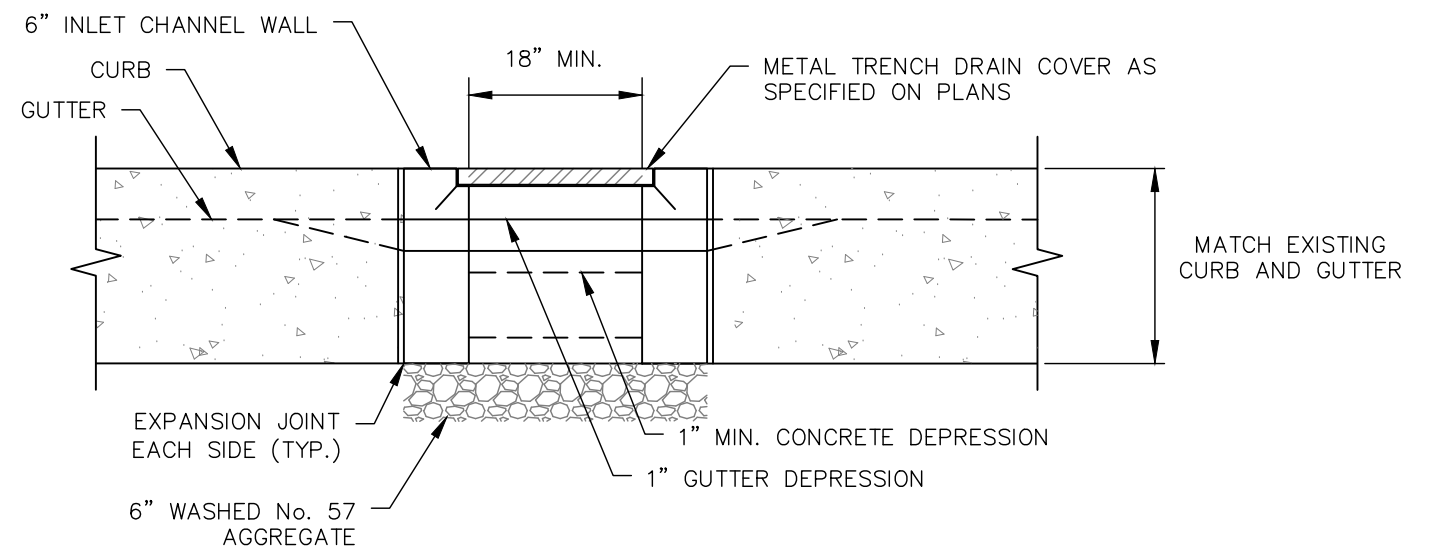
DETAIL No. 4.0.12A SCALE: N.T.S SHEET No. 15



PLAN VIEW



SECTION A-A



SECTION B-B

NOTES:

1. CURB OPENING DIMENSION SHOWN IS A MINIMUM. CURB CUTS SHALL BE SIZED TO CONVEY 1.2" RAINFALL (OFFLINE) OR TO CONTROL SPREAD IN THE GUTTER PAN (ONLINE) PER GCSMM.
2. REFER TO DESIGN PLANS FOR SIZE AND TYPE OF GRATE.
3. METAL TRENCH DRAIN COVER TO BE BOLTED DOWN (THEFT PROTECTED) BUT REMOVABLE.
4. FOR DIMENSIONS AND SLOPES, SEE DESIGN PLANS.
5. PROTECT THREADED HOLES IN FRAME FROM CLOGGING DURING INSTALLATION.
6. COVER TO BE APPROPRIATE FOR PEDESTRIAN LOADING WITH NON-SLIP SURFACE HAVING A STATIC COEFFICIENT OF FRICTION BETWEEN 0.6 AND 1.0 PER ASTM C1020.
7. COVER SHALL BE ADA COMPLIANT.
8. PRETREATMENT IS REQUIRED PRIOR TO DISCHARGING CONCENTRATED FLOW ONTO ERODIBLE AREAS. PRETREATMENT OPTIONS INCLUDE SPLASH BLOCK (DETAIL 4.0.10), GRAVEL DIAPHRAGM (DETAIL 4.0.2), FOREBAY, OR APPROVED EQUIVALENT.

No.	REVISION	DATE



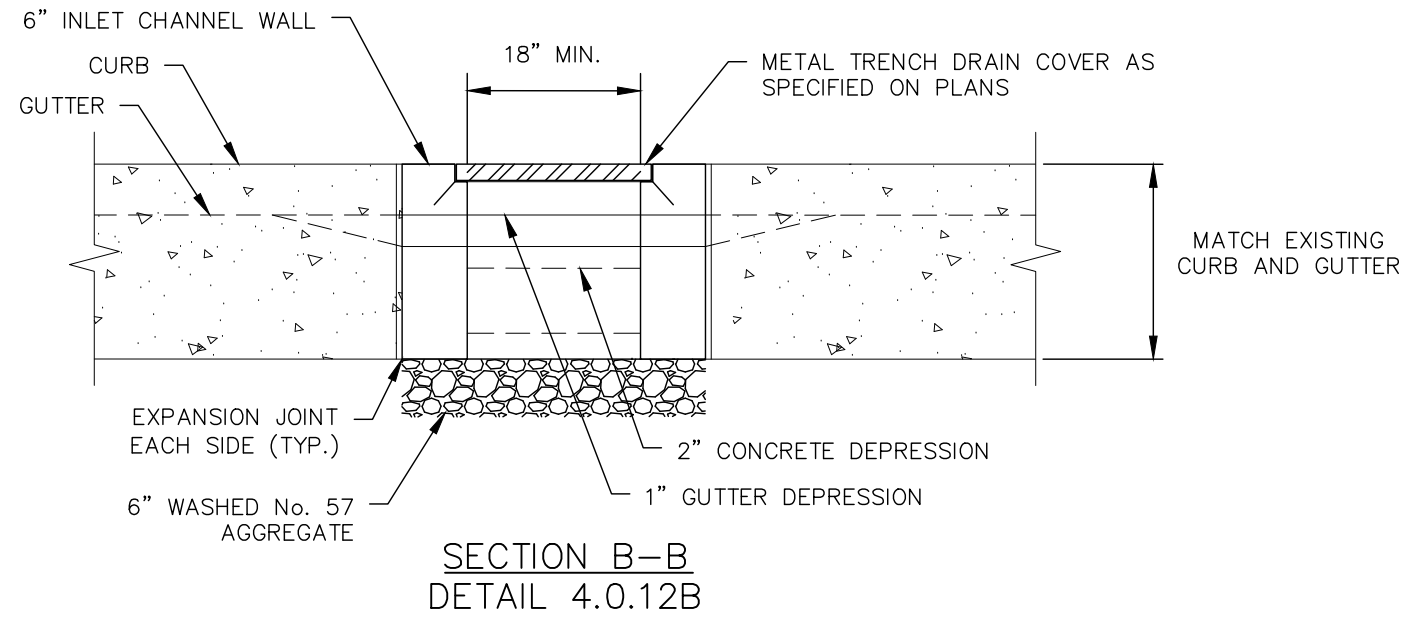
GWINNETT COUNTY DATE: AUGUST 2021

DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

CURB CUT INLETS

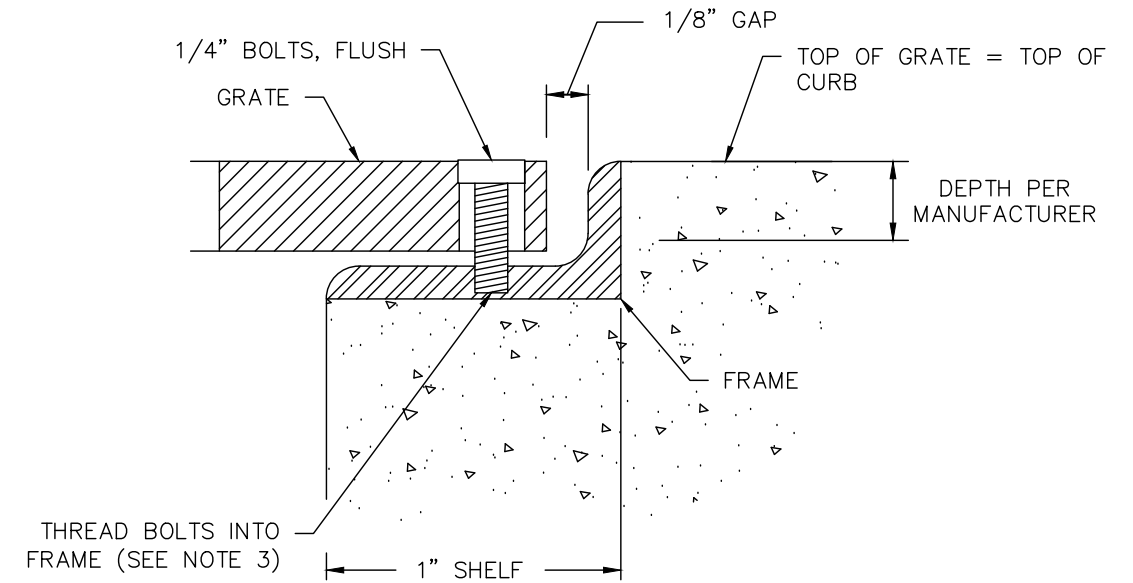
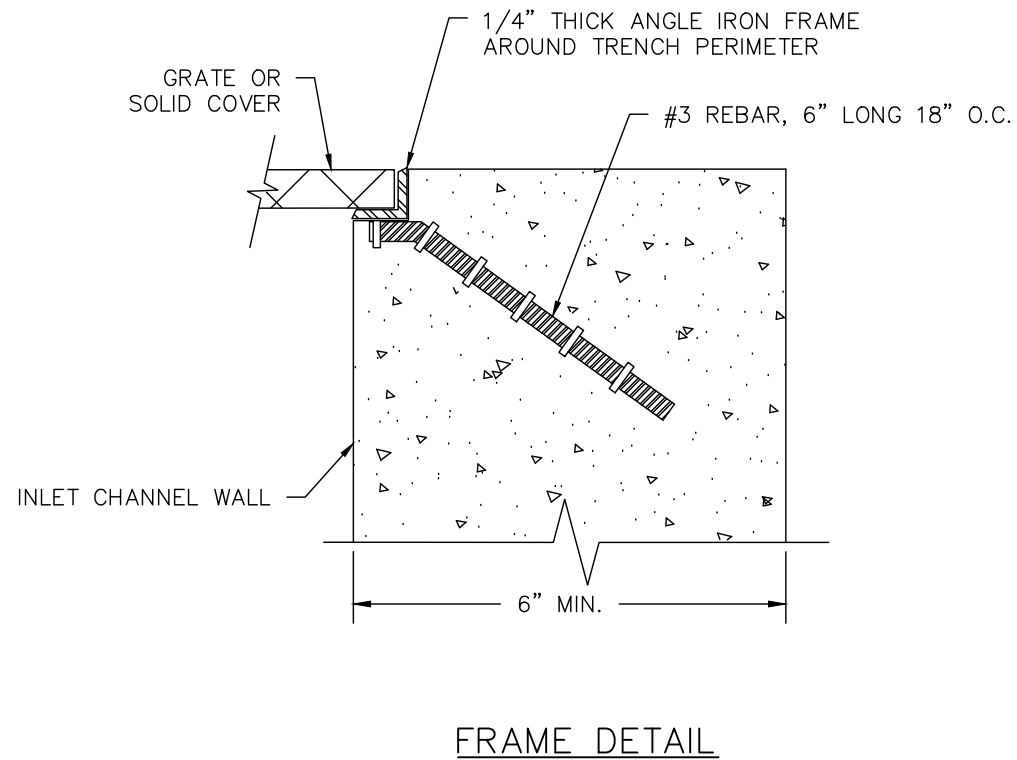
DETAIL No. 4.012B SCALE: N.T.S SHEET No. 16

