PROJECT MANUAL
BIDDING DOCUMENTS

CONTRACT GENERAL CONDITIONS AND TECHNICAL SPECIFICATIONS

ANDERSON
THE ELECTRIC CITY
Teamwork | Integrity | Professionalism

CITY OF ANDERSON
BRANCHCLIFF LANE
STREAMBANK STABILIZATION
City of Anderson Bid No. 2026-10

For

City of Anderson, South Carolina

October 2026

Reissued: October 23, 2026
(Incorporates Addendum No. 1)

Prepared by:

ARDURRA

55 Beattie Place, Suite 200
Greenville, South Carolina 29601

WKD Project No. 20240695.00.WK

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Anderson, South Carolina

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00 11 16
ADVERTISEMENT FOR BIDS

Separate sealed bids for Branchcliff Lane Streambank Stabilization (City Bid No. 2026-10) for the City of Anderson will be received by the OWNER in the Council Chambers located at the address below until 2:00 PM on November 2nd , 2026, and then at said place be publicly opened and read aloud. Electronic bids will not be accepted. All bids must be clearly marked with the bid name/number on the exterior envelope.

This project is being funded in whole or in part by funding provided by programs of the Federal Emergency Management Agency (FEMA). Contractor shall at all times comply with all applicable FEMA regulations, policies, procedures, and directives, including without limitation those listed directly or by reference, as they may be amended or promulgated from time to time during the term of the Contract. Contractor's failure to comply shall constitute a material breach of the Contract.

All contractors and subcontractors are required to be registered in the federal System for Award Management (SAM) and may not be debarred from doing business with the federal government. Respondents on this work will be required to comply with all applicable federal regulations.

Information and Bidding Documents for the Project are available at the following website: https://www.cityofandersonsc.com/requests/. Bidding Documents may be obtained from the designated website.

Prospective Bidders must register through the designated website in order to be recognized as an official plan holder, regardless of whether Bidding Documents are obtained from the designated website or from another source in either electronic or paper format. The designated website will be updated periodically with addenda, lists of registered plan holders, reports, and other information relevant to the preparation and submission of a Bid for the Project. All official notifications, addenda, and other Bidding Documents will be issued exclusively through the designated website. Neither the Owner nor the Engineer will be responsible for Bidding Documents, including addenda, obtained from sources other than the designated website.

Scope of Work: The work consists of furnishing all materials, equipment, and labor necessary for streambank stabilization, including grading, installation of boulder toe protection and boulder J-hook structures, soil lifts, erosion and sediment control measures, revegetation, and site restoration for the Branchcliff Lane Streambank Stabilization Project.

Construction Schedule: The OWNER intends to issue the Notice of Award within 30 days of the bid opening, and the Notice to Proceed on or about December 2nd, 2026. The allowable construction schedule for the project is 180 calendar days.

ENGINEERS
W.K. Dickson & Co., LLC,
an Ardurra Company
55 Beattie Place, Suite 200
Greenville, SC 29601
Attn: Will Rector, P.E.

OWNER
City of Anderson
Electric City Utilities
401 South Main Street
Anderson, SC 29622
Attn: David McCuen

A pre-bid conference for the Project will be held at the project site, 815 Canterbury Road, Anderson, SC 29621 on October 20th, 2026, at 9:00 AM.

Bidders must deposit security with all bids. Security shall be in the form of a certified check or bid bond made payable to the Owner, and shall be for an amount equal to not less than five percent (5%) of the amount of the bid. Provisions of the security shall be as described in the Information for Bidders.

No bid will be considered unless the bidder is legally qualified under the provisions of the South Carolina Contractor's Licensing Law (South Carolina Code of Laws as amended on April 1, 1999, Chapter 11, Sections 40-11-10 through 40-11-428). All bidders must be properly bonded and insured, with proof provided upon request. Contractors shall have a classification of AP.

No bidder may withdraw the bid within 60 days after the actual date of the opening and thereof.

The Owner hereby notifies all Bidders that it will affirmatively ensure that in any Contract entered into pursuant to this advertisement will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, sex, or national origin in consideration for an Award. The Owner is an Equal Opportunity Employer. Any Contract that uses federal funds to pay for construction work is a "federally assisted construction contract" and must include the equal opportunity clause found in 2 C.F.R. Part 200, unless otherwise stated in 41 C.F.R. Part 60, and encourages all small and minority owned firms and women's business enterprises to participate. No Bidder may withdraw his/her Bid within (60) days after the actual date of the opening thereof.

The Copeland "Anti-Kickback" Act is also applicable, which prohibits workers on construction projects from giving up wages that they are owed. The Contractor must not appear on the SAM.gov disbarment list.

Bidders must comply with the President's Executive Order No. 11246, as amended, which prohibits discrimination in employment regarding race, creed, color, sex, or national origin.

The Contractor shall comply with the Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (PL91-596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL91-54), or latest revisions.

The Owner welcomes submissions from minority and woman owned businesses. Please indicate that you are a minority or woman owned business with your request for bid documents.

This solicitation does not commit the Owner to award a contract, to pay any costs incurred in the preparation of a bid, or to procure or contract for services. The Owner reserves the right to waive any informalities, reject any and all responses, to cancel this solicitation, and to make an award deemed in its own best interest.

END OF SECTION

00 21 13
INFORMATION FOR BIDDERS

1. RECEIPT AND OPENING OF BIDS

The City of Anderson (hereinafter called the "Owner"), invites bids on the Bid Form attached hereto, all blanks of which must be appropriately filled in.

Bids will be received by the Owner at the location identified in the Advertisement for Bids until the stated time and date, at which time said bids will be publicly opened and read aloud. The envelopes containing your bid and Bid Bond only must be sealed, addressed to the OWNER, and designated as "Bid for City of Anderson Branchcliff Lane Streambank Stabilization, Bid No.2026-10."

The Owner may consider informal any bid not prepared and submitted in accordance with the provisions hereof and may waive any informalities or reject any and all bids. Any bid may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof. Any bid received after the time and date specified shall not be considered. No bidder may withdraw a bid within 60 days after the actual date of the opening thereof.

2. PREPARATION OF BID

Each bid must be submitted on the provided Bid Form. All blank spaces for bid prices must be filled in, in ink or typewritten and a Bid Bond must be submitted with the bid.

Bids which are incomplete, unbalanced, conditional or obscure, or which contain additions not called for, erasures, alterations, or irregularities of any kind, or which do not comply with the Information for Bidders, may be rejected at the option of the Owner.

The correct total amount bid for the completed work is defined as the correct sum total of the amounts bid for the individual items in the Proposal. The correct amount bid for each unit price item is defined as the correct product of the quantity listed for the item by the unit price bid.

Each bid must be submitted in a sealed envelope bearing on the outside the name of the bidder, bidder's address, Contractor's License Number, and the name of the project for which the bid is submitted. If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope addressed as specified above.

Only contractors who have downloaded a complete set of bid documents and by doing so have been placed on the official Planholders' List will be allowed to submit a bid on this project.

3. SUBCONTRACTS

The bidder is specifically advised that any person, firm or other party to whom it is proposed to award a subcontract under this contract must be acceptable to the Owner.

4. TELEGRAPHIC MODIFICATION

Any bidder may modify its bid by telegraphic or facsimile communication at any time prior to the scheduled time for receipt of bids, provided such telegraphic or facsimile communication is

received by the Owner prior to closing time, and provided further the Owner is satisfied that a written confirmation of the telegraphic or facsimile modification over the signature of the bidder was mailed prior to the closing time. The telegraphic or facsimile communication should not reveal the bid price, but should provide the addition or subtraction or other modification so that the final prices or terms will not be known by the Owner until the sealed bid is opened. If written confirmation is not received within two days from the closing time, no consideration will be given to the telegraphic or facsimile modification.

5. METHOD OF BIDDING

The Owner invites the following bid(s): Unit Price.

6. QUALIFICATION OF BIDDER

The Owner may make such investigations as is deemed necessary to determine the ability of the bidder to perform the work, and the bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. The Owner reserves the right to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the Owner that such bidder is properly qualified to carry out the obligations of the contract and to complete the work contemplated therein. Conditional bids will not be acceptable.

7. BID SECURITY

Each bid must be accompanied by cash, certified check of the bidder, or a Bid Bond prepared on the form of bid bond attached hereto, duly executed by the bidder as principal and having as surety thereon a surety company approved by the Owner, in the amount of five percent (5%) of the bid. Cash or checks will be returned to all except the three lowest bidders within three days after the opening of bids, and the remaining cash or checks will be returned promptly after the Owner and the accepted bidder have executed the contract, or, if no award has been made within sixty (60) days after the date of the opening of the bids, upon demand of the bidder at any time thereafter so long as bidder has not been notified of the acceptance of its bid.

8. LIQUIDATED DAMAGES FOR FAILURE TO ENTER INTO CONTRACT

The successful bidder, upon failure or refusal to execute and deliver the contract and bonds required within ten (10) days after they have received notice of the acceptance of their bid, shall forfeit to the Owner, as liquidated damages for such failure or refusal, the security deposited with the bid.

9. TIME OF COMPLETION AND LIQUIDATED DAMAGES

Bidder must agree to commence work on or before a date to be specified in a written "Notice to Proceed" of the Owner and to fully complete the project within the number of consecutive calendar days thereafter as indicated on the Bid Form. Bidder must agree also to pay as liquidated damages the sum indicated on the Bid Form for each consecutive calendar day thereafter as hereinafter provided in General Conditions.

10. CONDITIONS OF WORK

Each bidder must inform himself fully of the conditions relating to the construction of the project and the employment of labor thereon. Failure to do so will not relieve a successful bidder of the obligation to furnish all material and labor necessary to carry out the provisions of the contract.

Insofar as possible, the Contractor in carrying out the work must employ such methods or means as will not cause any interruption of or interference with the work of any other contractor.