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**NOTES:**

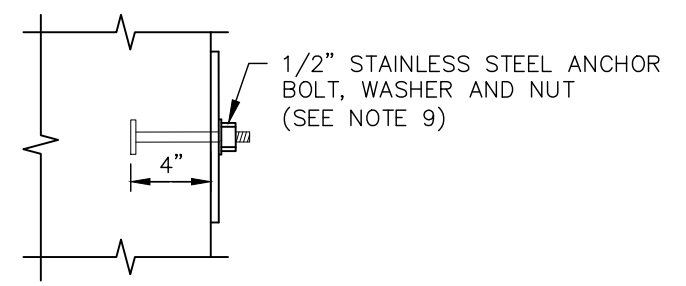
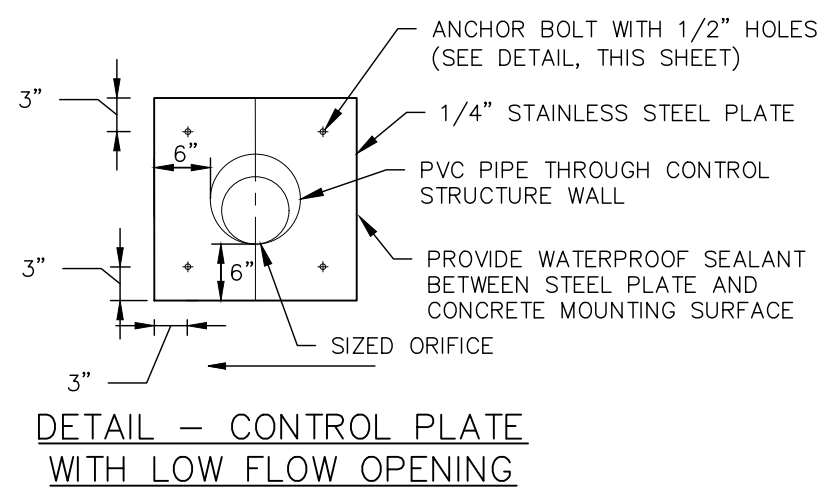
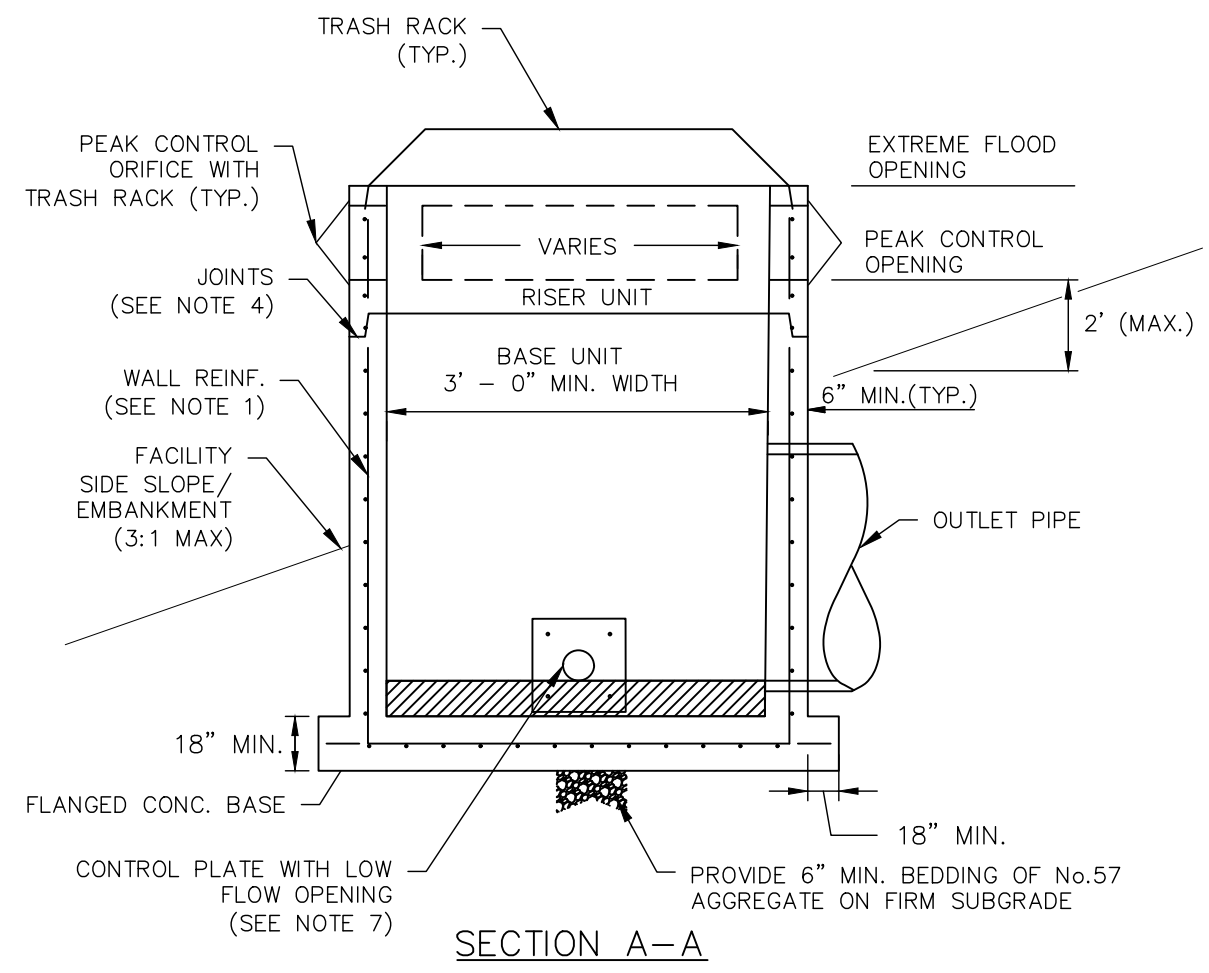
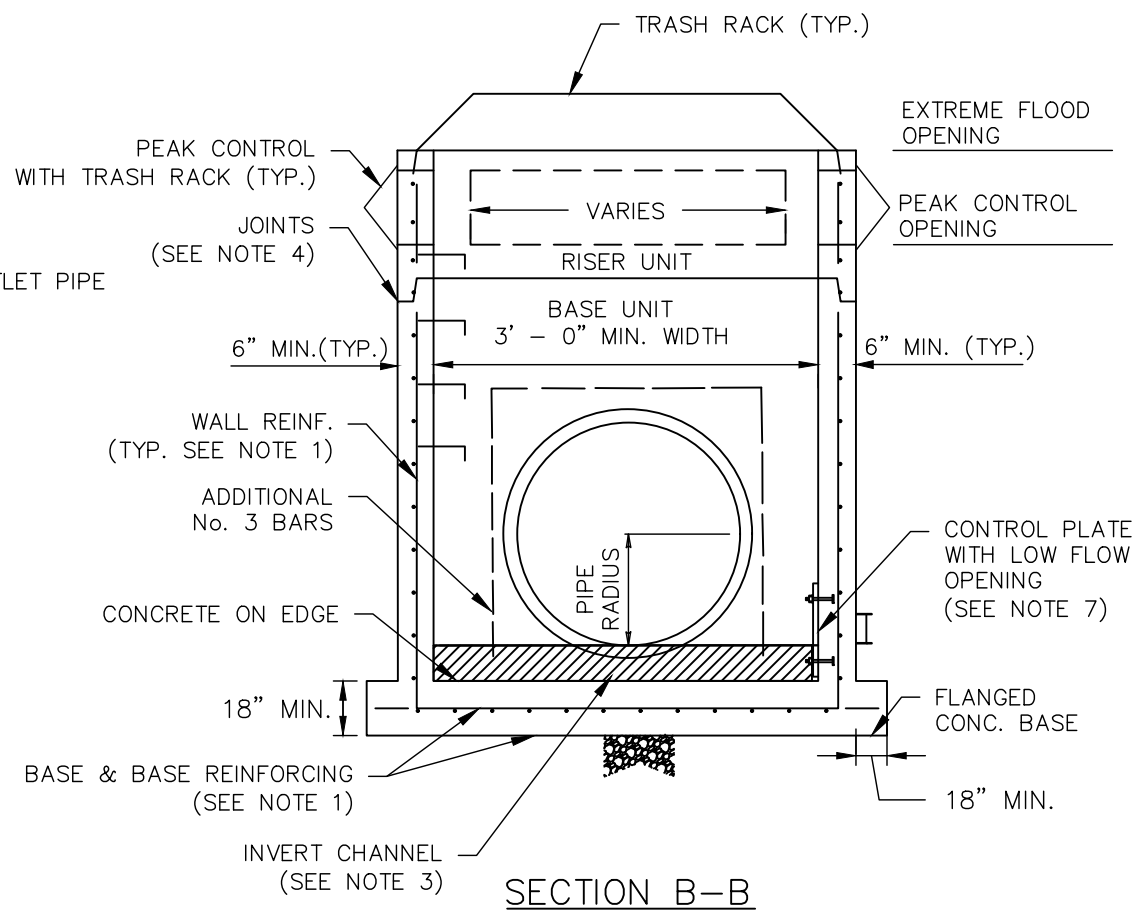
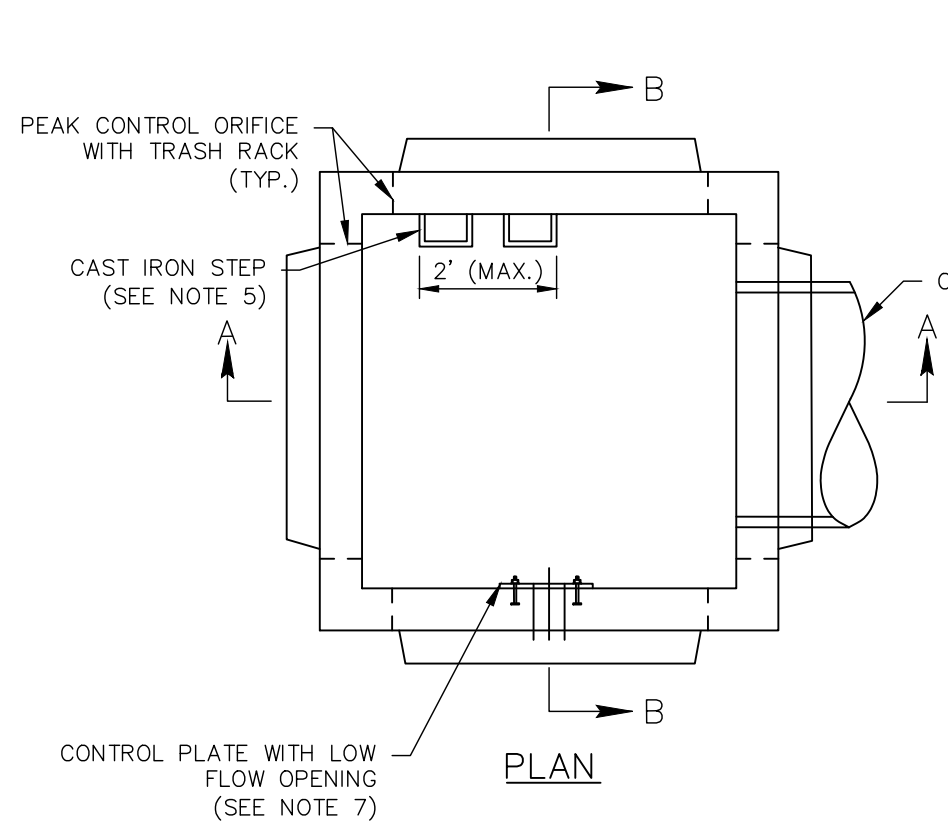
1. CAST IRON, NATURAL FINISH.
2. NO OPENING GREATER THAN 3/8".
3. PROTECT THREADED HOLES IN FRAME FROM CLOGGING DURING FRAME INSTALLATION.
4. GRATE TO BE RATED FOR H-20 LOADING, WITH A NON-SLIP SURFACE HAVING A STATIC COEFFICIENT OF FRICTION BETWEEN 0.60 AND 1.0 PER ASTM C1020. GRATES ON INCLINES GREATER THAN 4% SHALL HAVE A COEFFICIENT OF 0.80 TO 1.0.
5. WAVY GRATE AS SHOWN OR APPROVED ADA COMPLIANT EQUIVALENT.
6. ALTERNATE: PREFABRICATED FRAME AND COVER ASSEMBLIES TO BE SUBMITTED TO ENGINEER FOR APPROVAL.



No.	REVISION	DATE		GWINNETT COUNTY	DATE: AUGUST 2021
					DEPARTMENT OF WATER RESOURCES
				STANDARD DRAWING	
				<b>CURB CUT INLETS</b>	
				DETAIL No. 4.012C	SCALE: N.T.S SHEET No. 17



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**NOTES:**

1. MATERIALS: ALL CONCRETE, STEEL BARS AND STEEL WIRE REINFORCEMENT SHALL COMPLY WITH SECTION 866 OF GEORGIA STANDARD SPECIFICATIONS AND SPECIAL PROVISION WHICH MODIFY SECTION 866.
2. PRECAST CONCRETE STRUCTURES SHALL BE DESIGNED BY THE MANUFACTURER. CALCULATIONS AND DETAILS SHALL BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF GEORGIA AND SUBMITTED TO THE ENGINEER FOR REVIEW.
3. INVERT CHANNELS SHALL BE CHANNELS BUILT TO SUIT PIPE SIZES AND LOCATIONS. CHANNEL BUILT FROM GROUT OR CLASS "A" CONCRETE.
4. THE JOINTS SHALL BE SEALED BY THE CONTRACTOR AND MADE WATERTIGHT (WHERE APPLICABLE) USING MORTAR AND RUBBER O-RING GASKETS MEETING AASHTO M 198, TYPE B.
5. SEE LADDER BAR DETAIL ON DETAIL SHEET 602 (STANDARD CATCH BASINS) OF THE GWINNETT COUNTY STANDARD DRAWINGS.
6. DESIGNER SHALL SPECIFY THE PRECAST CONCRETE STRUCTURES FOR A MINIMUM FACTOR OF SAFETY AGAINST FLOTATION OF 1.5. CALCULATIONS SHALL BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF GEORGIA.
7. LOW FLOW OPENING SHALL INCLUDE EITHER INTERNAL ORIFICE PROTECTION (DETAIL 4.0.6) OR A TRASH RACK (DETAIL 4.0.15).
8. ALL ORIFICES ARE TO BE SIZED BY THE ENGINEER PER THE GWINNETT COUNTY STORMWATER MANAGEMENT DESIGN MANUAL.
9. ANCHOR BOLTS SHALL BE INSTALLED PER MANUFACTURER RECOMMENDATIONS AND IN ACCORDANCE WITH ACI 318 REQUIREMENTS.
10. CONCRETE DROP STRUCTURES REQUIRING A PVC TIE-IN SHALL BE DESIGNED TO HAVE A FLEXIBLE WATERTIGHT MANHOLE CONNECTOR INLAID IN THE DROP STRUCTURE FORM PRIOR TO CAST OR PRODUCTION. THIS IS TO PROPERLY TIE-IN PVC PIPE AND PREVENT LEAKAGE.
11. OUTLET CONTROL STRUCTURES SHALL BE INSTALLED IN THE FACILITY EMBANKMENT FOR MAINTENANCE ACCESS.