11. ADDENDA AND INTERPRETATIONS

No interpretation of the meaning of the plans, specifications or other pre-bid documents will be made to any bidder orally. Each request for such interpretation should be in writing, addressed to the ENGINEER. To be given consideration, the request must be received at least five days prior to the date fixed for the opening of bids. Any and all such interpretations and any supplemental instructions will be in the form of written addenda to the specifications which, if issued, will be mailed to all prospective bidders (at the respective addresses furnished for such purposes), no later than three days prior to the date fixed for the opening of bids. Failure of any bidder to receive any such addendum or interpretation shall not relieve such bidder from any obligation under its bid as submitted. All addenda so issued shall become part of the contract documents.

12. SECURITY FOR FAITHFUL PERFORMANCE

Simultaneously with bidders delivery of the executed contract, the Contractor shall furnish a surety bond or bonds as security for faithful performance of this contract and for the payment of all persons performing labor on the project under this contract, as specified in General Conditions included herein. The surety on such bond or bonds shall be a duly authorized surety company, bond shall be countersigned by an agent residing in South Carolina, and the said surety shall be satisfactory to the Owner.

13. POWER OF ATTORNEY

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

14. NOTICE OF SPECIAL CONDITIONS

Attention is particularly called to those parts of the contract documents and specifications that deal with the following:

(a) Inspection and testing of materials
(b) Insurance requirements
(c) Stated allowances
(d) Permits and Rights-of-way
(e) Hazardous Gas Safety (Section 01 73 02).

15. LAWS AND REGULATIONS

The Bidder's attention is directed to the fact that all applicable State laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout, and they will be deemed to be included in the contract the same as though herein written out in full.

16. METHOD OF AWARD - LOWEST QUALIFIED BIDDER

If at the time this contract is to be awarded, the lowest base bid submitted by a responsible bidder does not exceed the amount of funds then estimated by the Owner as available to finance the

contract, the contract will be awarded on the base bid only. If such bid exceeds such amount, the Owner may reject all bids or may award the contract on the base bid combined with such deductible alternates applied in numerical order in which they are listed in the Bid Form, as produces a net amount which is within the available funds. The Owner will decide which is the lowest qualified bidder, and in determining such bidder, the following elements will be considered for each bidder:

(a) Maintains a permanent place of business.
(b) Has adequate equipment and personnel to perform the work properly and expeditiously.
(c) Has suitable financial status to meet obligations incident to the work.
(d) Has appropriate technical experience.

17. OBLIGATION OF BIDDER

At the time of the opening of bids, each bidder will be presumed to have inspected the site and to have read and be thoroughly familiar with the plans and contract documents, including all addenda. The failure or omission of any bidder to examine any form, instrument or document shall in no way relieve any bidder from any obligation in respect to its bid.

18. ORDER OF WORK

The bidder's attention is directed to Section 00 60 06, Supplemental General Conditions, on special provisions associated with the order of completion of work.

19. COORDINATION OF OTHER DIVISIONS

The bidder's attention is directed to Section 00 60 06, Supplemental General Conditions, on special provisions associated with the coordination of other divisions.

20. LOCAL AND MINORITY BUSINESS ENTERPRISE PURCHASING PROGRAM

The City of Anderson encourages contractors to make reasonable efforts to solicit and utilize local and minority-owned businesses for subcontracting opportunities, material suppliers, and other services associated with this project. Contractors shall provide documentation of such efforts upon request by the City.

END OF SECTION

SECTION 00 40 00
AFFIDAVIT OF COMPLIANCE

With State E-Verify Statutes

STATE OF _____

COUNTY OF _____

I, _____ (hereinafter the "Affiant"), duly authorized by and on behalf of ___ _____ (hereinafter the "Employer") after being first duly sworn deposes and says as follows:

1. I am the _____ (President, Manager, CEO, etc.) of the Employer and possess the full authority to speak for and on behalf of the Employer identified above.

2. Employer understands that "E-Verify" means the federal E-Verify program operated by the United States Department of Homeland Security and other federal agencies, or any successor or equivalent program used to verify the work authorization of newly hired employees pursuant to federal law.

3. _____ Employer employs 25 or more employees in the state and, is in compliance with the provisions of state statutes. Employer has verified the work authorization of its employees through E-Verify and shall retain the records of verification for a period of at least one year.

   _____ Employer employs fewer than 25 employees and is therefore not subject to the provisions of state statutes.

4. All subcontractors engaged by or to be engaged by Employer have or will have likewise complied with the provisions of state statutes.

5. Employer shall keep Ardurra Group, Inc., Inc. informed of any change in its status.

This the _____ day of _____, 20___.

_____
Signature of Affiant
Print or Type Name: _____

STATE OF _____

COUNTY OF _____

Sworn to and subscribed before me, this the _____ day of _____, 20___.

_____
Notary Public

[SEAL]

My commission expires: _____

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SECTION 00 41 10
BYRD ANTI-LOBBYING AMENDMENT CERTIFICATION

Contractors who apply or bid for an award of $100,000 or more shall file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, officer or employee of Congress, or an employee of a Member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. § 1352.

Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier-to-tier up to the Recipient who in turn will forward the certification(s) to the awarding agency.

APPENDIX A, 44 C.F.R. PART 18, CERTIFICATION REGARDING LOBBYING – REQUIRED FOR CONTRACTS OVER $100,000

Certification for Contracts, Grants, Loans, and Cooperative Agreements

The undersigned certifies, to the best of his/her knowledge and belief, that:

☐ No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment or modification of any Federal contract, grant, loan or cooperative agreement.

☐ If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

☐ The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

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

The Contractor certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C., Chapter 38, Administrative Remedies for False Claims and Statements, apply to this certification and disclosure, if any.

BIDDER: _____

By (Signature): _____

Authorized Representative: _____

(Printed/Typed Name)

Title: _____

Date: _____

Phone Number: _____

Email Address: _____

END OF DOCUMENT

SECTION 00 41 11
CERITFICATION REGARDING DEBARMENT

CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION LOWER TIER COVERED TRANSACTION
(To be submitted with all bids exceeding $25,000.)

(1) The prospective lower tier participant (Bidder/Contractor) certifies, by submission of this bid or proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(2) The prospective Bidder/Contractor also certifies by submission of this bid or proposal that all subcontractors and suppliers (this requirement flows down to all subcontracts at all levels) are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(3) Where the prospective lower tier participant (Bidder/Contractor) is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this bid or proposal.

The lower tier participant (Bidder/Contractor), _____, certifies or affirms the truthfulness and accuracy of this statement of its certification and disclosure, if any.

DATE _____

SIGNATURE _____

COMPANY _____

NAME _____

TITLE _____

State of _____

County of _____

Subscribed and sworn to before me this ____ day of _____, 20____.

Notary Public _____

My Appointment Expires _____ [SEAL]

SECTION 00 41 12
NON-COLLUSION AFFIDAVIT OF PRIME BIDDER

STATE of _____ COUNTY of _____

I, _____, being first duly sworn, deposes and says that:

He/she is _____ of _____,

The Bidder that has submitted the attached Bid;

He or she is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;

Such Bid is genuine and is not collusive or sham Bid;

Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this Affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly with any other Bidder, firm or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, firm or person to fix the price or prices in the attached Bid or of any other Bidder, or to fix any overhead, profit or cost element of the Bid price or the Bid price of any other Bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against **City of Anderson**, or any person interested in the proposed Contract; and

The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees or parties in interest, including this Affiant.

BIDDER: _____

By (Signature): _____

_____
(Printed/Typed Name)

Title: _____

Date: _____

Subscribed and sworn to me this the _____ day of _____, 2023 .

Notary Public: _____
(Printed/Typed Name)

By (Signature): _____

Commission Expires: _____
(SEAL)

END OF DOCUMENT

SECTION 00 41 13
COPORATE CERTIFICATE

I, _____, certify that I am the Contracting and Attesting Officer named as Bidder in the foregoing Bid; that _____, who signed said Bid on behalf of the Contractor was then _____ of said Company; that said Bid was duly signed for and on behalf of said Company by authority of its Board of Directors, and is within the scope of its company's powers; that said Company is organized under the laws of the State of _____.

This the _____ day of _____, 20__.

Corporate Secretary

By (Signature): _____

_____
(Printed/Typed Name)

(SEAL)

END OF DOCUMENT

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SECTION 00 45 01
DRUG-FREE WORKPLACE AFFIDAVIT

By signature on this certificate, the Contractor certifies that:

____ It has a drug-free workplace program that complies with South Carolina Annotated Code, Title 44, Chapter 107, Drug-Free Workplace Programs (§ 44-107-20), which was in effect at the time of submission of this Bid, at least to the extent required by governmental entities.

____ It has less than five (5) employees receiving pay.

(Please indicate above which one, or both, that are correct.)

Pursuant to SC § 44-107-20, by signature on this Affidavit, the Contractor attests that it operates a drug-free workplace program, or other drug or alcohol testing program with requirements at least as stringent as that of the program operated by the Owner.

BIDDER: _____

By (Signature): _____

_____
(Printed/Typed Name)

Title: _____

Date: _____

END OF DOCUMENT

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SECTION 00 41 15
ATTESTATION PERSONNEL USED IN CONTRACT

Project Title: **Branchcliff Lane Streambank Stabilization**

The Bidder/Contractor, identified below, does hereby attest, certify, warrant, and assure that the Contractor shall not knowingly utilize the services of an illegal immigrant in the performance of this Contract and shall not knowingly utilize the services of any Subcontractor who will utilize the services of an illegal immigrant in the performance of this Contract.

BIDDER/CONTRACTOR: _____

By (Signature): _____

_____
(Printed/Typed Name)

Title: _____

Date: _____

NOTICE: This attestation MUST be signed by an individual empowered to contractually bind the Contractor. If said individual is not the chief executive or president, this document shall attach evidence showing the individual's authority to contractually bind the Contractor.