No.	REVISION	DATE



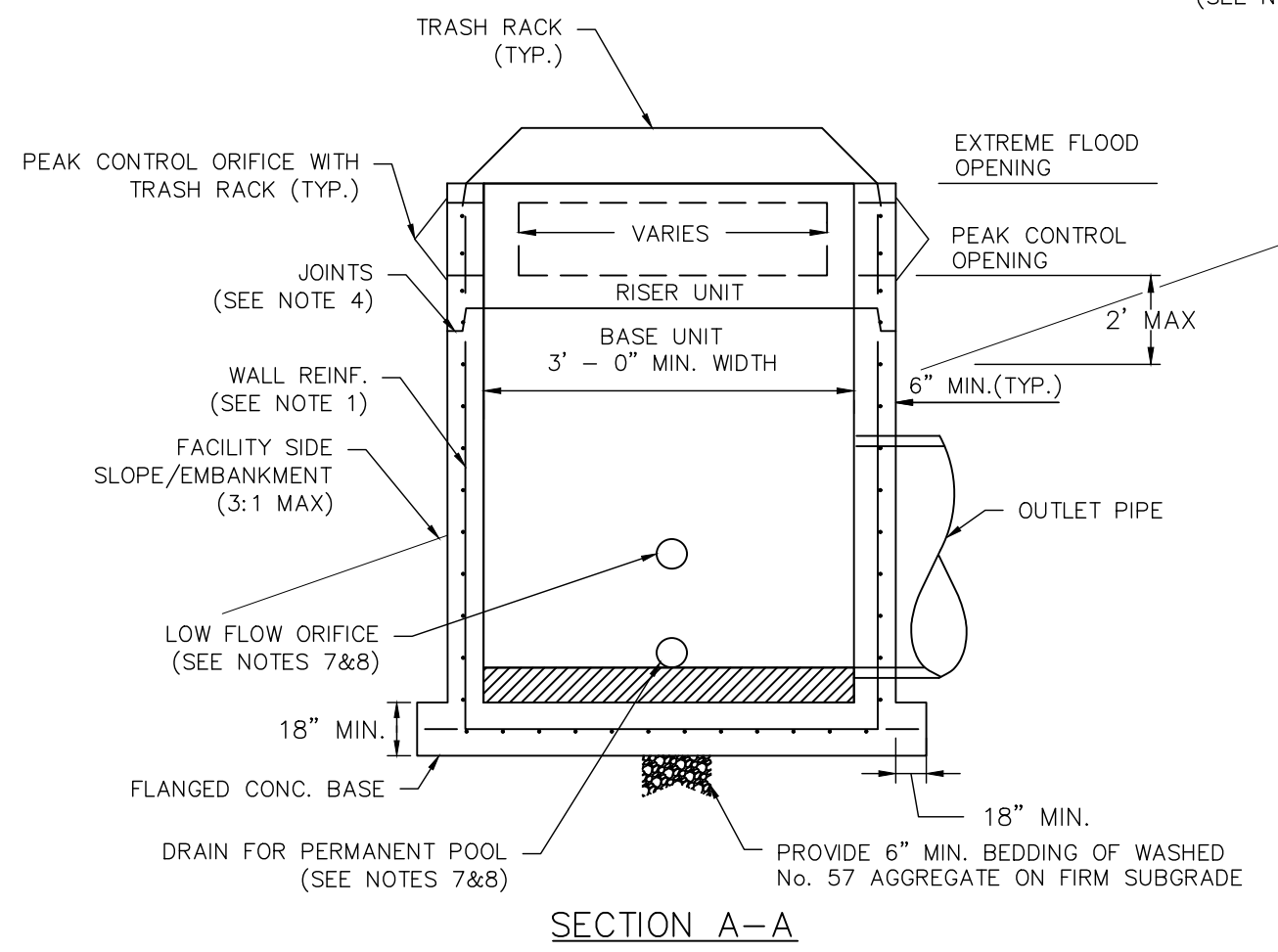
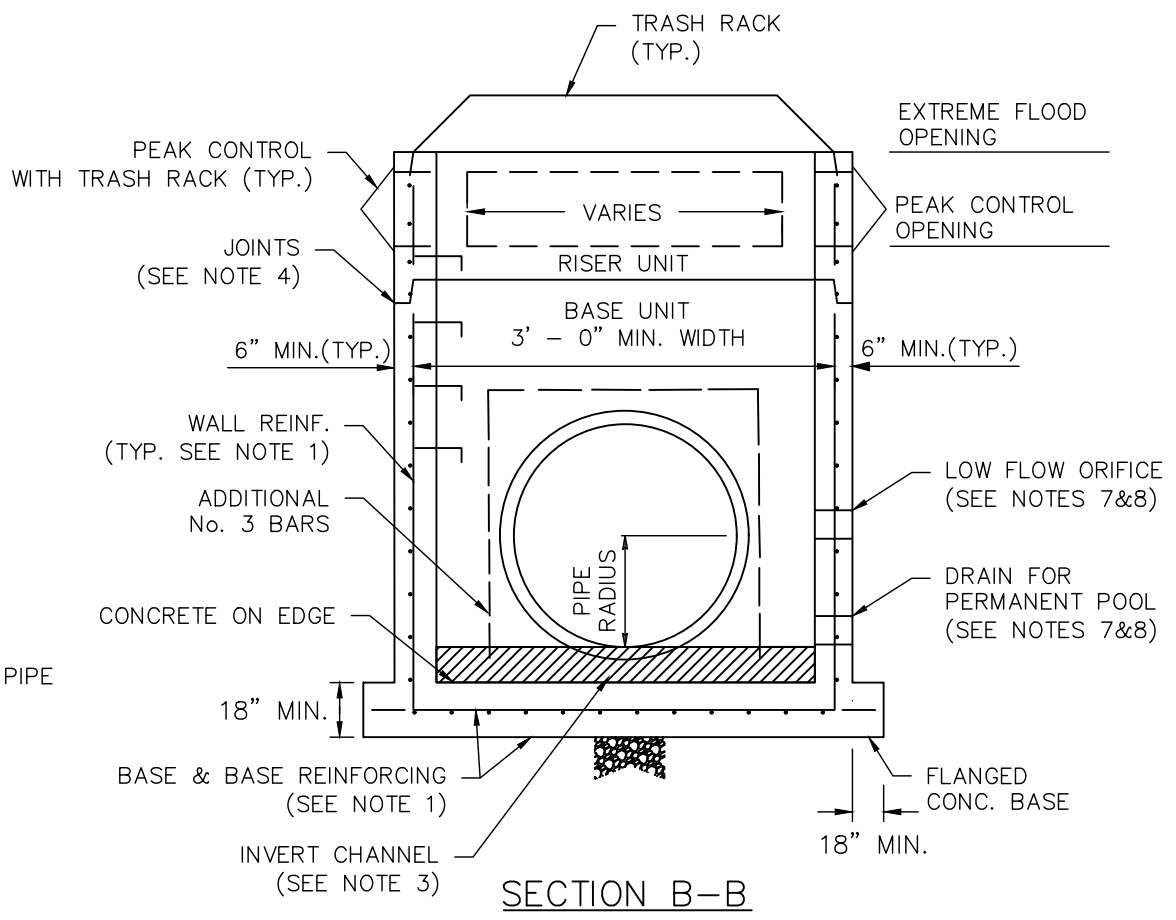
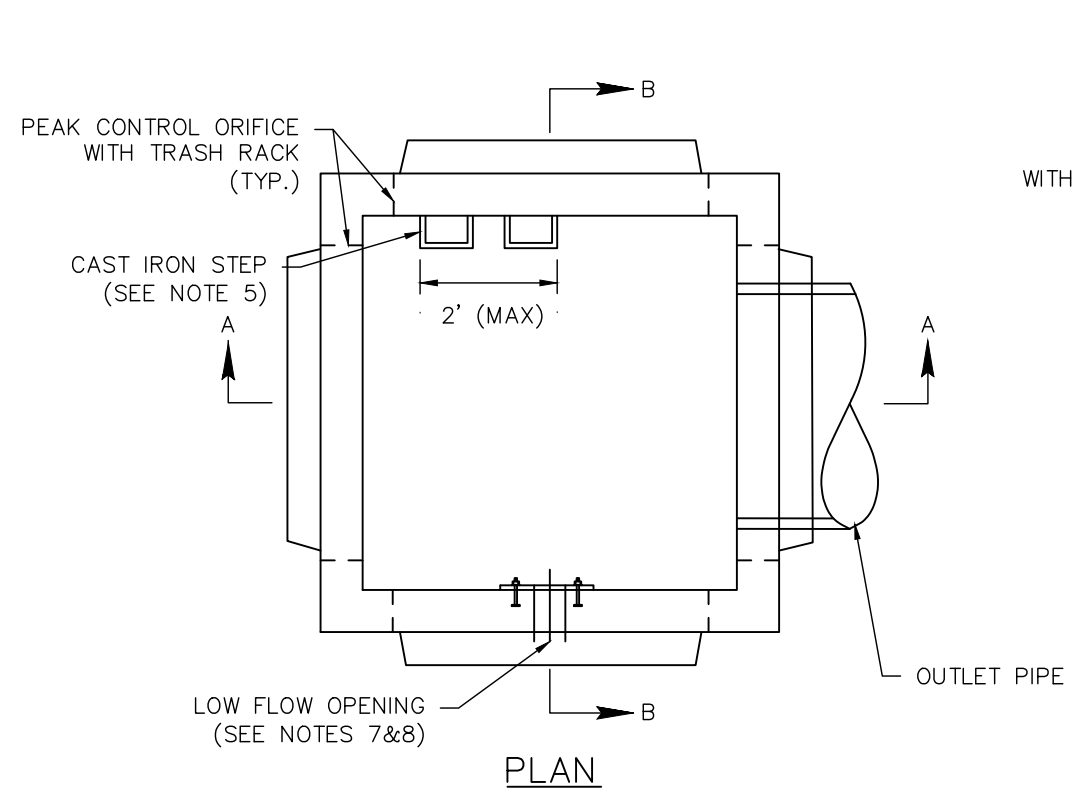
GWINNETT COUNTY DATE: AUGUST 2021

DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

**OUTLET CONTROL STRUCTURE -  
DRY AND EXTENDED DETENTION**

DETAIL No. 4.0.13 SCALE: N.T.S SHEET No. 18

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**NOTES:**

1. MATERIALS: ALL CONCRETE, STEEL BARS AND STEEL WIRE REINFORCEMENT SHALL COMPLY WITH SECTION 866 OF GEORGIA STANDARD SPECIFICATIONS AND SPECIAL PROVISION WHICH MODIFY SECTION 866.
2. PRECAST CONCRETE STRUCTURES SHALL BE DESIGNED BY THE MANUFACTURER. CALCULATIONS AND DETAILS SHALL BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF GEORGIA AND SUBMITTED TO THE ENGINEER FOR REVIEW.
3. INVERT CHANNELS SHALL BE CHANNELS BUILT TO SUIT PIPE SIZES AND LOCATIONS. CHANNEL BUILT FROM GROUT OR CLASS "A" CONCRETE.
4. THE JOINTS SHALL BE SEALED BY THE CONTRACTOR AND MADE WATERTIGHT (WHERE APPLICABLE) USING MORTAR AND RUBBER O-RING GASKETS MEETING AASHTO M 198, TYPE B.
5. SEE LADDER BAR DETAIL ON DETAIL SHEET 602 (STANDARD CATCH BASINS) OF THE GWINNETT COUNTY STANDARD DRAWINGS.
6. DESIGNER SHALL SPECIFY THE PRECAST CONCRETE STRUCTURES FOR A MINIMUM FACTOR OF SAFETY AGAINST FLOTATION OF 1.5. CALCULATIONS SHALL BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF GEORGIA.
7. LOW FLOW ORIFICE SHALL INCLUDE EITHER INTERNAL ORIFICE PROTECTION (DETAIL 4.0.6) OR A TRASH RACK (DETAIL 4.0.15).
8. AN UPTURNED UNDERDRAIN (DETAIL 4.0.5) MAY BE USED INSTEAD OF USING BOTH LOW FLOW AND POND DRAIN OPENINGS.
9. ALL ORIFICES ARE TO BE SIZED BY THE ENGINEER PER THE GWINNETT COUNTY STORMWATER MANAGEMENT DESIGN MANUAL.
10. CONCRETE DROP STRUCTURES REQUIRING A PVC TIE-IN SHALL BE DESIGNED TO HAVE A FLEXIBLE WATERTIGHT MANHOLE CONNECTOR INLAID IN THE DROP STRUCTURE FORM PRIOR TO CAST OR PRODUCTION. THIS IS TO PROPERLY TIE-IN PVC PIPE AND PREVENT LEAKAGE.
11. OUTLET CONTROL STRUCTURES SHALL BE INSTALLED IN THE FACILITY EMBANKMENT FOR MAINTENANCE ACCESS.