END OF DOCUMENT

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SECTION 00 41 16
CONTRACTORS LICENSE CERTIFICATION

Bidder:

Contractor's Name: _____

License Number: _____

License Classification: _____

Expiration Date of License: _____

I certify that the above information is true and correct and that the classification noted is applicable to the Bid for this project.

BIDDER/CONTRACTOR: _____

By (Signature): _____

_____
(Printed/Typed Name)

Title: _____

Date: _____

END OF DOCUMENT

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SECTION 00 41 43
BID FORM (UNIT PRICE)

Project:	City of Anderson Branchcliff Lane Streambank Stabilization
Location:	Anderson, SC
WKD Project No.:	20240695.00.WK

Date: _____

PROPOSAL OF _____ doing business as a corporation / a partnership / an individual (circle applicable term), with its principal office in the City of _____, County of _____, State of _____, (hereinafter called "Bidder").

TO: City of Anderson, SC
(hereinafter called "Owner"),

The Bidder, in compliance with your invitation for bids for the construction of the subject project, having examined the plans and specifications with related documents and the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed project, including the availability of materials and labor, hereby proposes to furnish all labor, materials and supplies, and to construct the project in accordance with the Contract Documents, within the time set forth therein, and at the prices stated below. These prices are to cover all expenses incurred in performing the work required under the Contract Documents, of which this proposal is a part.

Bidder hereby agrees to commence work under this contract on or before a date to be specified in written "Notice to Proceed" of the Owner and to fully complete the project within 180 consecutive calendar days thereafter as stipulated in the specifications. Bidder further agrees to pay as liquidated damages the sum of $ 500 for each consecutive calendar day thereafter as hereinafter provided in Paragraph 19 of the General Conditions.

The drawings, specifications and addenda are complementary of each other. What is called for by one shall be as binding as if called for by all. If a conflict between any of the above is discovered by the Bidder, the problem shall be referred to the Engineer as soon as possible for resolution by the Engineer. Should a conflict occur which is not resolved before bid time and/or is necessary to comply with mandatory requirements (i.e., codes, ordinances, etc.), it shall be the Bidder's responsibility to price and bid the more stringent method.

Bidder acknowledges receipt of the following addendum:

No.	_____	Dated	_____	No.	_____	Dated	_____
No.	_____	Dated	_____	No.	_____	Dated	_____

BID – UNIT PRICE: Bidder agrees to perform all work required for a complete project including, but not limited to, selective demolition, clearing and grubbing, grading, streambank stabilization, installation of boulder toe protection, boulder J-hook structures, soil lifts, erosion and sediment control measures, temporary stream diversion and dewatering, revegetation, site restoration, SWPPP requirements, and all other work as described in the specifications and shown on the plans for the sum of:

_____ Dollars _____ Cents. ($_____).

(Amount shall be shown in both words and figures. In case of discrepancy, the amount shown in words will govern.)

By submission of this bid, Bidder understands and agrees to the following:

- This is a unit price project. The Bidder (a.k.a. "Contractor") is responsible for reviewing the field conditions in comparison to the approximate quantities shown in the plans, in advance of preparing and submitting the bid, and shall notify the engineer in writing of any discrepancies, 7 days prior to the advertised bid opening date.

Bidder understands that the Owner reserves the right to reject any or all bids and to waive any informalities in the bidding.

The Bidder agrees that this bid shall be good and may not be withdrawn for a period of 60 calendar days after the scheduled closing time for receiving bids.

Upon receipt of written notice of the acceptance of this bid, Bidder will execute the formal contract attached within 10 days and deliver a Surety Bond or Bonds as required by Paragraph 30 of the General Conditions. The bid security attached in the sum of:

_____ Dollars _____ Cents. ($_____)

is to become the property of the Owner in the event the contract and bond are not executed within the time above set forth, as liquidated damages for the delay and additional expense to the Owner caused thereby.

By submission of this bid, each bidder certifies, and in the case of a joint bid, each party thereto certifies as to its own organization, that this bid has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this bid, with any other bidder or with any competitor.

Respectfully submitted:

BY: _____

_____
(Print Name)

_____
(Title)

_____
(Business Address)

Ardurra Group, Inc.
55 Beattie Place, Suite 200
SC License (C00177)
Greenville, SC 29601
Phone (864) 990-0180

BID TAB

Date: 10/22/2026

Project: Branchcliff Lane Streambank Stabilization
Client: City of Anderson
WKD # 20240695.00.WK

Pay Item No.	Description	QTY	UNIT	UNIT PRICE	COST
1	Mobilization	1	LS		
2	Construction Stakeout	1	LS		
3	PLS-Sealed As-Built Survey	1	LS		
4	Erosion and Sediment Control	1	LS		
5	Clearing and Grubbing	1000	SY		
6	Comprehensive Grading	350	CY		
7	Construction Entrance	1	EA		
8	Undercut Excavation	200	CY		
9	Pump Around & Required Materials	1	LS		
10	Furnish Materials and Install Boulder Toe Protection	105	LF		
11	Furnish Materials and Install Boulder J-Hook	10	LF		
12	6'-8' Deep 10" PVC Gravity Sewer Remove & Replace	280	LF		
13	6'-8' Deep 4' Manhole Remove & Replace	2	EA		
14	Sanitary Sewer Transition Coupling	2	EA		
15	Wastewater Bypass Pumping	1	LS		
16	Rock Excavation	50	CY		
17	Topsoil	500	CY		
18	Vegetated Soil Lift	35	LF		
19	Remove Surplus/Unsuitable Mateiral	400	CY		
20	Coconut Fiber Blanket	300	SY		
21	Live Stakes	1500	EA		
22	Riparian Plantings	0.38	AC		
23	Temporary, Permanent Seed and Mulch	2000	SY		
				TOTAL BASE BID PRICE	

ALTERNATIVE MATERIAL LINE ITEMS

1	6'-8' Deep 10" DIP Gravity Sewer Remove & Replace	280	LF		

SIGNATURE OF COMPANY OFFICER

DATE

Branchcliff Lane Streambank Stabilization is a unit price bid. Quantities shown in the bid tab shall be used for bid purposes.

SECTION 00 43 13
BID BOND

KNOW ALL MEN BY THESE PRESENTS: That we, the undersigned _____ as Principal, and _____as Surety, are hereby held and firmly bound unto the _____ as Owner, in the penal sum of _____ Dollars _____ Cents ($_____), for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns.

Signed this _____ day of _____, 20____.

The condition of the above obligation is such that: Whereas, the Principal has submitted to _____ a certain Bid, attached hereto and by reference made a part hereof, to enter into a contract in writing for the _____.

NOW, THEREFORE,

(a) If said BID shall be rejected, or

(b) If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attachment hereto (properly completed in accordance with said BID) and shall furnish a BOND for faithful performance of said contract, and for the payment of all persons performing labor furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID, then this obligation shall be void; otherwise the same shall remain in force and effect - it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by any extension of the time within which the OWNER may accept such BID, and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

_____
Principal (Corporate Seal)

BY: _____(L.S.)

_____
Surety (Corporate Seal)

BY: _____(L.S.)

COUNTERSIGNED (SC RESIDENT AGENT)

BY: _____

IMPORTANT: 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.

NOTE: Bond must be countersigned by a South Carolina resident agent.

END OF SECTION

SECTION 00 43 15
EMPLOYMENT ELIGIBILITY VERIFICATION REQUIREMENTS

A. Contractor is required to comply with all applicable State and Federal employment eligibility verification requirements including but not limited to the following:

1. By signing its bid or proposal, Contractor certifies that it will comply with the applicable requirements of Title 41, Chapter 8 of the South Carolina Code of Laws and agrees to provide to (Owner) City of Anderson upon request any documentation required to establish either: (a) that Title 41, Chapter 8 is inapplicable both to Contractor and its subcontractors or sub-subcontractors; or (b) that Contractor and its subcontractors or sub-subcontractors are in compliance with Title 41, Chapter 8. Pursuant to Section 41-8-70, "In addition to other penalties provided by law, a person who knowingly makes or files any false, fictitious, or fraudulent document, statement, or report pursuant to this chapter is guilty of a felony, and, upon conviction, must be fined within the discretion of the court or imprisoned for not more than five years, or both." Contractor agrees to include in any contracts with its subcontractor's language requiring its subcontractors to (a) comply with the applicable requirements of Title 41, Chapter 8, and (b) include in their contracts with the sub-subcontractors language requiring the sub-subcontractors to comply with the applicable requirements of Title 41, Chapter 8.

B. Contractor is required to complete and submit the attached affidavit along with the executed contract documents.

C. E-Verify.

1. In addition to completing and maintaining the federal employment eligibility verification form (Form I-9), Contractor must, within three business days after employing a new employee, verify the employee's work authorization through the E-Verify federal work authorization program administered by the U.S. Department of Homeland Security. Employers may no longer confirm a new employee's employment authorization with a driver's license or state identification card.

2. Contractor shall enroll in E-Verify at www.dhs.gov/e-verify.

END OF SECTION

Attachment

CONTRACTOR AFFIDAVIT
SOUTH CAROLINA ILLEGAL IMMIGRATION REFORM ACT (Amended)

In accordance with the requirements of the South Carolina Illegal Immigration Reform Act, (Contractor) _____ hereby certifies that it is currently in compliance with the requirements of Title 41, Chapter 8 of the SC Code Annotated and will remain in compliance with such requirements throughout the term of its contract with the (Owner) City of Anderson _____.

The Contractor hereby acknowledges that in order to comply with requirements of SC Code Annotated Section 41-8-20:

(A) All private employers in South Carolina shall be imputed a South Carolina employment license, which permits a private employer to employ a person in this State. A private employer may not employ a person unless the private employer's South Carolina employment license and any other applicable licenses as defined in Section 41-8-10 are in effect and are not suspended or revoked. A private employer's employment license shall remain in effect provided the private employer complies with the provisions of this chapter.

(B) All private employers who are required by federal law to complete and maintain federal employment eligibility verification forms or documents must register and participate in the E-Verify federal work authorization program, or its successor, to verify the work authorization of every new employee within three business days after employing a new employee. A private employer who does not comply with the requirements of this subsection violates the private employer's licenses.

(C) The South Carolina Department of Employment and Workforce shall provide private employers with technical advice and electronic access to the E-Verify federal work authorization program's website for the sole purpose of registering and participating in the program.

(D) Private employers shall employ provisionally a new employee until the new employee's work authorization has been verified pursuant to this section. A private employer shall submit a new employee's name and information for verification even if the new employee's employment is terminated less than three business days after becoming employed. If a new employee's work authorization is not verified by the federal work authorization program, a private employer must not employ, continue to employ, or reemploy the new employee.

(E) To assist private employers in understanding the requirements of this chapter, the director shall send written notice of the requirements of this section to all South Carolina employers, and shall publish the information contained in the notice on its website. Nothing in this section shall create a legal requirement that any private employer receive actual notice of the requirements of this chapter through written notice from the director, nor create any legal defense for failure to receive notice.

(F) If a private employer is a contractor, the private employer shall maintain the contact phone numbers of all subcontractors and sub-subcontractors performing services for the private employer. The private employer shall provide the contact phone numbers or a contact phone

number, as applicable, to the director pursuant to an audit or investigation within seventy-two hours of the director's request.

The Contractor agrees to provide to the City of Anderson upon request any documentation required to establish the applicability of the South Carolina Illegal Immigration Reform Act (Amended) to the contractor, subcontractor or sub-subcontractor. The Contractor further agrees that it will upon request provide the City of Anderson with any documentation required to establish that the contractor and any subcontractors or sub-subcontractors are in compliance with the requirements of Title 41, Chapter 8 of the S. C. Code Annotated.

Date:_____ By:_____
Contractor

Title: _____

SECTION 00 45 01
CONTRACT

THIS AGREEMENT made this _____ day of _____, 2026, by and between City of Anderson, acting herein through its City Manager, hereinafter called "Owner", and _____, doing business as a corporation, with its principal office in the City of _____, County of _____, State of _____, hereinafter called "Contractor".

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

Branchcliff Lane Streambank Stabilization (City Bid No. 2026-10), hereinafter called the "Project", for the sum of _____ Dollars _____Cents ($_____).

Contractor further agrees to commence and complete any and all extra work in connection therewith, under the terms as stated in the General and Special Conditions of the Contract; and at his (its or their) own proper cost and expense to furnish all the materials, supplies, machinery, equipment, tools, superintendents, labor, insurance and other accessories and services necessary to complete the said project in accordance with the conditions and prices stated in the Proposal and the General Conditions, Supplemental General Conditions and Special Conditions of the Contract, the plans, including all maps, plats, blueprints, and other drawings and printed or written explanatory matters thereof, the specifications and contract documents therefore as prepared by W.K. Dickson & Co., LLC herein entitled the "Engineer", and as enumerated in Paragraph 1 of the Supplemental General Conditions, all of which are made a part hereof and collectively evidence and constitute the Contract.

The Contractor hereby agrees to commence work under the Contract on or before a date to be specified in written Notice to Proceed from the Owner and to fully complete the project within **180** consecutive calendar days thereafter.

The Contractor further agrees to pay as liquidated damages the amount of $**500.00** for each consecutive calendar day thereafter that the Contractor fails to complete the project, as hereinafter provided in Paragraph 19 of the General Conditions.

The Owner agrees to pay the Contractor in current funds for the performance of the Contract, subject to additions and deductions, as provided in the General Conditions of the Contract, and to make payments on account thereof as provided in Paragraph 25, "Payments to Contractor", of the General Conditions.

[Signatures are on the following page.]

IN WITNESS WHEREOF the Owner and Contractor hereto have executed this contract on the day and date first below written in Four (4) counterparts, each of which shall be deemed an original contract.

Approved:

By: _____

Name: _____

Title: _____

Date: _____

Approved:

By: _____

Name: _____

Title: _____

Approved:

By: _____

Name: _____

Title: _____

ATTEST:

By: _____

Name: _____

Title: _____

OWNER: CITY OF ANDERSON, S.C.

By: _____

Name: David McCuen

Title: City Manager

CONTRACTOR:

By: _____

Name: _____

Title: _____

Date: _____

Address: _____

_____

SECTION 00 45 77
CONTRACTOR'S LICENSE CERTIFICATION

The Contractor's License Certification follows this page.

SECTION 00 60 01
CONTRACTOR'S AFFIDAVIT

The State of _____ Date: _____

The County of _____

The City/Town of _____

_____ (Officer's Name & Title)

of _____ (Contractor's Name)

being duly sworn, deposes and says that _____ (Contractor's Name)

has furnished all labor and material entering into the _____

_____ (Kind of Work)

at _____ (Name and Location of Plant or Work)

called for in the Contract Documents dated _____ with _____ (Owner's Name)

_____ (Contractor's Name) states further that this officer has full knowledge of all obligations for such labor and materials which have entered into and become part of that certain project known and designated above, and that this officer further deposes and says that all debts and other obligations for such labor and materials have been fully and completely paid for in good and lawful money of the United States of America and that there are no suits for damages against them proceeding, prospective and/or that there are no suits for damages against them proceeding, prospective, or otherwise, in consequence of their operations on the above said project.

The said _____ (Contractor's Name) will hold the Owners,

_____ (Owner's Name) blameless of any and all mechanic's liens that may be hereafter entered or filed for record, so as to constitute charge against said premises for work or labor done or materials furnished by them.

IN WITNESS HEREOF, this officer has heretofore put his hand and seal:

_____ (Seal)
(Officer's Name)

I, _____ Notary Public in and for the above named County and State do hereby certify that _____ (Officer's Name) personally known to me to be the affiant in the foregoing Affidavit, personally appeared before me this day and, having been duly sworn, deposes and says that the facts set forth in the above Affidavit are true and correct.

WITNESS my hand and seal this _____ day of _____, 20___.

_____ (Seal)

Notary Public for the State of _____

My Commission Expires: _____

SECTION 00 60 05
GENERAL CONDITIONS

1. CONTRACT AND CONTRACT DOCUMENTS. The plans, specifications and addenda, hereinafter enumerated in Paragraph 1 of Supplemental General Conditions, shall form part of this contract and the provisions thereof shall be as binding upon the parties hereto as if they were herein fully set forth. The table of contents titles, heading, running headlines and marginal notes contained herein and in said documents are solely to facilitate reference to various provisions of the contract documents and in no way affect, limit or cast light on the interpretations of the provisions to which they refer.

2. DEFINITIONS. The following terms as used in this contract are respectively defined as follows:
   (a) Contractor. A person, firm or corporation with whom the contract is made by the Owner.
   (b) Subcontractor. A person, firm or corporation supplying labor and materials, or only labor, for work at the site of the project for and under separate contract or agreement with the Contractor.
   c) Work on or at the Project. Work to be performed at the location of the project, including the transportation of materials and supplies to or from the location of the project by employees of the Contractor and any Subcontractor.

3. ADDITIONAL INSTRUCTIONS AND DETAIL DRAWINGS. The Contractor will be furnished additional instructions and detail drawings as necessary to carry out the work included in the Contract. The additional drawings and instructions thus supplied to the Contractor will coordinate with the Contract Documents and will be so prepared that they can be reasonably interpreted as part thereof. The Contractor shall carry on the work in accordance with the additional detail drawings and instructions. The Contractor and the Engineer will prepare jointly:
   (a) A schedule fixing the dates at which special detail drawings will be required; such drawings, if any, to be furnished by the Engineer in accordance with said schedule; and
   (b) A schedule fixing the respective dates for the submission of shop drawings, the beginning of manufacture, testing and installation of materials, supplies, and equipment, and the completion of the various parts of the work; each such schedule to be subject to change from time to time in accordance with the progress of the work.

4. SHOP DRAWINGS AND SAMPLES. Submit to the Engineer for approval, in accordance with the requirement of Section 01 33 01.

4.1 Samples. Contractor shall also submit to the Engineer for approval, all samples required by Section 01 33 01. All samples will have been checked by and stamped with the approval of the Contractor, identified clearly as to material, manufacturer, any pertinent catalog numbers and the use for which intended.

4.2 Deviations. At the time of each submission, Contractor shall in writing call the Engineer's attention to any deviations that the Shop Drawings or samples may have from the requirements of the Contract Document.

4.3 Engineer's Review. Engineer will review and approve with reasonable promptness Shop Drawings and samples, but his review and approval shall be only for conformance with the design concept of the project and for compliance with the information given in the Contract Documents. The approval of a separate item as such will not indicate approval of the assembly in which the item functions. Contractor shall make any corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and resubmit new samples until approved. Contractor shall direct specific attention in writing or on resubmitted Shop Drawings to revisions other than the corrections called for by Engineer on previous submissions. Contractor's stamp of approval on any Shop Drawing or sample shall constitute a representation to Owner and Engineer that Contractor has either

determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers and similar data or he assumes full responsibility for doing so, and that he has reviewed or coordinated each Shop Drawing or sample with the requirements of the work and Contract Documents.

4.4 Contractor's Records. Where a Shop Drawing or sample submission is required by the Specifications, no related work shall be commenced until the submission has been approved by Engineer. A copy of each approved shop drawing and each approved sample shall be kept in good order by Contractor at the site and shall be available to Engineer.

4.5 Contractor's Responsibility. Engineer's approval of Shop Drawings or sample shall not relieve Contractor from his responsibility for any deviations from the requirements of the Contract Documents unless Contractor has in writing called the Engineer's attention to such deviation at the time of submission and Engineer has given written approval to the specific deviation, nor shall any approval by Engineer relieve Contractor from responsibility for errors or omissions in the Shop Drawings.

5. MATERIALS, SERVICES AND FACILITIES shall be furnished by the Contractor.

(a) It is understood that except as otherwise specifically stated in the Contract Documents, the Contractor shall provide and pay for all materials, labor, tools, equipment, water, gas lights, power, transportation, superintendence, taxes, insurance, temporary construction of every nature, and all other services and facilities of every nature whatsoever necessary to execute, complete and deliver the work within the specified time.