No.	REVISION	DATE

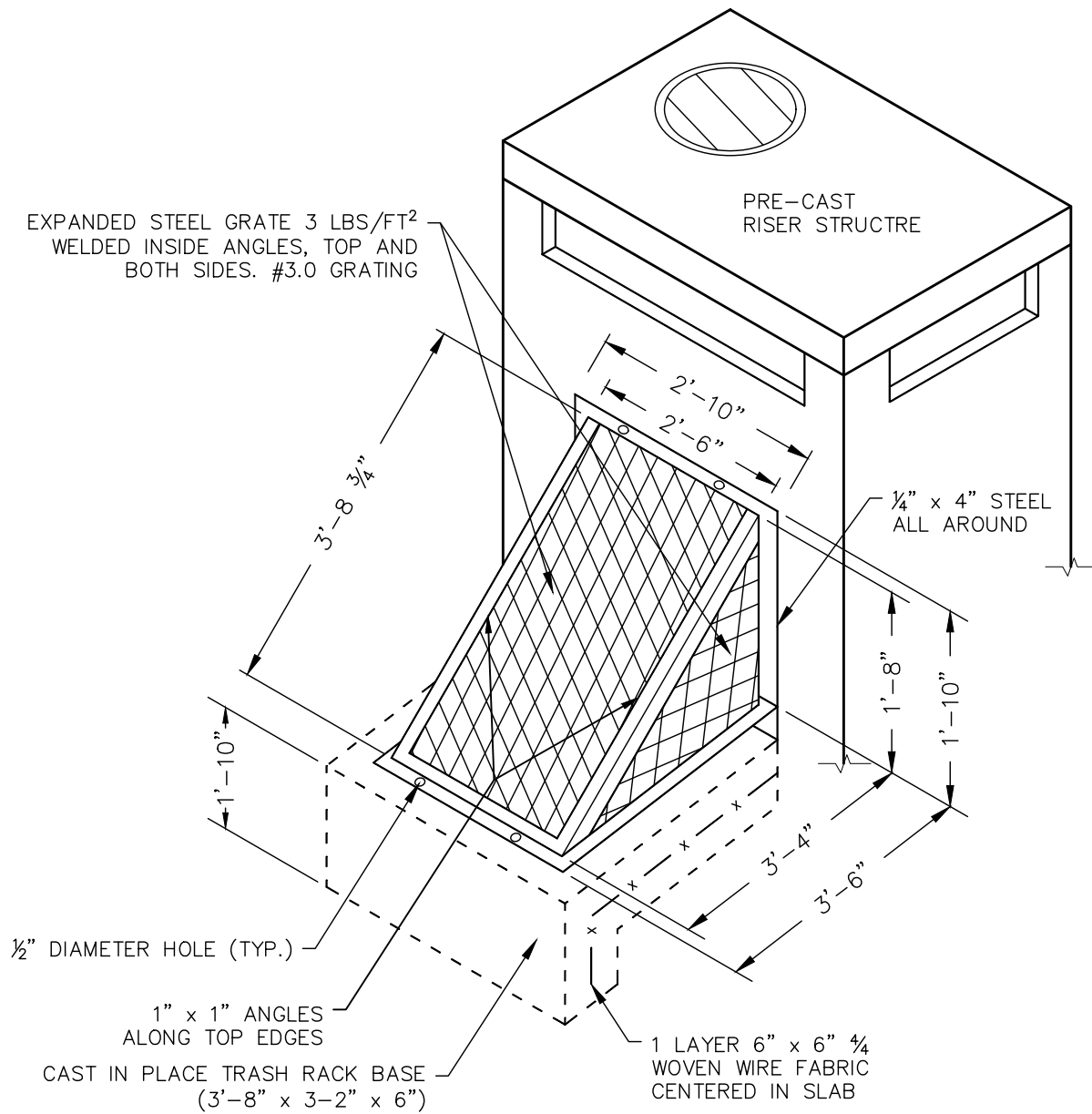


GWINNETT COUNTY      DATE: AUGUST 2021

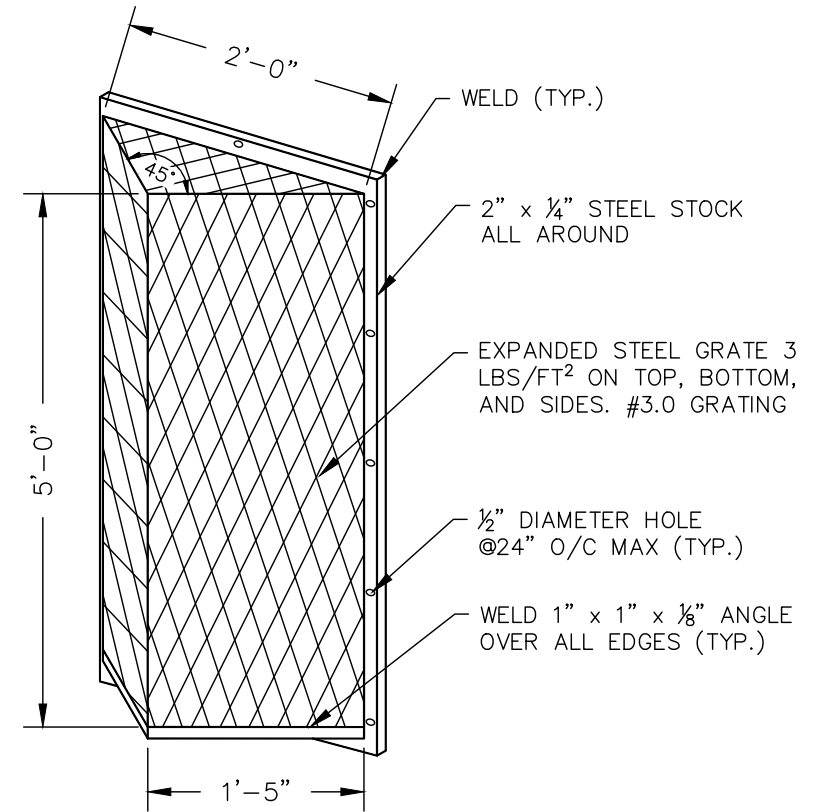
**DEPARTMENT OF WATER RESOURCES**  
**STANDARD DRAWING**

**OUTLET CONTROL STRUCTURE -**  
**WET PONDS & STORMWATER WETLANDS**

DETAIL No. 4.0.14      SCALE: N.T.S      SHEET No. 19



OPTION A - EXPANDED TRASH RACK PROTECTION




OPTION B - TRASH RACK PROTECTION

NOTES

1. TRASH RACK TO BE CENTERED OVER OPENING
2. STEEL TO CONFORM TO ASTM A-36
3. ALL SURFACES TO BE COATED WITH ZINC RICH COATING COLD GALVANIZING COMPOUND AFTER WELDING
4. TRASH RACK TO BE FASTENED TO THE WALL WITH 1/2" MASONRY ANCHORS. TRASH RACK TO BE REMOVABLE
5. GRATE OPENINGS SHALL BE NO LARGER THAN 1/2 OF THE SIZE OF THE LOW FLOW ORIFICE.
6. GRATE OPTION SHOWN PROVIDES 60% OPEN AREA AND IS SUITABLE FOR LOW FLOW ORIFICE DIAMETERS 2-INCHES AND GREATER.
7. ALTERNATIVE GRATE OPTIONS AND MATERIALS MAY BE USED AS APPROVED BY DWR. OPEN AREA FOR TRASH RACK GRATE SHALL BE 50% OR GREATER.
8. ALL STRUCTURAL AND REINFORCEMENT DESIGN SHALL BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF GEORGIA.

No.	REVISION	DATE



GWINNETT COUNTY DATE: AUGUST 2021

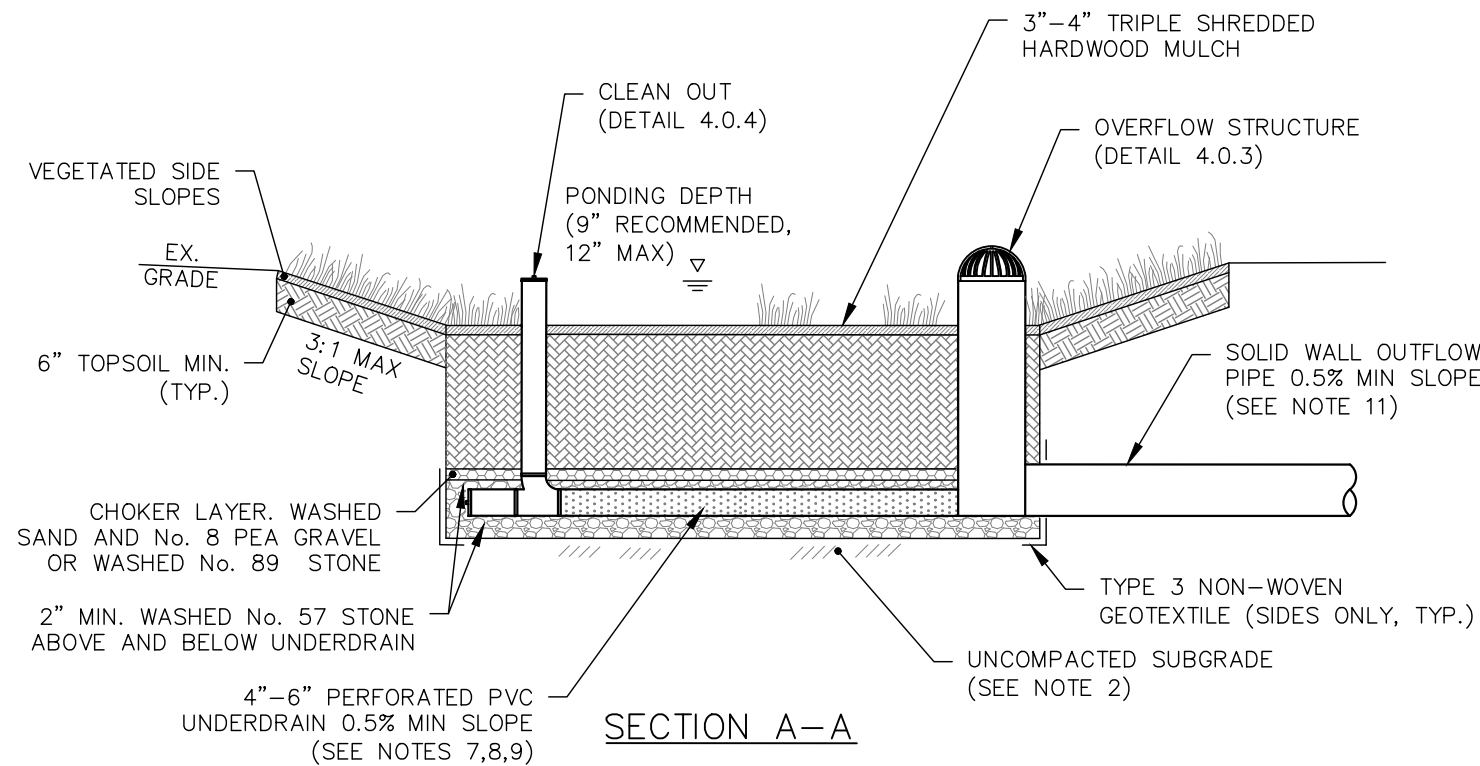
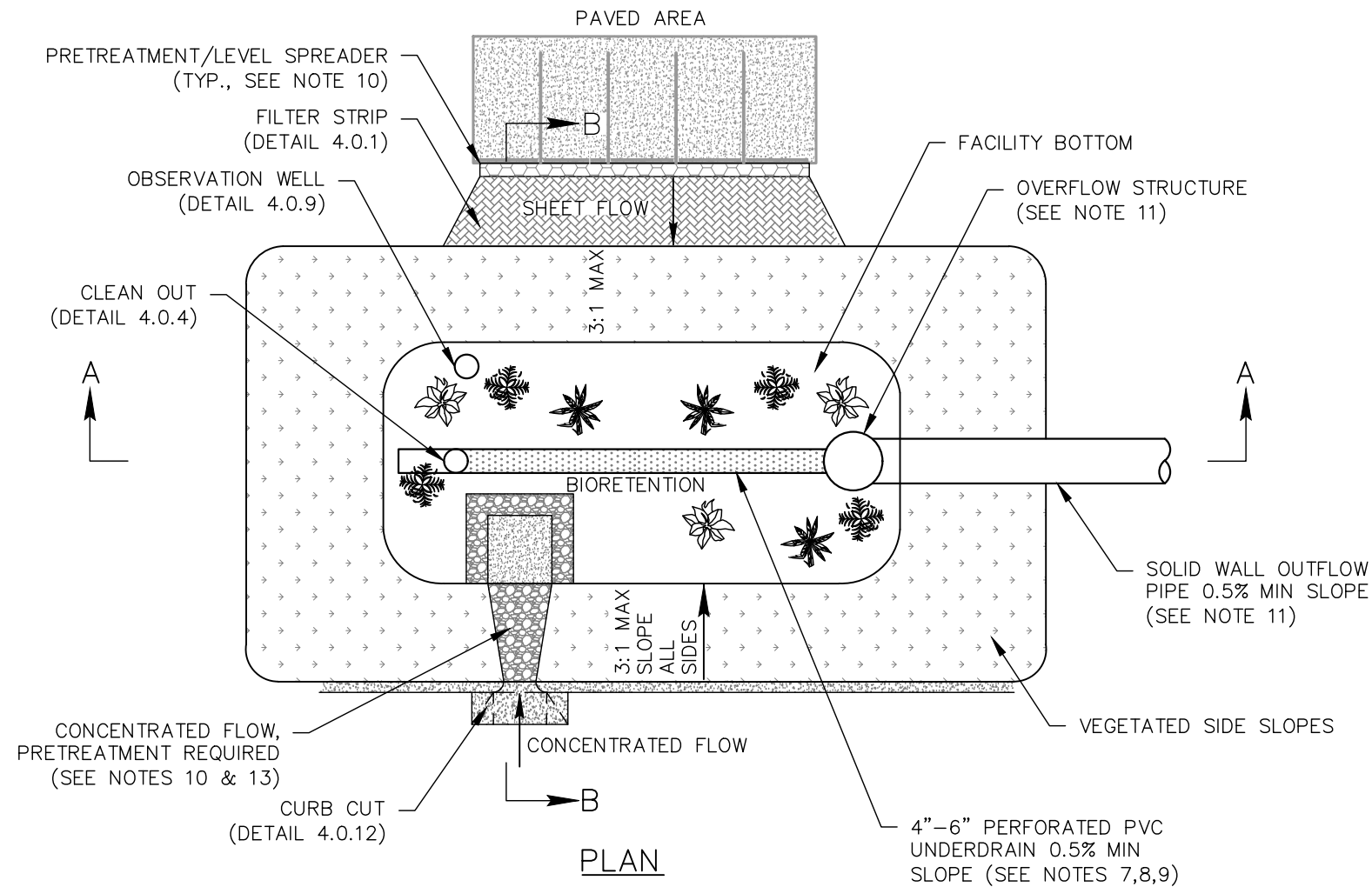
DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

**TRASH RACK PROTECTION FOR  
LOW FLOW ORIFICE**

DETAIL No. 4.0.15 SCALE: N.T.S SHEET No. 20

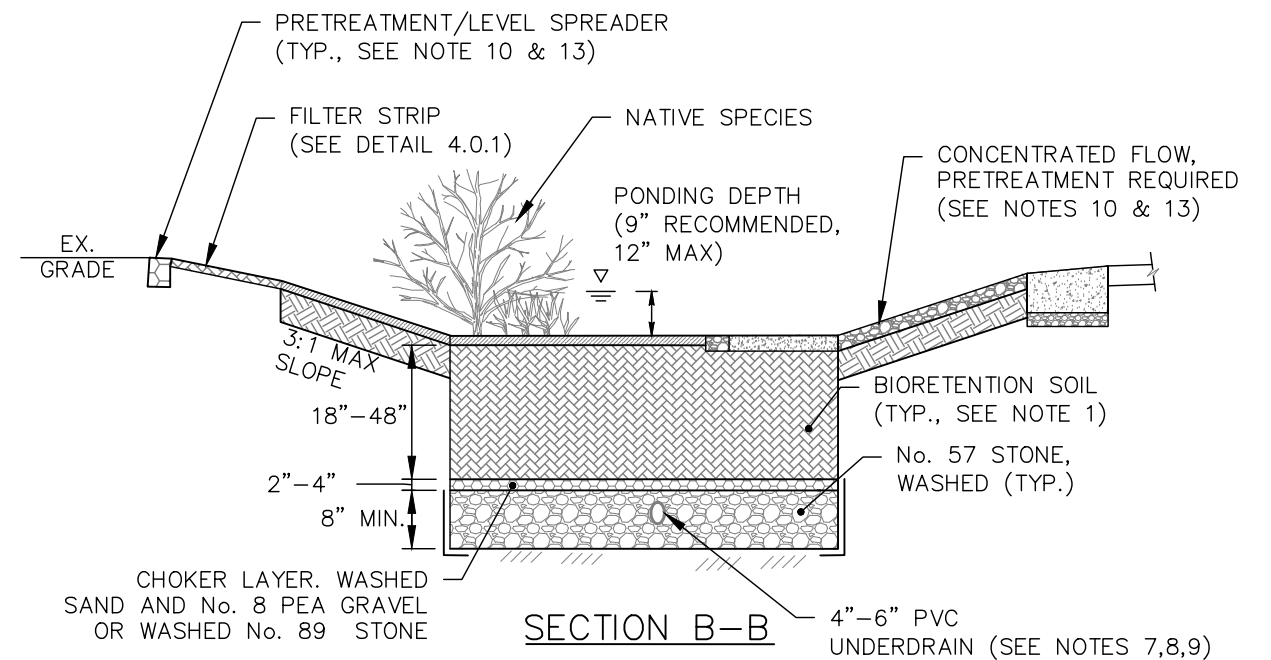


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**NOTES:**

1. BIORETENTION MATERIALS AND CONSTRUCTION SHALL MEET CRITERIA LISTED IN SECTION 4.2.5.3 OF THE GWINNETT COUNTY STORMWATER MANAGEMENT MANUAL (GCSMM).
3. SCARIFY SUBGRADE 6" MIN. BEFORE INSTALLATION.
4. MECHANICAL COMPACTION OF SOIL MEDIA SHALL BE AVOIDED. SOIL MEDIA SHALL BE PLACED IN 9-INCH TO 12-INCH LIFTS WITH MACHINERY ADJACENT TO THE FACILITY. IF WORKING WITHIN THE FACILITY, PLACE LIFTS AT THE FAR END FROM THE ENTRANCE AND WORK BACKWARDS TO AVOID OVER COMPACTING. THE ENTIRE SURFACE AREA OF THE SOIL MEDIA SHALL BE SATURATED WITH WATER TO FACILITATE "NATURAL COMPACTION" FOLLOWING THE PLACEMENT OF EACH LIFT. COMPACTION OF THE FACILITY BOTTOM SHALL BE AVOIDED TO EXTENT POSSIBLE.
5. FACILITIES SHALL NOT BE PLACED ON TOP OF EXISTING UTILITIES UNLESS GRANTED BY UTILITY OWNER. CONTRACTOR TO USE BMPS TO PREVENT CLOGGING SOILS FROM ENTERING FACILITY. ANY MEDIA, AGGREGATE, OR OTHER FACILITY COMPONENTS THAT ARE NOT PROTECTED SHALL BE REPLACED BY THE CONTRACTOR AT THEIR EXPENSE.
6. CONTRIBUTING DRAINAGE AREA MUST BE STABILIZED BEFORE RUNOFF CAN BE ACCEPTED BY FACILITY.
7. FOR UPTURNED UNDERDRAIN DESIGN SEE DETAIL 4.0.5.
8. UNDERDRAIN SPACING SHALL BE A MINIMUM OF 20 FEET ON-CENTER BETWEEN COLLECTION LATERALS AND A MAXIMUM OF 10 FEET FROM THE EDGE OF THE FACILITY. UNDERDRAIN PERFORATIONS SHALL BE 3/8" DIA. EVERY 90° AROUND PIPE AND SPACED 6" O.C. LONGITUDINALLY. ALTERNATIVE PERFORATION SCHEDULE OR SLOTTED UNDERDRAIN MAY BE USED AS APPROVED BY DWR.
9. ALTERNATE MATERIALS FOR UNDERDRAIN SUCH AS HDPE OR SLOTTED PIPE SHALL BE ALLOWED AS APPROVED BY DWR.
10. PRETREATMENT IS REQUIRED FOR ALL FACILITIES.
11. OVERFLOW STRUCTURE (DETAIL 4.0.3) OR WEIR OUTLET REQUIRED FOR ON-LINE FACILITIES. FOR OFF-LINE FACILITIES, FLOWS EXCEEDING DESIGN CAPACITY OF FACILITY MUST BYPASS BIORETENTION TREATMENT AREA.
12. PRETREATMENT, FACILITY AREA, AND OUTFLOW SHALL BE SIZED TO PROJECT REQUIREMENTS.
13. PRETREATMENT IS REQUIRED PRIOR TO DISCHARGING CONCENTRATED FLOW ONTO ERODIBLE AREAS. PRETREATMENT OPTIONS INCLUDE SPLASH BLOCK (DETAIL 4.0.10), GRAVEL DIAPHRAGM (DETAIL 4.0.2), FOREBAY, OR APPROVED EQUIVALENT.



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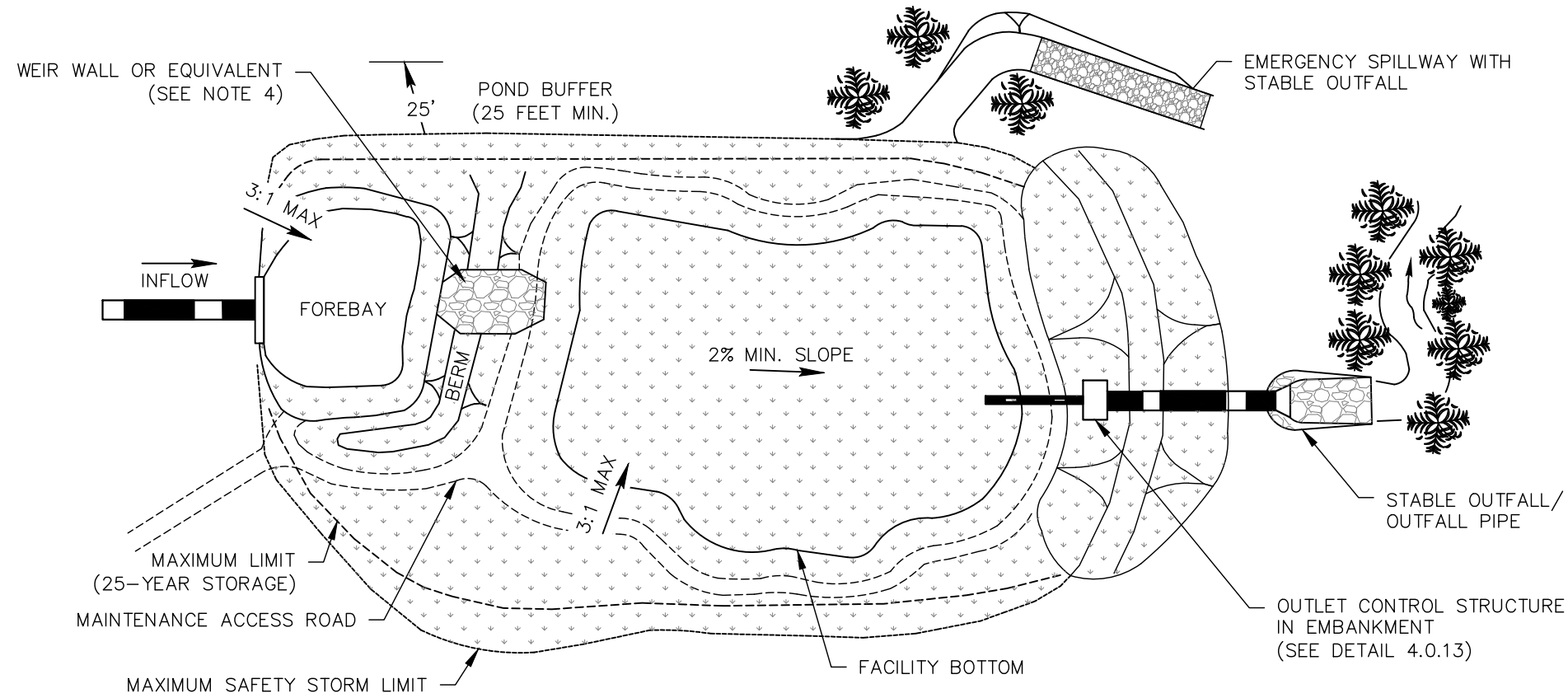
GWINNETT COUNTY DATE: AUGUST 2021

DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

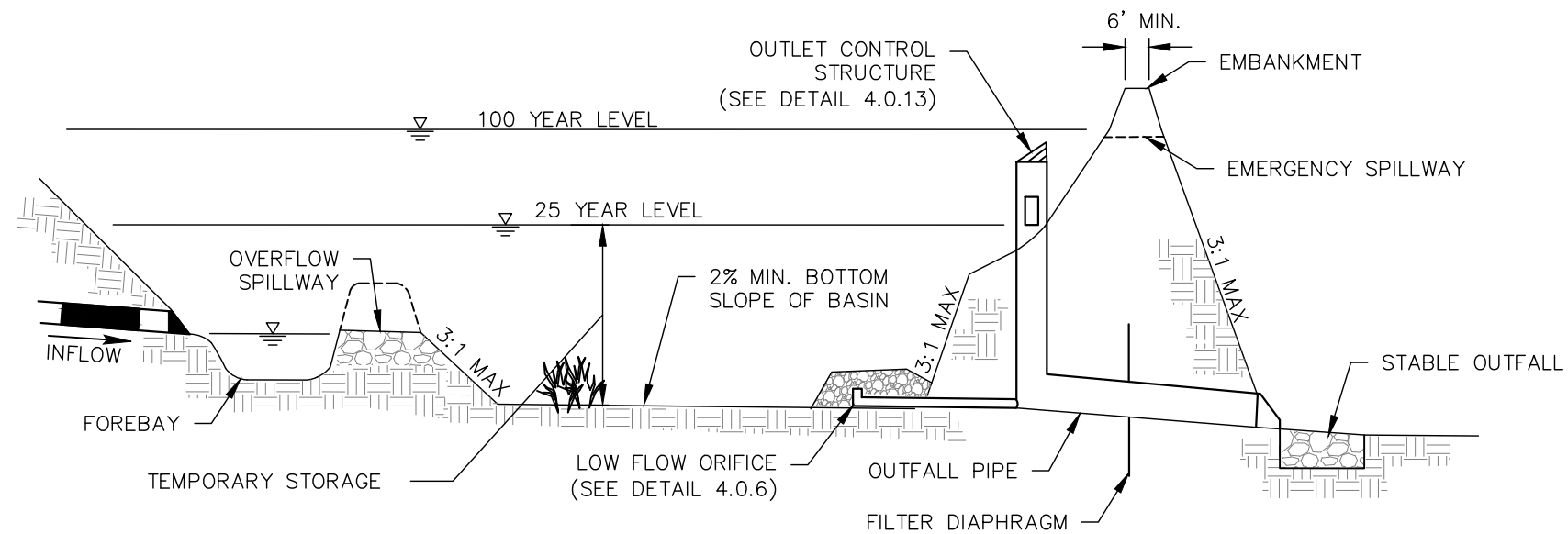
**BIORETENTION WITH UNDERDRAIN**

DETAIL No. 4.2.3 SCALE: N.T.S SHEET No. 21

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PLAN VIEW



PROFILE VIEW

NOTES:

1. A FOREBAY IS REQUIRED AT EACH MAJOR INLET ( $\geq 10\%$  PONDS CONTRIBUTING DRAINAGE AREA). DROP STRUCTURES ARE RECOMMENDED TO FURTHER REDUCE INFLOW VELOCITIES.
2. BASINS SHALL BE ELONGATED WITH A LENGTH TO WIDTH RATIO OF 1.5:1.
3. A MINIMUM OF 1.5' FREEBOARD SHALL BE PROVIDED BETWEEN THE 100-YEAR ELEVATION AND THE TOP OF EMBANKMENT.
4. A WEIR WALL OR ALTERNATE FORM OF OUTLET PROTECTION AT THE FOREBAY IS REQUIRED.
5. OUTLET CONTROL STRUCTURES SHALL BE DESIGNED FOR ANTI-FLOATATION. SEEPAGE CONTROL SHALL BE PROVIDED FOR ALL OUTLET PIPES (DETAIL 4.0.13).
6. EMBANKMENT SHALL HAVE SIDE SLOPES NO STEEPER THAN 3:1 (HORIZONTAL TO VERTICAL).
7. STORAGE VOLUMES GREATER THAN 100 ACRE-FT OR EMBANKMENT HEIGHTS GREATER THAN 25 FEET ARE SUBJECT TO THE REQUIREMENTS OF THE GEORGIA SAFE DAMS ACT (GEORGIA ANNOTATED CODE 12-5-370) UNLESS THE FACILITY IS EXCAVATED TO PROVIDE THIS VOLUME.

No.	REVISION	DATE

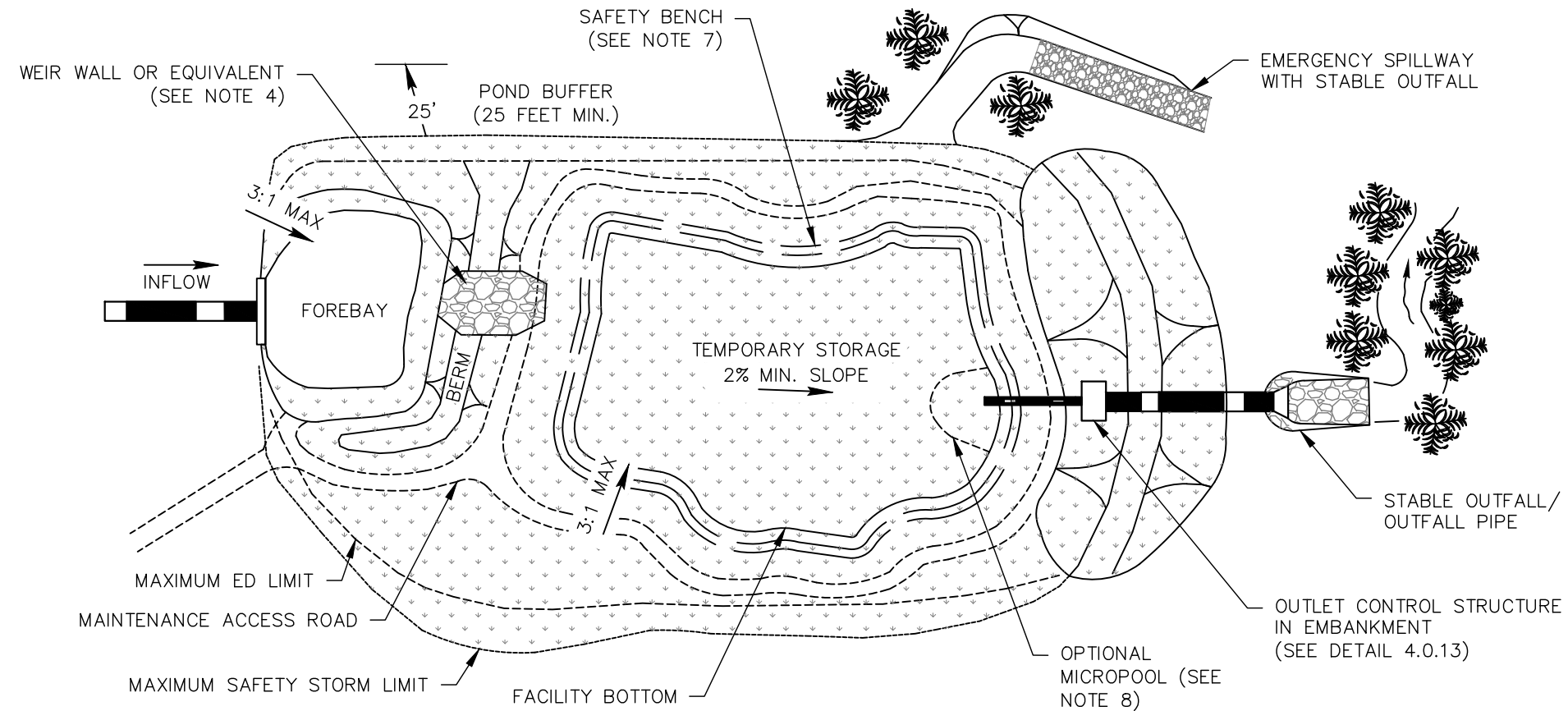


GWINNETT COUNTY DATE: AUGUST 2021

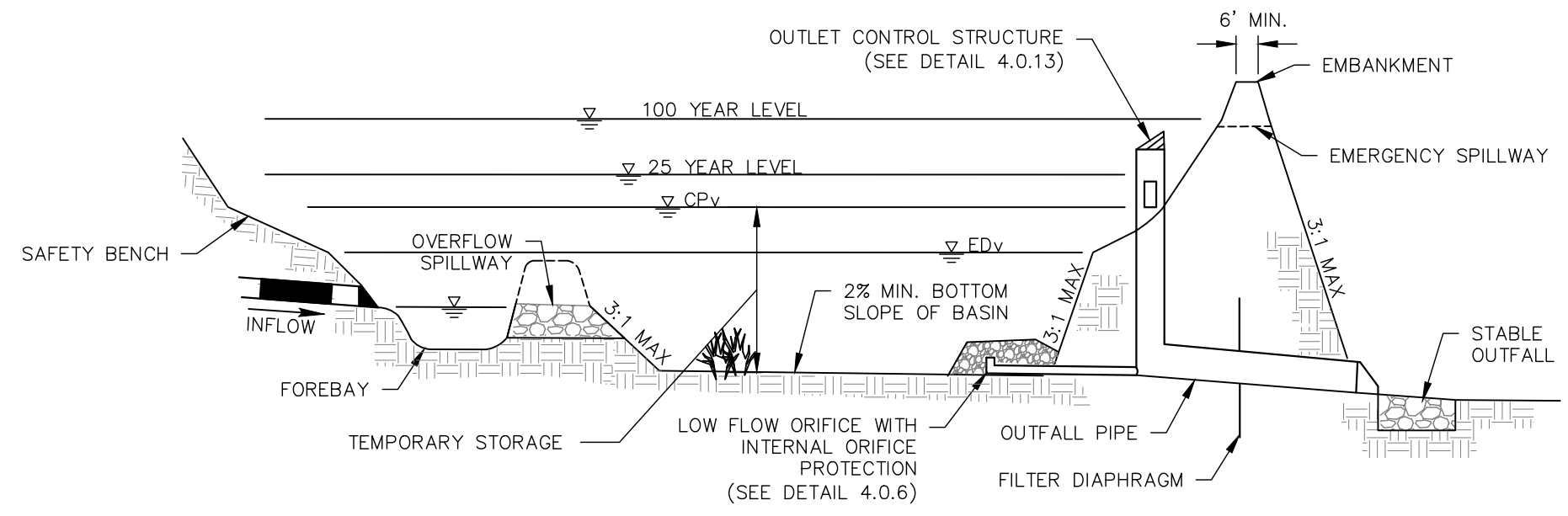
DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