(b) Any work necessary to be performed after regular working hours, on Sundays, or legal holidays, shall be performed without additional expense to the Owner.

6. CONTRACTOR'S TITLE TO MATERIALS. No materials or supplies for the work shall be purchased by the Contractor or by any subcontractor subject to any chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller. The Contractor warrants that he has good title to all materials and supplies used by him in the work, free from all liens, claims or encumbrances.

7. INSPECTION AND TESTING OF MATERIALS. Unless otherwise specifically provided for in the specifications, the inspection and testing of material and finished articles to be incorporated in the work at the site shall be made by bureaus, laboratories, or agencies approved by the Owner. The cost of such inspection and testing shall be paid by the Contractor.

7.1 Certification by Contractor. Where the detailed specifications call for certified copies of mill or shop tests to establish conformance of certain materials with the specifications, it shall be the responsibility of the Contractor to assure delivery of such certifications to the Owner. No materials or finished articles shall be incorporated in the work until such materials and finished articles have passed the required tests. The Contractor shall promptly segregate and remove rejected material and finished articles from the site of the work.

7.2 Guaranty. The testing and approval of materials by the laboratory, or laboratories, shall not relieve the Contractor of any of his obligations to fulfill his contract and guarantee of workmanship and materials as called for in paragraph entitled "General Warranty for One Year After Completion of Contract" herein. The Contractor may, at his option and at his own expense, cause such other tests to be conducted as he may deem necessary to assure suitability, strength and durability of any material or finished article.

8. "OR EQUAL" CLAUSE. The phrase "or equal" shall be construed to mean that material or equipment will be acceptable only when, in the judgment of the Engineer, they are composed of parts of equal quality, or equal workmanship and finish, designed and constructed to perform or

accomplish the desired result as efficiently as the indicated brand, pattern, grade, class, make or model. Written approval will be obtained from the Engineer prior to installation.

9. PATENTS. The Contractor shall hold and save the Owner and its officers, agents, servants, and employees harmless from liability of any nature or kind, including cost and expenses for, or on account of, any patented or unpatented invention, process, article, or appliance manufactured or used in the performance of the contract, including its use by the Owner, unless otherwise specifically stipulated in the Contract Documents. If the Contractor uses any design, device or material covered by letter, patent, or copyright, he shall provide for such use by suitable agreement with the Owner of such patented or copyrighted design, device or material. It is mutually agreed and understood that, with exception, the contract prices shall include all royalties or costs arising from the use of such design, device or materials, in any way involved in the work. The Contractor and/or his sureties shall indemnify and save harmless the Owner of the project from any and all claims for infringements by reason of the use of such patented or copyrighted design, device or materials or any trademark or copyright in connection with work agreed to be performed under this contract, and shall indemnify the Owner for any cost, expense or damage which it may be obliged to pay by reason of such infringement at any time during the prosecution of the work or after completion of the work.

10. SURVEYS, LAWS AND REGULATIONS. The Contractor shall comply with the following:

10.1 Construction staking shall be in accordance with the requirements of Section 01 73 01 entitled "Field Engineering".

10.2 Laws and Regulations. The Contractor shall keep himself fully informed of all laws, ordinances and regulations of State, City and County in any manner affecting those engaged or employed in the work, or the materials used in the work, or in any way affecting the conduct of the work, and of all orders and decrees of bodies or tribunals having any jurisdiction or authority over same. If any discrepancy or inconsistency should be discovered in this contract, or in the drawings or specifications herein referred to, in relation to any such law, ordinance, regulation, order or decree, he shall forthwith report the same in writing to the Owner. He shall, at all times, himself observe and comply with all such existing and future laws, ordinances and regulations (to the extent that such requirements do not conflict with Federal laws or regulations) and shall protect and indemnify the Owner and its agents against any claims or liability arising from or based on the violation of any such law, ordinance, regulation, order or decree, whether by himself or by his employees.

11. CONTRACTOR'S OBLIGATIONS. The Contractor shall, in good workmanlike manner, do and perform all work and furnish all supplies and materials, machinery, equipment, facilities and means, except as herein otherwise expressly specified, necessary or proper to perform and complete all the work required by this contract, within the time herein specified, in accordance with provisions of this contract and said specifications, and in accordance with the plans and drawings covered by this contract and any and all supplemental plans and drawings and in accordance with the directions of the Engineer as given from time to time during the progress of the work. He shall furnish, erect, maintain and remove such construction plant and such temporary works as may be required. The Contractor shall observe, comply with, and be subject to all terms, conditions, requirements and limitation of the contract and specifications, and shall do, carry on and complete the entire work to the satisfaction of the Engineer and the Owner.

12. WEATHER CONDITIONS. In the event of temporary suspension of work or during inclement weather, or whenever the Engineer shall direct, the Contractor will, and will cause his subcontractors to, protect carefully his and their work and materials against damage or injury from the weather. If, in the opinion of the Engineer, any work or materials shall have been damaged or injured by reason of failure on the part of the Contractor or any of his Subcontractors to so protect its work, such materials shall be removed and replaced at the expense of the Contractor.

13. PROTECTION OF WORK AND PROPERTY, EMERGENCY. The Contractor shall at all times safely guard the Owner's property from injury or loss in connection with this contract. He shall at all times safely guard and protect his own work and that of adjacent property from damage. The Contractor shall replace or make good any such damage, loss or injury unless such be caused directly by errors contained in the contract or by the Owner or by his duly authorized representatives. In case of emergency which threatens loss or injury of property and/or safety of life, the Contractor will be allowed to act, without previous instructions from the Engineer, in a diligent manner. He shall notify the Engineer immediately thereafter. Any claim for compensation by the Contractor due to such extra work shall be promptly submitted to the Engineer for approval. Where the Contractor has not taken action but has notified the Engineer of an emergency threatening injury to persons or damage to the work of any adjoining property, he shall act as instructed or authorized by the Engineer. The amount of reimbursement claimed by the Contractor on account of any emergency action shall be determined in the manner provided in paragraph entitled "Changes in Work" of these specifications.

14. INTERPRETATIONS. If any person contemplating submitting a bid for the proposed contract is in doubt as to the true meaning of any part of these proposed contract documents, he may submit to the Engineer a written request for an interpretation thereof. The person submitting the request will be responsible for its prompt and actual delivery. Any interpretation of such documents will be made only by addendum duly issued, and a copy of such addendum will be mailed or delivered to each person receiving a set of such documents. The Owner will not be responsible for any other explanation or interpretation of such documents which anyone presumes to make on behalf of the Owner before expiration of the ultimate time set for the receipt of bids.

15. REPORTS RECORDS AND DATA. The Contractor shall submit to the Owner such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data as the Owner may request concerning work performed or to be performed under this contract.

16. SUPERINTENDENCE BY CONTRACTOR. The Contractor shall employ only competent and skilled men on the work. The Contractor shall have competent Superintendent or Foreman present at all times when the work is in progress, who shall have full authority to act for the Contractor. It is understood that such representative shall be acceptable to the Engineer and shall be one who can be continued in that capacity for the particular job involved unless he ceases to be on the Contractor's payroll. The Contractor shall, upon demand from the Engineer, immediately remove any superintendent, foreman or workman whom the Engineer may consider incompetent or undesirable.

17. CHANGES IN WORK. No changes in the work covered by the approved contract documents shall be made without having prior written approval of the Owner. Charges or credits for the work covered by the approved change shall be determined by one or more, or a combination of, the following methods:
    (a) Unit bid prices previously approved.
    (b) An agreed lump sum.
    (c) The actual cost of:
        1. Labor, including foremen.
        2. Materials entering permanently into the work.
        3. The ownership or rental cost of construction plant and equipment during the time of use on the extra work.
        4. Power and consumable supplies for the operation of power equipment.
        5. Insurance.
        6. Social security and old age and unemployment contributions.

To the cost under (c) there shall be added a fixed fee to be agreed upon but not to exceed 15 percent of the estimated cost of the work. The fee shall be compensation to cover the cost of supervision, overhead, bond, profit and any other general expenses.

18. EXTRAS. Without invalidating the contract, the Owner may order extra work or make changes by altering, adding to or deducting from the work, the contract sum being adjusted accordingly, and the consent of the surety being first obtained where necessary or desirable. All the work of the kind bid upon shall be paid for at the price stipulated in the proposal, and no claims for any extra work or materials shall be allowed unless the work is ordered in writing by the Owner, or the Engineer acting officially for the Owner, and the price is stated in such order. Extra work shall be performed only upon the execution of authorized change orders as set forth in the preceding paragraph.

19. TIME FOR COMPLETION AND LIQUIDATED DAMAGES. It is hereby understood and mutually agreed by and between the Contractor and the Owner that the date of beginning and the time for completion as specified in the contract of the work to be done hereunder are essential conditions of this contract; and it is further mutually understood and agreed that the work embraced in this contract shall be commenced on a date to be specified in the Notice to Proceed.

19.1 Regular Prosecution of Work. The Contractor agrees that said work shall be prosecuted regularly, diligently and uninterruptedly at such rate of progress as will insure full completion thereof within the time specified. It is expressly understood and agreed, by and between the Contractor and the Owner, that the time for completion of the work described herein is a reasonable time for completion of same, taking into consideration the average climatic range and usual industrial conditions prevailing in this locality.

19.2 Liquidated Damages. If the Contractor shall neglect, fail, or refuse to complete the work within the time herein specified, or any proper extensions thereof granted by the Owner, then the Contractor does hereby agree, as a part consideration for the awarding of this contract, to pay to the Owner the amount specified in the contract not as a penalty but as liquidated damages for such breach of contract as hereinafter set forth, for each and every calendar day that the Contractor shall be in default after the time stipulated in the contract for completing the work. The said amount is fixed and agreed upon by and between the Contractor and the Owner because of the impracticality and extreme difficulty of fixing and ascertaining the actual damages the Owner would in such event sustain, and said amount is agreed to be the amount of damages which the Owner would sustain and said amount shall be retained from time to time by the Owner from current periodical estimates.