**DRY DETENTION BASIN**

DETAIL No. 4.5.1 SCALE: N.T.S SHEET No. 22



PLAN VIEW



PROFILE VIEW

NOTES:

1. A FOREBAY IS REQUIRED AT EACH MAJOR INLET ( $\geq 10\%$  PONDS CONTRIBUTING DRAINAGE AREA). FOREBAYS SHALL BE SIZED FOR 0.1" OF RUNOFF PER IMPERVIOUS ACRE IN DRAINAGE AREA. DROP STRUCTURES ARE RECOMMENDED TO FURTHER REDUCE INFLOW VELOCITIES.
2. BASINS SHALL BE ELONGATED WITH A LENGTH TO WIDTH RATIO OF 1.5:1.
3. A MINIMUM OF 1.5' FREEBOARD SHALL BE PROVIDED BETWEEN THE 100-YEAR ELEVATION AND THE TOP OF EMBANKMENT.
4. A WEIR WALL OR ALTERNATE FORM OF OUTLET PROTECTION AT THE FOREBAY IS REQUIRED.
5. OUTLET CONTROL STRUCTURES SHALL BE DESIGNED FOR ANTI-FLOTATION. SEEPAGE CONTROL SHALL BE PROVIDED FOR ALL OUTLET PIPES (DETAIL 4.0.13).
6. EMBANKMENTS SHALL HAVE SIDE SLOPES NO STEEPER THAN 3:1 (HORIZONTAL TO VERTICAL).
7. SAFETY BENCH RECOMMENDED FOR LARGER BASINS. SAFETY BENCH SHALL EXTEND OUTWARD FROM EDv OR CPv ELEVATION NO LESS THAN 15 FEET AT A MAXIMUM SLOPE OF 6%.
8. SMALL SHALLOW MARSH OR MICROPOOL MAY BE INCORPORATED IN LOWER STAGE OF DRY EXTENDED DETENTION BASIN TO INCREASE SEDIMENT TRAPPING AND SEDIMENT RESUSPENSION PRIOR TO LOW-FLOW ORIFICE.
9. STORAGE VOLUMES GREATER THAN 100 ACRE-FT OR EMBANKMENT HEIGHTS GREATER THAN 25 FEET ARE SUBJECT TO THE REQUIREMENTS OF THE GEORGIA SAFE DAMS ACT (GEORGIA ANNOTATED CODE 12-5-370) UNLESS THE FACILITY IS EXCAVATED TO PROVIDE THIS VOLUME.

No.	REVISION	DATE



GWINNETT COUNTY DATE: AUGUST 2021

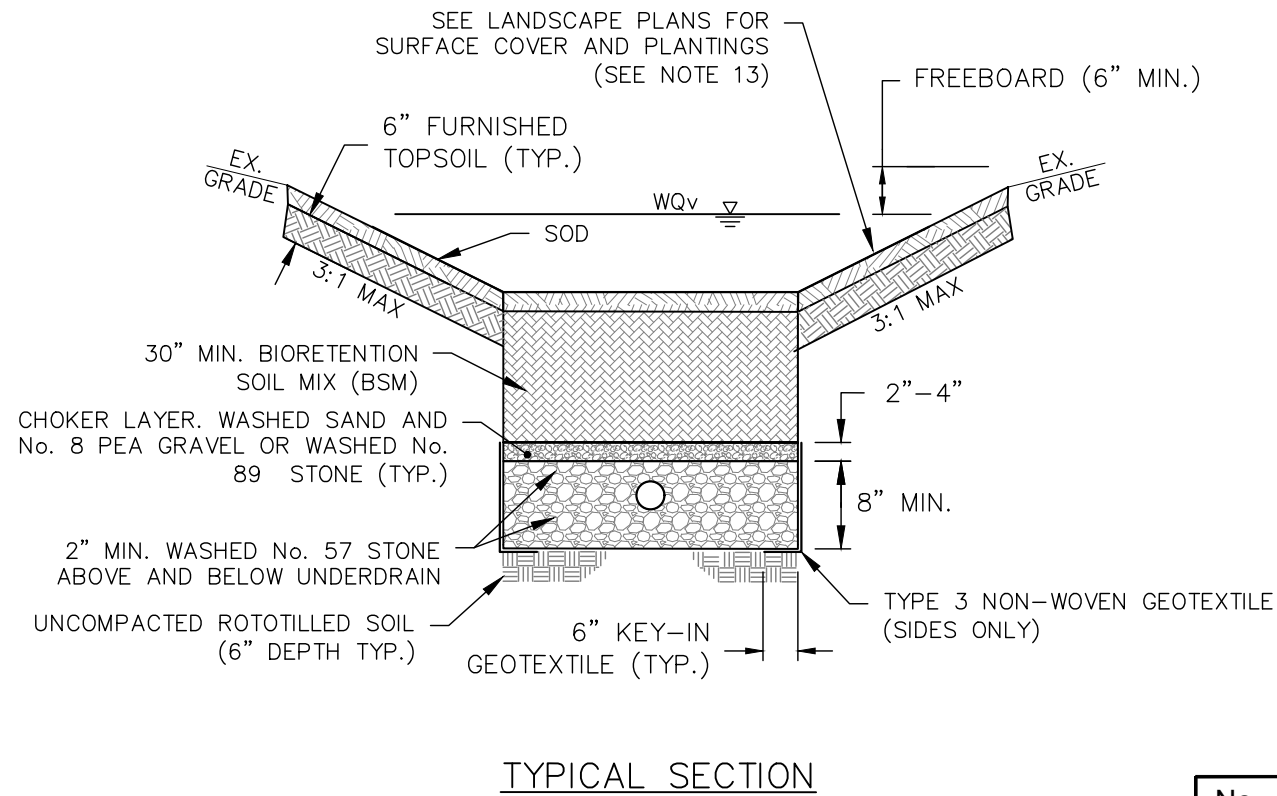
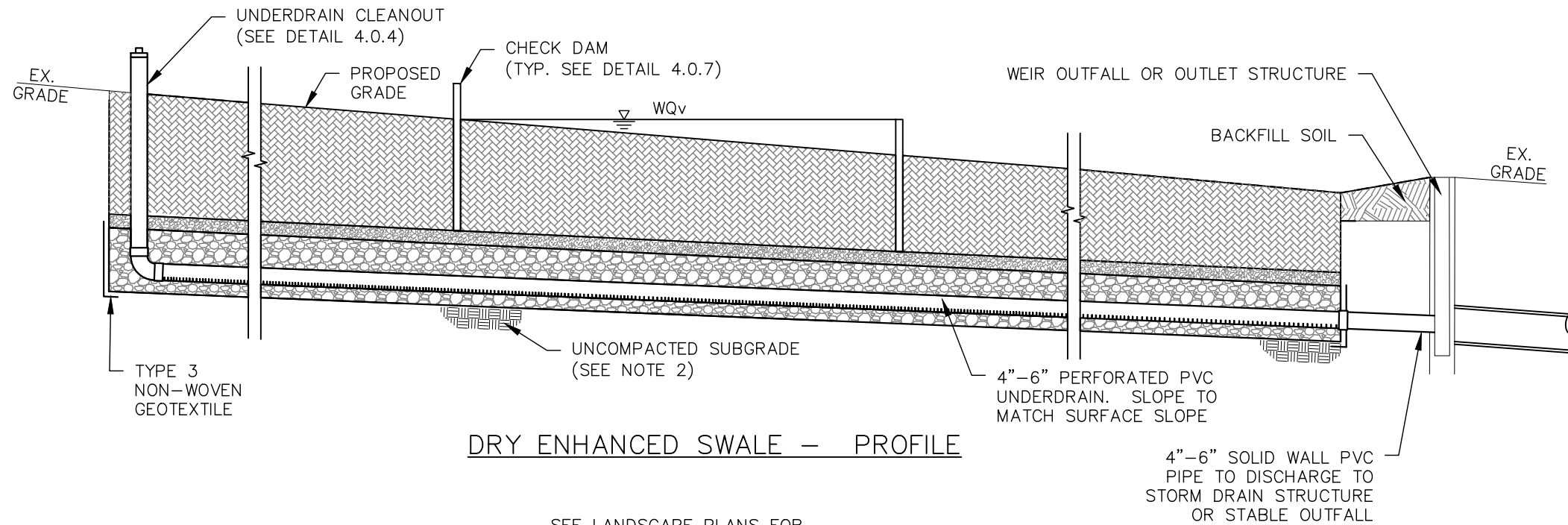
DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

**DRY EXTENDED DETENTION**

DETAIL No. 4.6.1 SCALE: N.T.S SHEET No. 23



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**NOTES:**

1. ENHANCED DRY SWALE MATERIALS AND CONSTRUCTION SHALL MEET CRITERIA LISTED IN SECTION 4.8.5 OF THE GWINNETT COUNTY STORMWATER MANAGEMENT MANUAL (GCSMM).
2. SCARIFY SUBGRADE 6" MIN. BEFORE INSTALLATION.
3. MECHANICAL COMPACTION OF SOIL MEDIA SHALL BE AVOIDED. SOIL MEDIA SHALL BE PLACED IN 9-INCH TO 12-INCH LIFTS WITH MACHINERY ADJACENT TO THE FACILITY. IF WORKING WITHIN THE FACILITY, PLACE LIFTS AT THE FAR END FROM THE ENTRANCE AND WORK BACKWARDS TO AVOID OVER COMPACTION. THE ENTIRE SURFACE AREA OF THE SOIL MEDIA SHALL BE SATURATED WITH WATER TO FACILITATE "NATURAL COMPACTION" FOLLOWING THE PLACEMENT OF EACH LIFT. COMPACTION OF THE FACILITY BOTTOM SHALL BE AVOIDED TO EXTENT POSSIBLE.
4. FACILITIES SHALL NOT BE PLACED ON TOP OF EXISTING UTILITIES UNLESS GRANTED BY UTILITY OWNER.
5. CONTRIBUTING DRAINAGE AREA MUST BE STABILIZED BEFORE RUNOFF CAN BE ACCEPTED BY FACILITY. CONTRACTOR TO USE BMPs TO PREVENT CLOGGING SOILS FROM ENTERING FACILITY. ANY MEDIA, AGGREGATE, OR OTHER FACILITY COMPONENTS THAT ARE NOT PROTECTED SHALL BE REPLACED BY THE CONTRACTOR AT THEIR EXPENSE.
6. PRETREATMENT IS REQUIRED FOR ALL FACILITIES.
7. DESIGN CAPACITY OF FACILITY MUST BYPASS TREATMENT AREA.
8. PRETREATMENT, FACILITY AREA, AND OUTFLOW SHALL BE SIZED TO PROJECT REQUIREMENTS.
9. CHECK DAMS SHALL BE USED AS NEEDED TO MEET SLOPE REQUIREMENTS. FOR CHECK DAM HEIGHTS GREATER THAN 12" OR FOR SURFACE SLOPES GREATER THAN 4%, DESIGNER SHOULD EMBED CHECK DAM THE FULL DEPTH OF THE ENGINEERED MEDIA TO PREVENT THE POTENTIAL FOR MEDIA BLOWOUT UNDERNEATH THE CHECK DAM.
10. CLEANOUTS SHALL BE INSTALLED WITH A MAX. 200-FT SPACING BETWEEN CLEANOUTS.
11. ENHANCED DRY SWALE SHALL BE FURNISHED WITH "HALF-CUT" OR "THIN CUT" LOCALLY SOURCE SOD FROM NON-CLAYEY SOURCES. ALTERNATIVE VEGETATION / PLANTINGS MAY BE ALLOWED AS APPROVED BY DWR.

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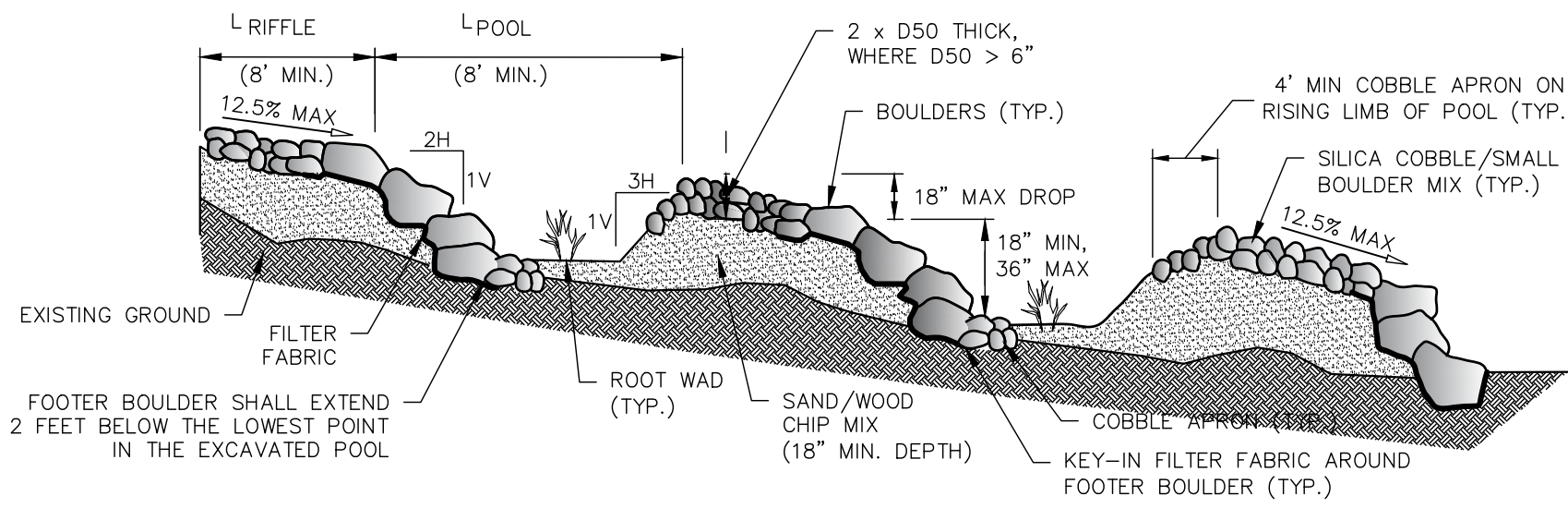
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DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