19.3 Extensions of Time for Completion. It is further agreed that time is of the essence of each and every portion of this contract and of the specifications wherein a definite and certain length of time is fixed for the performance of any act whatsoever; and where under the contractor an additional time is allowed for the completion of any work, the new time limit fixed by such extension shall be of the essence of this contract. Provided, that the Contractor shall not be charged with liquidated damages or any excess cost when the delay in completion of the work is due:

(a) To any preference, priority or allocation order duly issued by the Government.

(b) To unforeseeable cause beyond the control and without the fault or negligence of the Contractor including, but not restricted to, acts of the public enemy, acts of the Owner, acts of another contractor in the performance of a contract with the Owner; fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, hurricanes, tornadoes; and

(c) To any delays of subcontractors or suppliers occasioned by any of the causes specified in subsections (a) and (b) of this article.

Provided, further that the Contractor shall, within seven (7) days from the beginning of such delay, unless the Owner shall grant a further period of time prior to the date of final settlement of the contract, notify the Owner in writing of the causes of delay, who shall ascertain the facts and extent of delay and notify the Contractor within a reasonable time of its decision in the matter, and grant such extension of time as the Owner shall deem suitable and just.

Normal weather conditions for the project area are taken into consideration in the time for completion of the contract; therefore, no extension of time will be extended for normal weather conditions, with the exception of hurricanes and tornadoes.

20. CORRECTION OF WORK. All work, all materials, whether incorporated in the work or not, all processes of manufacturer, and all methods of construction, shall be at all times and places subject to the inspection of the Engineer, who shall be the final judge of the quality and suitability of the work, materials, processes of manufacture, and methods of construction of the purposes for which they are used. Should they fail to meet his approval, they shall be forthwith reconstructed, made good, replaced and/or corrected, as the case may be, by the Contractor at his own expense. Rejected material shall immediately be removed from the site. If, in the opinion of the Engineer, it is undesirable to replace any defective or damaged materials or to reconstruct or correct any portion of the work injured or not performed in accordance with the contract documents, the compensation to be paid to the Contractor hereunder shall be reduced by such amount as, in the judgment of the Engineer, shall be equitable.

21. SUBSURFACE CONDITIONS FOUND DIFFERENT. Should the Contractor encounter subsurface and/or latent conditions at the site materially differing from those shown on the plans or indicated in the specifications, he shall immediately give notice to the Engineer of such conditions before they are disturbed. The Engineer will thereupon promptly investigate the conditions, and if he finds that they materially differ from those shown on the plans or indicated in the specifications, he will at once make such changes in the plans and/or specifications as he may find necessary; any increase or decrease of cost resulting from such changes to be adjusted in the manner provided in paragraph 17 of these specifications.

(a) Where no specific subsurface conditions are indicated or specified, no increase in cost will be considered in regards to subsurface conditions encountered.

22. CLAIMS FOR EXTRA COSTS. No claim for extra work or cost shall be allowed unless the same was done in pursuance of a written order of the Engineer, as aforesaid, and the claim presented with the first estimate after the changes or extra work is done. When work is performed under the terms of subparagraph 17(c) of these specifications, the Contractor shall furnish satisfactory bills payrolls and vouchers covering all items of cost and when requested by the Owner, give the Owner access to accounts relating thereto.

23. RIGHT OF OWNER TO TERMINATE CONTRACT. In the event that any of the provisions of this contract are violated by the Contractor or by any of his subcontractors, the Owner may serve written notice upon the Contractor and the surety of its intention to terminate the contract, such notices to contain the reasons for such intention to terminate the contract, and unless within 10 days after the serving of such notice upon the Contractor, such violation or delay shall cease and satisfactory arrangement or correction be made, the contract shall, upon the expiration of said 10 days, cease and terminate. In the event of any such termination, the Owner shall immediately serve notice thereof upon the surety and the Contractor, and the surety shall have the right to take over and perform the contract; provided, however, that if the surety does not commence performance thereof within 10 days from the date of the mailing to such surety of notice of termination, the Owner may take over the work and prosecute same to completion by the contract or by force account for the account and at the expense of the Contractor, and the Contractor and his surety shall be liable to the Owner for any excess cost occasioned thereby, and in such event the Owner may take possession of and utilize in completion the work such materials, appliances and plant as may be on the site of the work and necessary therefore. If the Contractor should die, be declared an incompetent, be declared bankrupt or insolvent, make an assignment for the benefit of creditors during the term of his contract, the Owner may terminate the contract in the manner and under the procedure set forth above with the

exception that no notices to the Contractor shall be required, but in lieu thereof the Owner must make a reasonable effort to notify the estate of the Contractor, his guardian, assignee, or legal representative of the intention to terminate and fact of termination, if there is any such guardian, assignee, or legal representative at the time the Owner desires to terminate.

24. CONSTRUCTION SCHEDULE AND PERIODIC ESTIMATES. Immediately after execution and delivery of the contract and before the first partial payment is made, the Contractor shall deliver to the Owner an estimated construction progress schedule in form satisfactory to the Owner, showing the proposed dates of commencement and completion of each of the various subdivisions of work required under the contract documents and the anticipated amount of each monthly payment that will become due the Contractor in accordance with the progress schedule.

24.1 Contractor's Estimate. The Contractor shall also furnish:

(a) A detailed estimate, giving a complete breakdown of the contract price; and

(b) Periodic itemized estimates of work done for the purpose of making partial payments thereon. The costs employed in making up any of these schedules will be used only for determining the basis of partial payments and will not be considered as fixing a basis for addition to or deductions from the contract price.

24.2 Equipment Delivery Schedule. The Contractor shall also prepare a schedule of anticipated shipping dates for materials and equipment. It is intended that equipment and materials be so scheduled as to arrive at the job site just prior to time for installation to prevent excessive materials on hand for inventory and the necessity for extensive storage facilities at the job site.

25. PAYMENTS TO CONTRACTOR shall be made according to the following:

(a) Payments to the Contractor will be made within thirty (30) days upon receipt of a duly certified approved estimate of the work performed during the preceding calendar month under this contract, but to insure the proper performance of this contract, the Owner will retain a portion of each estimate until final completion and acceptance of all work covered by this contract in accordance with the following:

1) Retention of up to 10% of payment claimed until construction is complete, or as follows;

2) After construction is 50% complete, 10% of the 50% completion portion will be retained and no additional retainage will be withheld, provided that the contractor is making satisfactory progress and there is no specific cause for greater withholding.

3) When the project is substantially complete (operational or beneficial occupancy), the retained amount may be further reduced to only that amount necessary to assure completion.

4) The Owner will accept a cash bond or irrevocable letter of credit if offered in lieu of cash retainage under (2), and will accept a cash bond or irrevocable letter of credit if offered in lieu of cash retainage under (3).

5) The Owner may reinstate up to ten (10) percent retainage if the Owner determines, at its discretion, that the contractor is not making satisfactory progress or there is other specific cause for such retainage.

(b) In preparing estimates, the material delivered on the site and preparatory work done may be taken into consideration.

(c) All material and work covered by partial payments shall thereupon become the sole property of the Owner, but this provision shall not be construed as relieving the Contractor from the sole responsibility for the care and protection of materials and work upon which payments have been made or the restoration of any damaged work, or as a waiver of the right of the Owner to require the fulfillment of all the terms of the contract.

25.1 Owner's Right to Withhold Certain Amounts and Make Application Thereof. The Contractor agrees that he will indemnify and save the Owner harmless from all claims growing out of the lawful

demands of subcontractors, laborers, workmen, mechanics, materialmen, 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. The Contractor shall, at the Owner's request, furnish satisfactory evidence that all obligations of the nature hereinabove designated have been paid, discharged, or waived. If the Contractor fails so to do, then the Owner may, after having served written notice on the contractor, either pay unpaid bills, of which the Owner has written notice, direct, or withhold from the 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 the 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 the Owner to either the Contractor or his surety. In paying any unpaid bills of the Contractor, the Owner shall be deemed the agent of the Contractor, and any payment so made by the Owner shall be considered as a payment made under the contract by the Owner to the Contractor, and the Owner shall not be liable to the Contractor for any such payment made in good faith.

26. ACCEPTANCE OF WORK AND FINAL PAYMENT. Before final acceptance of the work and payment to the Contractor of the percentage retained by the Owner, the following requirements shall be complied with:

(a) Final Inspection. Upon notice from the Contractor that his work is completed, the Engineer will make a final inspection of the work and shall notify the Contractor of all instances where his work fails to comply with the contract drawings and specifications, as well as any defects he may discover. The Contractor shall immediately make such alterations as are necessary to make the work comply with the contract drawings and specifications, and to the satisfaction of the Engineer.

(b) Operating Test. After the alterations for compliance with the contract drawings and specifications have been made, and before acceptance of the whole or any part of the work, it shall be subjected to test to determine that it is in accordance with the contract drawings and specifications. The Contractor shall maintain all work in first class condition for a thirty (30) day operating period after the work has been completed as a whole, the final inspection has been made, and the Engineer has notified the Contractor in writing that the work has been finished to his satisfaction. The retained percentage as provided herein will not become due or payable to the Contractor until after the thirty (30) day operating period has expired.

(c) Cleaning Up. Before the work is considered as complete, all rubbish and unused material due to or connected with the construction must be removed and the premises left in a condition satisfactory to the Owner. Streets, curbs, crosswalks, pavements, sidewalks, fences and other public and private property disturbed or damaged should be restored to their former condition. Final acceptance will be withheld until such work is finished.

(d) Liens. Final acceptance of the work will not be granted, and the retained percentage will not be due or payable until the Contractor has furnished the Owner proper and satisfactory evidence under oath that all claims for labor and material employed or used in the construction of the work under this contract have been settled, and that no legal claims can be filed against the Owner for such labor or material.