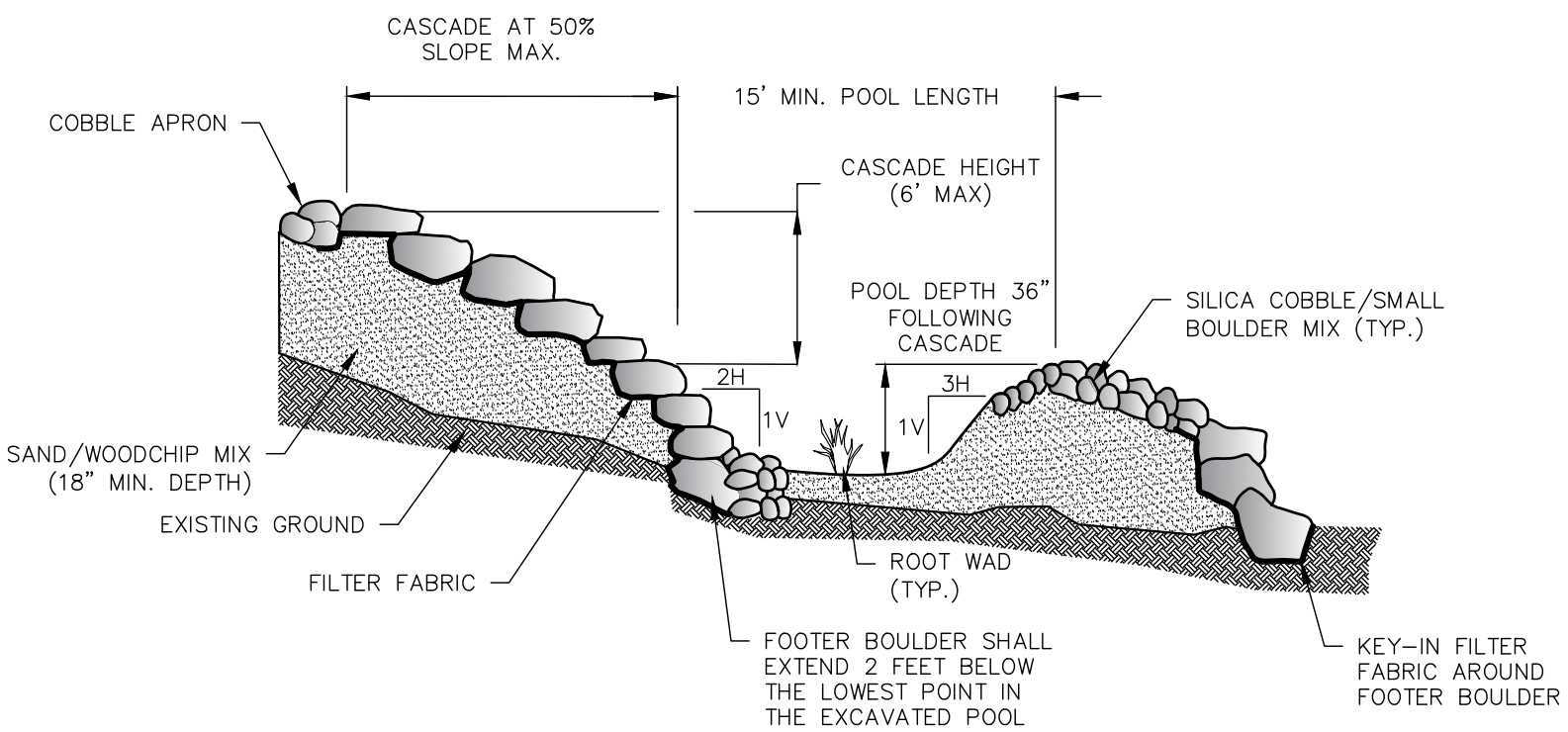
**DRY ENHANCED SWALE  
WITH UNDERDRAIN**

DETAIL No. 4.8.1 SCALE: N.T.S SHEET No. 24

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TYPICAL PROFILE – ALTERNATING POOLS AND RIFFLES



CASCADE PROFILE

NOTES:

1. TYPICAL PROFILE TO BE USED TO TRAVERSE SLOPES LESS THAN OR EQUAL TO 5%. CASCADE TO BE USED FOR SLOPES GREATER THAN 5%.
2. ADDITIONAL ARMORING OR SCOUR PROTECTION MAY BE REQUIRED IN ENTRY POOLS LOCATED AT A PIPE OUTFALL. WHERE RSC IS BELOW PIPE OUTFALL, THE INVERT OF THE WEIR ASSOCIATED WITH THE ENTRY POOL SHOULD BE SET AT OR ABOVE INVERT OF DISCHARGE PIPE OR CULVERT.
3. WHERE POSSIBLE DIVERT FLOWS FROM LARGE STORM EVENTS AROUND PRACTICE.
4. DIRECT MAINTENANCE ACCESS SHALL BE PROVIDED TO THE RSC.
5. ROUTINE / BIENNIAL MAINTENANCE OF RCS SYSTEM IS PRESCRIBED FOR A PERIOD OF 3 YEARS. THIS INCLUDES, BUT IS NOT LIMITED TO MULCHING, SEEDING OF DEVOID AREAS, DISEASED PLANT REPLACEMENT AND REPLANTING IF NECESSARY, AND REMOVAL OF EXCESSIVE DEBRIS AND INVASIVE SPECIES.
6. IN THE EVENT SEDIMENT ACCUMULATION EXCEEDS 6 INCHES IN THE FIRST YEAR, CONTRACTOR SHALL SPRAY DOWN AN ADDITIONAL LAYER OF COMPOST AND REPLANT THE POOL BOTTOMS. REMOVAL OF ACCUMULATED SEDIMENT SHOULD BE LIMITED TO WHEN THE ACCUMULATED SEDIMENT THREATENS THE STRUCTURAL INTEGRITY OF THE SYSTEM.
7. CONSTRUCTION EQUIPMENT SHOULD BE RESTRICTED FROM THE REGENERATIVE STORMWATER CONVEYANCE SYSTEM TO PREVENT COMPACTION OF THE NATIVE SOILS.
8. A DENSE AND VIGOROUS VEGETATIVE COVER SHOULD BE ESTABLISHED OVER THE CONTRIBUTING PERVIOUS DRAINAGE AREAS BEFORE RUNOFF CAN BE ACCEPTED INTO THE FACILITY TO PREVENT SEDIMENT FROM CLOGGING THE PORES IN PLANTING MEDIA.
9. CONTRIBUTING DRAINAGE AREA MUST BE STABILIZED BEFORE RUNOFF CAN BE ACCEPTED BY FACILITY. CONTRACTOR TO USE BMPS TO PREVENT CLOGGING SOILS FROM ENTERING FACILITY. ANY MEDIA, AGGREGATE, OR OTHER FACILITY COMPONENTS THAT ARE NOT PROTECTED SHALL BE REPLACED BY THE CONTRACTOR AT THEIR EXPENSE.
10. RIFFLES AND POOLS SHALL BE STABILIZED AT THE END OF EACH WORKING DAY
11. BYPASS FOR UPSTREAM RUNOFF OR PUMP AROUND PRACTICE WITH FILTRATION AS REQUIRED TO ENSURE THAT THE SITE REMAINS DEWATERED DURING CONSTRUCTION AND UNTIL PERMANENT STABILIZATION CAN BE ESTABLISHED.
12. PROVIDE TEMPORARY SEED AND MULCH COVER FOR ENTIRE SITE THROUGHOUT CONSTRUCTION
13. THE RATIO OF RIFFLE / CASCADE LENGTH TO POOL LENGTH SHALL BE A MAXIMUM OF 1:1
14. RIFFLES SHALL INCLUDE 20-25% SMALL BOULDERS (D50 ≤ 24") TO PACK AND HOLD SILICA COBBLE MATERIAL IN PLACE.
15. AFTER ROUGH GRADING ALL AREAS OF RIFFLE MATERIAL SHALL BE WASHED WITH SILICA PEA GRAVEL AND CLEAN SAND TO FROM AN INTERLOCKING SANDY MATRIX CAPABLE OF SUPPORTING PLANT MATERIAL.
16. ALL VOIDS BETWEEN BOULDERS SHALL BE CHINKED WITH SMALL COBBLE OR BOULDER FRAGMENTS TO FILL VOIDS AND PROMOTE SURFACE FLOW OVER BOULDERS.
17. SAND AND WOODCHIP MIX SHALL CONTAIN APPROXIMATELY 20% WOODCHIPS BY VOLUME TO INCREASE SUBSTRATES NITROGEN CONTENT AND SUPPORT NITROGEN PROCESSING. EXCLUDE WOODCHIP WHEN COMPUTING ALL FILL QUANTITY REQUIREMENTS.

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**DEPARTMENT OF WATER RESOURCES**  
**STANDARD DRAWING**

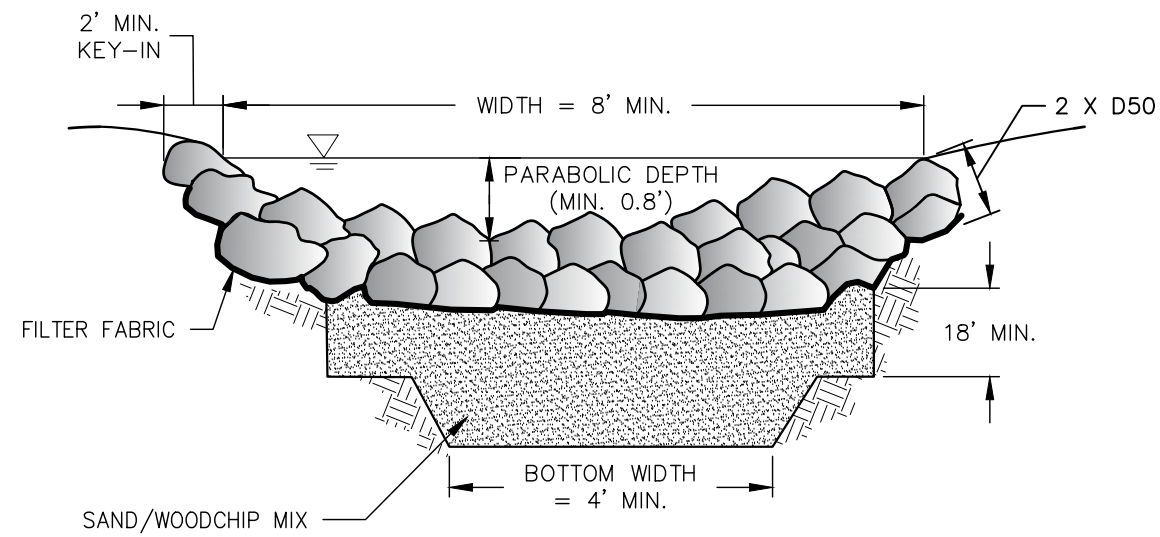
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**REGENERATIVE**  
**STORMWATER CONVEYANCE**

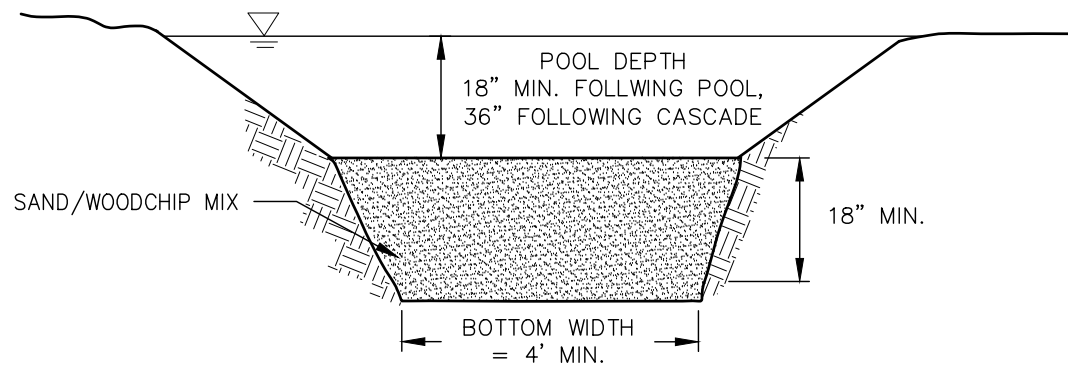
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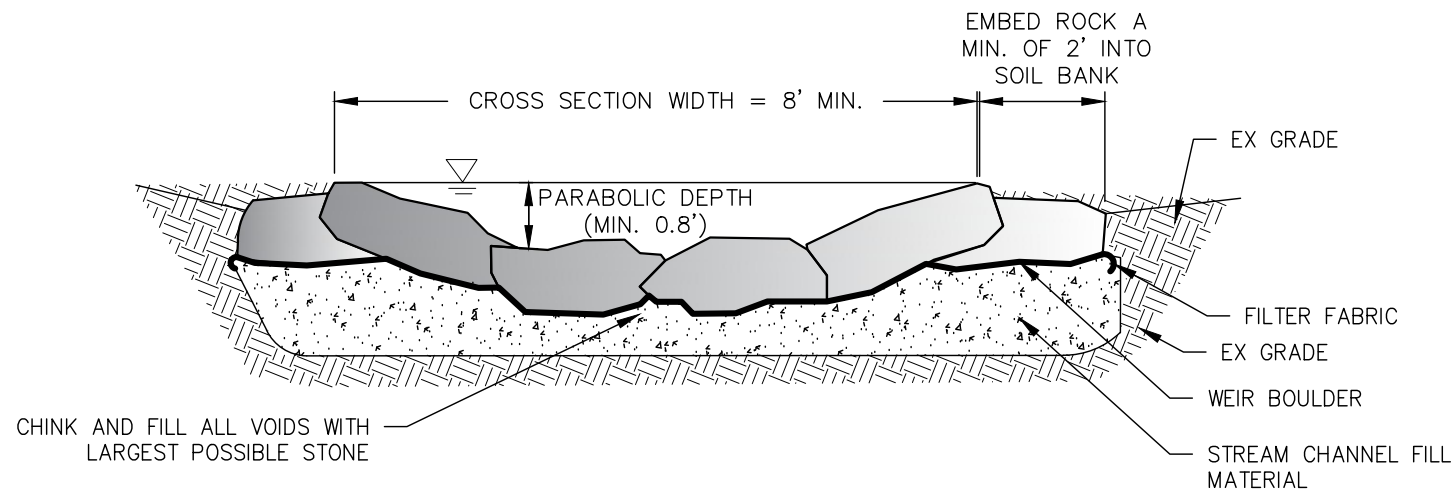
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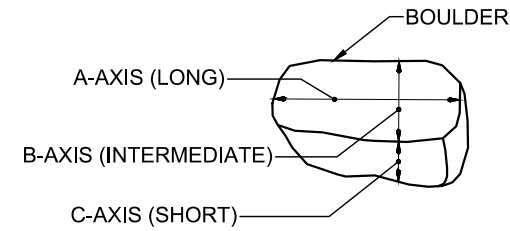
RIFFLE POOL CROSS SECTION THROUGH COBBLE - SECTION AA