(e) Final Estimate. Upon completion of all cleaning up, alterations and repairs required by the final inspection or operating test, the satisfactory completion of the operating test, and upon submitting proper and satisfactory evidence to the Owner that all claims have been settled, the Contractor shall then prepare his final estimate. After review and approval of the final estimate by the Engineer and the Owner, the payment shall then become due.

27. ACCEPTANCE OF FINAL PAYMENT AS RELEASE. The acceptance by the Contractor of final payment shall be and shall operate as a release to the owner of all claims and all liability to the

Contractor for all things done or furnished in connection with this work and for every act and neglect of the Owner and others relating to or arising out of this work. No payment, final or otherwise, shall operate to release the Contractor or his sureties from any obligations under this Contract or his sureties from any obligations under this contract or the performance and payment bond.

28. PAYMENTS BY CONTRACTOR. The Contractor shall pay:
   (a) For all transportation and utility services not later than the 20th day of the calendar month following that in which services are rendered;
   (b) For all materials, tools, and other expendable equipment to the extent of ninety (90) percent of the cost thereof not later than the 20th day of the calendar month following that in which such materials, tools, and equipment are delivered at the site of the project, and the balance of the cost thereof not later than the 30th day following completion of that part of the work in or on which such materials, tools, and equipment are incorporated or used; and
   (c) To each of his subcontractors not later than the 5th day following each payment to the Contractor, the respective amounts allowed the Contractor on account of the work performed by his subcontractors to the extent of each subcontractor's interest therein.

29. INSURANCE. The Contractor shall procure and shall maintain during the life of this contract, whether such operation be by himself or by a subcontractor or anyone directly or indirectly employed by either of them, such insurance as required by statute and/or ordinance to adequately protect the Owner from any claims or damages, including bodily injury or death, which may arise from them during operations under this contract.

29.1 Limits of Liability. Insurance shall be obtained for not less than the limits of liability as specified in Section 00 60 06 entitled Supplemental General Conditions.

29.2 Certificates of Insurance. The Contractor shall furnish the Owner, if requested, certificates showing the type, amount, class of operations covered, effective dates and dates of expiration of the policies. Such certificates shall contain substantially the following statement: "The insurance covered by this certificate will not be cancelled or materially altered except after 30 days written notice has been received by the Owner".

30. CONTRACT SECURITY. The Contractor shall furnish a 100 percent performance bond and a 100 percent payment bond as security for the faithful performance of this contract, as security for the payment of all persons performing labor on the project under this contract and furnishing materials in connection with this contract. The performance bond and payment bond shall be in separate instruments. Before the final acceptance, each bond must be approved by the Owner.

31. ASSIGNMENTS. The Contractor shall not assign the whole or any part of this contract or any moneys due or to become due hereunder without written consent of the Owner. In case the Contractor assigns all or any part of any moneys due or to become due under this contract, the instrument of assignment shall contain a clause substantially to the effect that is agreed that the right of the assignee in and to any moneys due or to become due to the Contractor shall be subject to prior claims of all persons, firms and corporations for services rendered or materials supplied for the performance of the work called for in this contract.

32. MUTUAL RESPONSIBILITY OF CONTRACTORS. If through acts of neglect on the part of the Contractor, any other contractor or any subcontractor shall suffer loss or damage on the work, the Contractor agrees to settle with such other contractor or subcontractor by agreement or arbitration. If such other contractor or subcontractor shall assert any claim against the Owner on account of any damage alleged to have been sustained, the Owner shall notify the Contractor, who shall indemnify and save harmless the Owner against any such claim.

33. SEPARATE CONTRACTS. The Contractor shall coordinate his operations with those of other contractors. Cooperation will be required in the arrangement for the storage of materials and in the detailed execution of the work. The Contractor, including his subcontractor, shall keep informed of the progress and the detail work of other contractors and shall notify the Engineer immediately of lack of progress or defective workmanship on the part of other contractors. Failure of a contractor to keep informed of the work progressing on the site and failure to give notice of lack of progress or defective workmanship by others shall be construed as acceptance by him of the status of the work as being satisfactory for proper coordination with his own work.

34. SUBCONTRACTING shall comply with the following:

(a) The Contractor may utilize the services of specialty contractors on those parts of the work that under normal contracting practices are performed by specialty subcontractors.

(b) The Contractor shall not award any work to any subcontractor without prior written approval of the Owner, which approval will not be given until the Contractor submits to the Owner a written statement concerning the proposed award to the subcontractor, which statement shall contain such information as the Owner may require.

(c) The Contractor shall be as fully responsible to the Owner for the acts and omissions of his subcontractors, and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons employed by him.

(d) The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind subcontractors to the Contractor by the terms of the General Conditions and other contract documents insofar as applicable to the work of subcontractors and to give the Contractor the same power as regards terminating any subcontract that the Owner may exercise over the Contract under any provisions of the contract documents.

(e) Nothing contained in this contract shall create any contractual relation between any subcontractor and the Owner.

35. ENGINEER'S AUTHORITY. The Engineer shall determine the amount, quality, acceptability and fitness of the several kinds of work and materials which are to be paid for under this contract and shall decide all questions which may arise in relation to said work and the construction thereof. The Engineer's estimates and decisions shall be final and conclusive, except as herein otherwise expressly provided. In case any question shall arise between the parties hereto relative to said contract or specifications, the determination or decision of the Engineer shall be a condition precedent to the right of the Contractor to receive any money or payment for work under this contract affected in any manner or to any extent by such question.

35.1 Interpretation of Drawings and Specifications. The Engineer shall decide the meaning and intent of any portion of the specifications and of any plans or drawings where the same may be found obscure or be in dispute. Any differences or conflicts in regard to their work that may arise between the Contractor under this contract and other contractors performing work for the Owner shall be adjusted and determined by the Engineer.

36. Not Used.

37. USE OF PREMISES AND REMOVAL OF DEBRIS. The Contractor expressly undertakes at his own expense:

(a) To take every precaution against injuries to persons or damage to property.

(b) To store his apparatus, materials, supplies and equipment in such orderly fashion at the site of the work as will not unduly interfere with the progress of his work or the work of any other contractors.

(c) To place upon the work or any part thereof only such loads as are consistent with the safety of that portion of the work.

(d) To clean up frequently all refuse, rubbish, scrap materials, and debris caused by his operations, to the end that at all times the site of the work shall present a neat, orderly and workmanlike appearance.

(e) Before final payment to remove all surplus material, false work, temporary structures, including foundations thereof, plant of any description and debris of every nature resulting from his operations, and to put the site in a neat, orderly condition.

(f) To effect all cutting, fitting or patching of his work required to make the same conform to the plans and specifications, and, except with the consent of the Engineer, not to cut or otherwise alter the work of any other contractor.

38. QUANTITIES OF ESTIMATE. The estimated quantities of work to be done and materials to be furnished under this contract, shown in any of the documents, including the proposal, are given for use in comparing bids, and the right is especially reserved except as herein otherwise specifically limited, to increase or diminish them as may be deemed reasonably necessary or desirable by the Owner to complete the work contemplated by this contract, and such increase or diminution shall in no way vitiate this contract, nor shall any such increase or diminution give cause for claims or liability for damages.

39. RIGHT-OF-WAY AND SUSPENSION OF WORK. The Owner shall furnish all land and rights-of-way necessary for the carrying out of this contract and the completion of the work herein contemplated, and will use due diligence in acquiring said land and rights-of-way as speedily as possible. But it is possible that all lands and rights-of-way may not be obtained as herein contemplated before construction begins, in which event the Contractor shall begin his work upon such land and rights-of-way as the Owner may have previously acquired, and no claim for damages whatsoever will be allowed by reason of the delay in obtaining the remaining lands and rights-of-way.

Should the Owner be prevented or enjoined from proceeding with the work, or from authorizing its prosecution, either before or after the commencement, by reason of any litigation or by reason of its ability to procure any lands or rights-of-way for said work, the Contractor shall not be entitled to make or assert claim for damage by reason of said delay or to withdraw from the contract except by consent of the Owner; but time for completion of the work will be extended to such time as the Owner determines will compensate for the time lost by such delay, such determination to be set forth in writing.

40. GENERAL WARRANTY FOR ONE YEAR AFTER COMPLETION OF CONTRACT. For a period of at least one year after the completion of the contract, the Contractor warrants the fitness and soundness of all work done and materials and equipment put in place under the contract, and neither the final certificate of payment nor any provision in the Contract Documents nor partial or entire occupancy of the premises by the Owner shall constitute an acceptance of work not done in accordance with the Contract Documents or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship. The Contractor shall remedy any defects in the work and pay for any damage to other work resulting there from, which shall appear within a period of one year from the date of final acceptance of the work, unless a longer period is specified. The Owner will give notice of observed defects with reasonable promptness.

41. NOTICE AND SERVICE THEREOF. Any notice to any Contractor from the Owner relative to any part of this contract shall be in writing and considered delivered and the service thereof completed, when said notice is posted by registered mail to said Contractor or his authorized representative on the work, or is deposited in the regular United States Mail in a sealed, postage prepaid envelope and the receipt thereof is acknowledged by the Contractor.

41.1 Owner's Notice. All papers required to be delivered to the Owner shall be delivered as indicated in Section 00 60 06 entitled Supplemental General Conditions.

42. REQUIRED PROVISIONS DEEMED INSERTED. Each and every provision of law and clause required by law to be inserted in this contract shall be deemed to be inserted herein, and the contract shall be read and enforced as though it were included herein, and if through mistake or otherwise any such provision is not inserted or is not correctly inserted, then upon the application of either party the contract shall forthwith by physically amended to make such insertion or correction.