RIFFLE POOL CROSS SECTION THROUGH POOL - SECTION BB



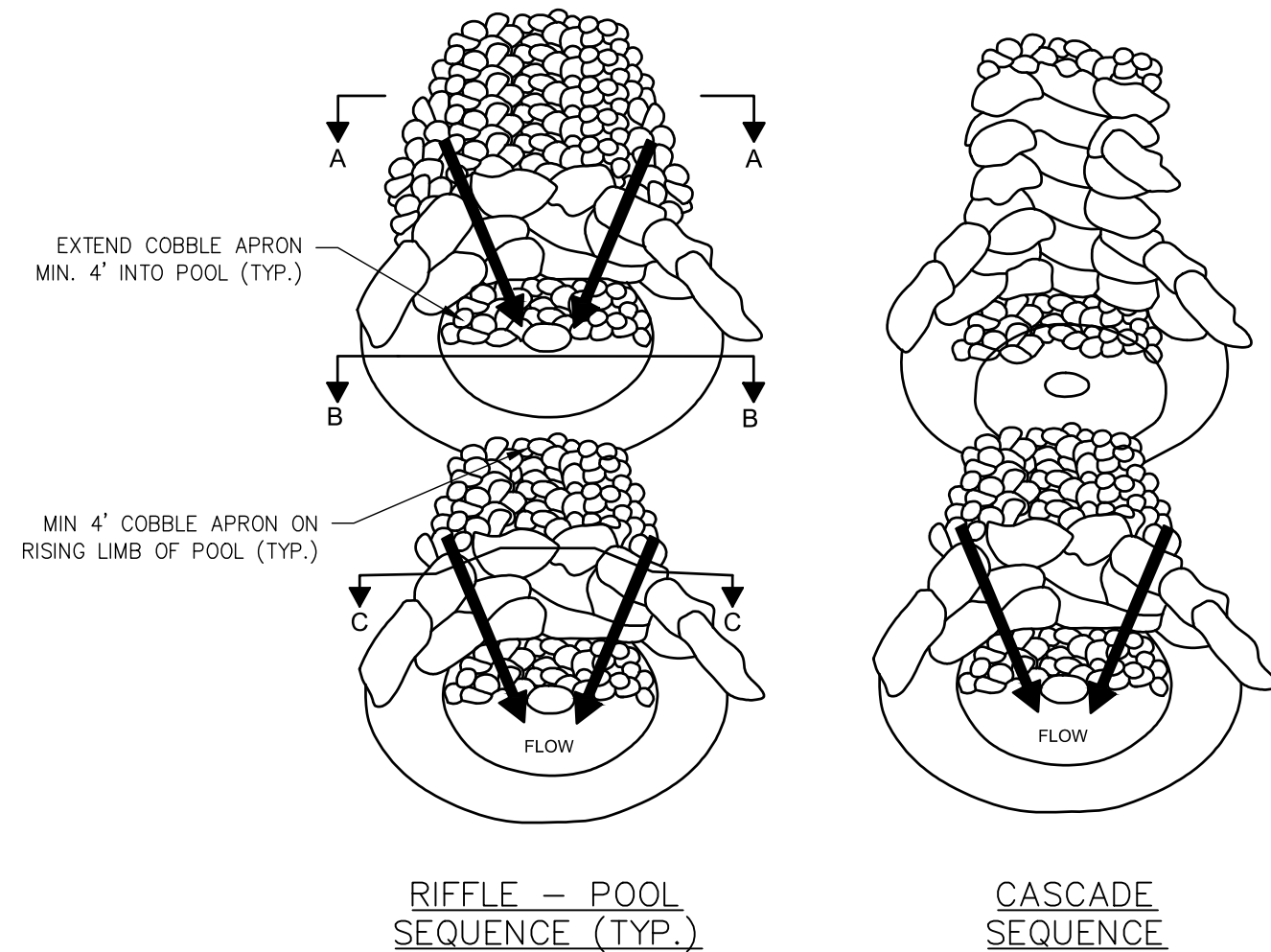
GRADE CONTROL THROUGH BOULDER WEIR - SECTION CC



RECOMMENDED BOULDER DIMENSIONS (FT)			
TYPE	A-AXIS	B-AXIS	C-AXIS
RIFFLE & CASCADE (SURFACE)	2.0' MIN.	2.0' MIN.	1.0'-2.0'
FOOTER BOULDERS (SUBSURFACE)	3.0' MIN.	2.5' MIN.	2.0' MIN.

**NOTES:**

1. MINIMUM POOL TOP WIDTH SHALL BE EQUIVALENT TO DESIGN WIDTH OF DOWNSTREAM STRUCTURE.
2. BOULDERS SHALL BE TABULAR IN SHAPE TO ALLOW FOR MAXIMUM INTERLOCKING. BOULDERS SHOULD BE PLACED WITH THE C-AXIS VERTICAL AND B-AXIS PARALLEL TO THE DIRECTION OF FLOW.
3. ALL VOIDS BETWEEN BOULDERS SHALL BE CHINKED WITH COBBLE OR BOULDER FRAGMENTS TO FILL ALL VOIDS AND PROMOTE SURFACE FLOW OVER BOULDERS.



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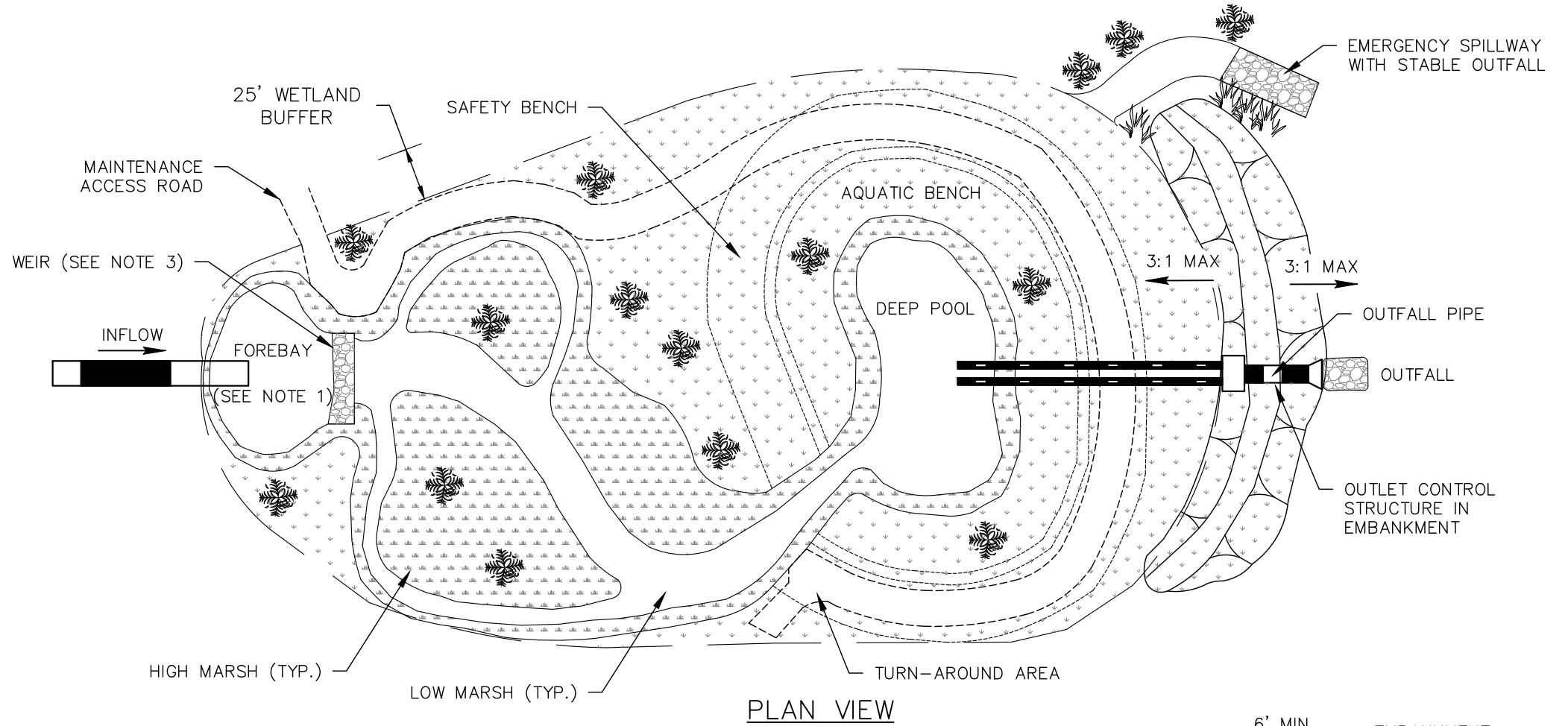
GWINNETT COUNTY DATE: AUGUST 2021

DEPARTMENT OF WATER RESOURCES  
STANDARD DRAWING

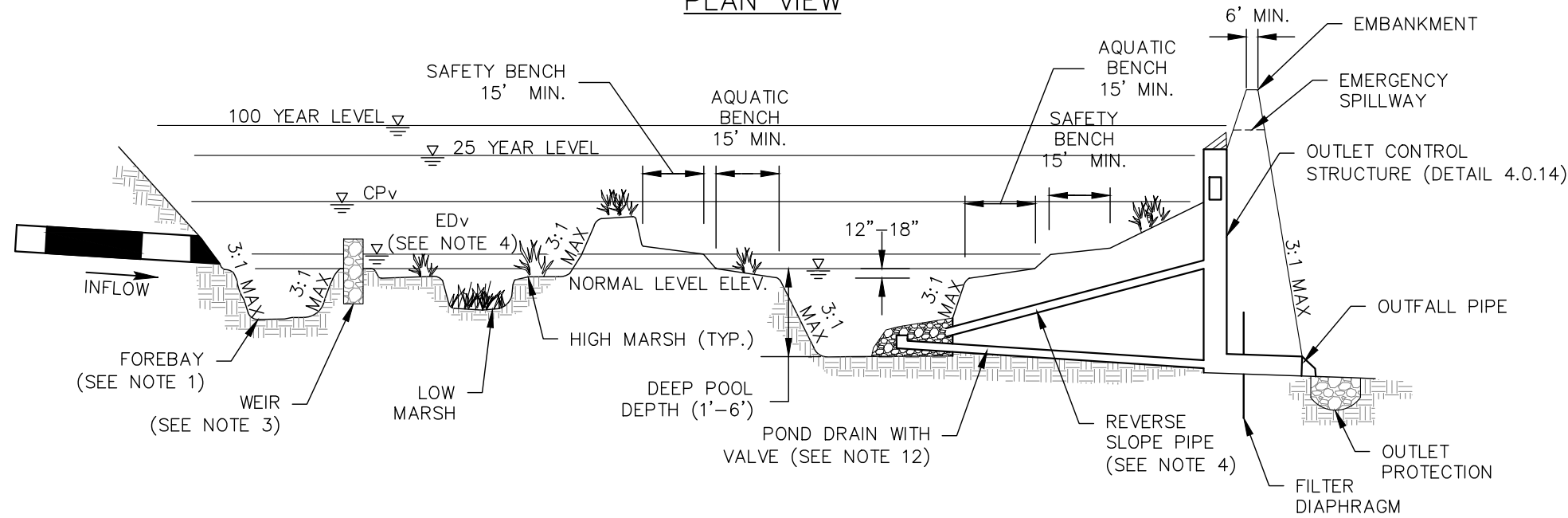
REGENERATIVE  
STORMWATER CONVEYANCE

DETAIL No. 4.20.1B SCALE: N.T.S SHEET No. 26

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**PLAN VIEW**



**PROFILE VIEW**

**NOTES:**

1. A FOREBAY IS REQUIRED AT EACH MAJOR INLET ( $\geq 10\%$  PONDS CONTRIBUTING DRAINAGE AREA). DROP STRUCTURES ARE RECOMMENDED TO FURTHER REDUCE INFLOW VELOCITIES.
2. A MINIMUM OF 1.5 FEET OF FREEBOARD SHALL BE PROVIDED BETWEEN THE 100-YEAR ELEVATION AND THE TOP OF EMBANKMENT.
3. A WEIR WALL OR ALTERNATE FORM OF OUTLET PROTECTION AT THE FOREBAY IS REQUIRED.
4. UP TO ONE FOOT OF DEPTH OF THE WATER QUALITY VOLUME CAN BE PROVIDED AS EXTENDED DETENTION VOLUME.
5. A SAFETY BENCH IS REQUIRED AROUND THE PERIMETER OF ANY POOLS DEEPER THAN 30". SAFETY BENCH REQUIREMENT MAY BE WAIVED IF SIDE SLOPES ARE 4:1 OR FLATTER.
6. OUTLET CONTROL STRUCTURES SHALL BE DESIGNED FOR ANTI-FLOTATION. SEEPAGE CONTROL SHALL BE PROVIDED FOR ALL OUTLET PIPES (DETAIL 4.0.14).
7. ALTERNATE POND DRAIN CONFIGURATIONS SHALL BE APPROVED BY THE ENGINEER.
8. MAINTENANCE ACCESS ROAD SHALL PROVIDE ACCESS TO ALL APPROPRIATE COMPONENTS, INCLUDING SAFETY BENCH.
9. THIS DETAIL SHOWS A LEVEL 1 WETLAND. MODIFICATIONS TO THE COMPONENTS AND GEOMETRY CAN BE MADE TO PROVIDE A LEVEL 2 DESIGN PER THE GCSMM.
10. EMBANKMENT SHALL HAVE SIDE SLOPES NO STEEPER THAN 3:1 (HORIZONTAL TO VERTICAL).
11. STORAGE VOLUMES GREATER THAN 100 ACRE-FT OR EMBANKMENT HEIGHTS GREATER THAN 25 FEET ARE SUBJECT TO THE REQUIREMENTS OF THE GEORGIA SAFE DAMS ACT (GEORGIA ANNOTATED CODE 12-5-370) UNLESS THE FACILITY IS EXCAVATED TO PROVIDE THIS VOLUME.
12. POND DRAIN SHALL BE CONTROLLED BY A VALVE LOCATED INSIDE THE OUTLET CONTROL STRUCTURE AT AN ELEVATION THAT WILL NOT BE REGULARLY INUNDATED

No.	REVISION	DATE



GWINNETT COUNTY DATE: AUGUST 2021

**DEPARTMENT OF WATER RESOURCES**  
**STANDARD DRAWING**

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**STORMWATER WETLANDS (LEVEL 1)**  
**WITH EXTENDED DETENTION**

DETAIL No. 4.26.1 SCALE: N.T.S SHEET No. 27