43. PROTECTION OF LIVES AND HEALTH. In order to protect the lives and health of his employees under the contract, the Contractor shall comply with all pertinent provisions of the "Manual of Accident Prevention in Construction" issued by the Associated General Contractors of America, Inc., and shall maintain an accurate record of all cases of death, occupational disease, and injury requiring medical attention or causing loss of time from work, arising out of and in the course of employment on work under the contract. The Contractor alone shall be responsible for the safety, efficiency and adequacy of his plant, appliances and methods, and for any damage that may result from their failure or their improper construction, maintenance or operation.

44. WAGES AND OVERTIME COMPENSATION. The Contractor and each of his subcontractors shall comply with all applicable State and local laws or ordinances with respect to the hours worked by laborers and mechanics engaged in work on the project and with respect to compensation for overtime.

45. PROHIBITED INTERESTS. No official of the Owner, who is authorized in such capacity and on behalf of the Owner to negotiate, make, accept or approve or to take part in negotiating, making, accepting, or approving any architectural, engineering, inspection, construction, or material supply contract or any subcontract in connection with the construction of the project, shall become directly or indirectly interested personally in this contract or in any part hereof. No officer, employee, architect, attorney, engineer, or inspector of and on behalf of the Owner to exercise any legislative, executive, supervisory or other similar functions in connection with the construction of the project shall become directly or indirectly interested personally in this contract or in any part hereof, any material supply contract, subcontract, insurance contract, or any other contract pertaining to the project.

46. CONFLICTING CONDITIONS. Any provisions in any of the Contract Documents which may be in conflict or inconsistent with any of the paragraphs in these General Conditions shall be void to the extent of such conflict or inconsistency.

47. INDEMNIFICATION

47.1 The CONTRACTOR will indemnify and hold harmless the OWNER, the ENGINEER, the South Carolina Office of Resilience and their agents and employees from and against all claims, damages, losses and expenses including attorney's fees arising out of or resulting from the performance of the WORK, provided that any such claims, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property including the loss of use resulting there from; and is caused in whole or in part by any negligent or willful act of omission of the CONTRACTOR and SUBCONTRACTOR, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.

47.2 In any and all claims against the OWNER, the ENGINEER, the South Carolina Office of Resilience, or any of their agents or employees, by an employee of the CONTRACTOR, any SUBCONTRACTOR, anyone directly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way by limitation on

the amount or type of damages, compensation or benefits payable by or for the CONTRACTOR or any SUBCONTRACTOR under workmen's compensation acts, disability benefit acts or other employee benefits acts.

47.3 The obligation of the CONTRACTOR under this paragraph shall not extend to the liability of the ENGINEER, its agents or employees arising out of the preparation or approval of maps, drawings, opinions, reports, surveys, change orders, design or specifications.

END OF SECTION

SECTION 00 60 06
SUPPLEMENTAL GENERAL CONDITIONS

A. ENUMERATION OF PLANS, SPECIFICATIONS AND ADDENDA

1. The plans, specifications and addenda which form a part of this contract as set forth in Paragraph 1 of the General Conditions, Contract and Contract Documents are enumerated in Section 00 01 05 - Table of Contents and Section 00 01 15 - Drawings Index.

B. CONTRACTOR'S AND SUBCONTRACTOR'S INSURANCE

1. As required under Paragraph 29 of the General Conditions, the CONTRACTOR shall not commence WORK under this Contract until he has obtained all the insurance required under this paragraph and such insurance has been approved by the OWNER, nor shall the CONTRACTOR allow any SUBCONTRACTOR to commence WORK on his Subcontract until all similar insurance required of the SUBCONTRACTOR has been so obtained and approved.
2. Unless otherwise specified in this Contract, the CONTRACTOR shall, at its sole expense, maintain in effect at all times, during the performance of WORK, insurance coverage with limits not less than those set forth below with insurers and under forms of policies satisfactory to OWNER.
3. The CONTRACTOR shall deliver Certificates of Insurance to the ENGINEER no later than ten (10) days after award of the Contract but in any event, prior to execution of the Contract by the OWNER and prior to commencing WORK on the site as evidence that policies providing such coverage and limits of insurance are in full force and effect.
    a. Certificates shall provide that not less than thirty (30) days advance notice will be given in writing to the OWNER prior to cancellation, termination or material alteration of said policies of insurance.
    b. Certificates shall identify on their faces the PROJECT NAME and the ENGINEER'S PROJECT NUMBER.
4. Additional Insured: The Commercial General Liability, Excess Liability (Umbrella) and Comprehensive Automobile Liability insurance policies shall be endorsed to include the OWNER. ENGINEER, and the South Carolina Office of Resilience as additional insured for ongoing and completed operations. Such insurance shall be primary and not be contributory with any other insurance maintained by the OWNER, ENGINEER, or the South Carolina Office of Resilience.
5. The OWNER, ENGINEER, and the South Carolina Office of Resilience are not maintaining any insurance on behalf of the CONTRACTOR covering against loss or damage to the WORK or to any other property of the CONTRACTOR unless otherwise specifically stated herein and as may be described by appendix hereto. In the event the CONTRACTOR maintains insurance against physical loss or damage to the CONTRACTOR'S construction equipment and tools, such insurance shall include an insurer's waiver of rights of subrogation in favor of OWNER, ENGINEER, and the South Carolina Office of Resilience.
6. Provide only insurance carrier(s) with an “A” rating.

8. **Insurance Requirements:**
    a. **Commercial General Liability Insurance:** The CONTRACTOR shall take out and maintain during the life of the Contract such commercial general liability insurance as shall protect him from claims for damage for bodily injury, including accidental death, as well as from claims for property damage, which may arise from operations under this contract whether such operations are by himself or by any SUBCONTRACTOR or by anyone directly or indirectly employed by either of them. The amount of such insurance shall be not less than the following:

General Aggregate	$2,000,000.00
Products - Complete/Operations Aggregate	$2,000,000.00
Personal and Advertising Injury	$1,000,000.00
Each Occurrence	$1,000,000.00
Fire Damage (Any one fire)	$50,000.00
Medical Expenses (Any one person)	$5,000.00

1) The General Aggregate listed above shall be for this project only.
2) **Special Hazards:** The CONTRACTOR'S and his SUB-CONTRACTOR'S General Liability Insurance shall provide adequate protection against use of explosives, collapse, and underground hazards. Each detonation of blasting shall be considered a single occurrence.
3) Provide Waiver of Subrogation in favor of the Owner and WK Dickson & Co., LLC

b. **Comprehensive Automobile Liability Insurance:**
1) Includes coverage for all owned, hired and non-owned automobiles.
2) The combined single limit of liability shall not be less than the following:

Any One Accident or Loss	$1,000,000.00

3) Provide Waiver of Subrogation in favor of the Owner and WK Dickson & Co., LLC

c. **Excess Liability (Umbrella) Insurance:**
1) CONTRACTOR shall carry and maintain Combined Excess Liability (Umbrella) insurance for a limit not less than the following:

Each Occurrence	$5,000,000.00
Aggregate	$5,000,000.00

d. **Worker's Compensation:** The insurance required by this Section shall be written for not less than the following or greater if required by law:
1) Statutory benefits as provided by South Carolina Law.
2) Employers' Liability:

Each Accident	$500,000.00
Disease - Policy Limit	$500,000.00
Disease - Each Employee	$500,000.00

3) Provide Waiver of Subrogation in favor of the Owner and WK Dickson & Co., LLC

e. **Builders Risk Insurance and Installation Floater Policy:** Where buildings and applicable above-ground structures are included in the Project, CONTRACTOR shall purchase and maintain an "all risk" or special perils form builder's risk policy. Where utilities and underground structures are included in the Project, CONTRACTOR shall purchase and maintain an Installation Floater Policy. Policy shall be issued in the name of the CONTRACTOR, OWNER and all SUBCONTRACTORS for the full contract value of the insurable portions of the WORK. This policy shall contain a provision that in the event of payment of any loss or damage, the insurer will have no rights of recovery against any of the parties named as insureds or additional insureds.

f. **Flood Insurance:** The CONTRACTOR is required to carry flood insurance for projects located in designated flood hazard areas in which Federal Flood Insurance is available.

g. **Not Used**.

h. **OWNER'S Protective Liability Insurance:** The CONTRACTOR shall purchase and maintain an OWNER'S Protective Liability policy issued in the name of the OWNER with a combined single limit of liability of not less than the following:

Each Occurrence	$2,000,000.00
Aggregate	$2,000,000.00

C. ABBREVIATIONS AND DEFINITIONS

1. Abbreviations used in these Specifications refer to the following:

OWNER: City of Anderson, SC

ENGINEER: WK Dickson & Co., LLC or their duly authorized representative

2. Definitions: Wherever in the specifications or upon the drawings the words "directed", "required", "permitted", "ordered", "designated", "prescribed", or words of like import are used, it shall be understood that the direction, requirement, permission, order, designation or prescription of the OWNER is intended; and similarly, the words "approved", "acceptable", "satisfactory", or words of like import shall mean approved by, or acceptable to, or satisfactory to the OWNER, unless otherwise expressly stated.

D. NOTICE AND SERVICE THEREOF

1. All papers required to be delivered to the OWNER shall, unless otherwise specified in writing to the CONTRACTOR, be delivered to the OWNER'S representative as indicated in the Advertisement for Bids, and any notice to or demand upon the OWNER shall be sufficiently given if delivered to the office of said representative, or if deposited in the United States Mail, in a sealed postage prepaid envelope, or delivered with charges prepaid to any telegraph company for transmission, in each case addressed to the OWNER'S representative as indicated below, or to such other representative of the OWNER, or to such other address as the OWNER may subsequently specify in writing to the CONTRACTOR for such purposes.

E. CORRELATION OF PLANS AND SPECIFICATIONS

1. The contract, plans and specifications are to be interpreted as mutually explanatory or supplementary, and therefore any features shown in one and not in the other shall have the same force and effect as if shown by both, and shall be fully executed. Prior to execution of the WORK, the CONTRACTOR shall check all drawings and specifications, and shall immediately report to the ENGINEER all errors, discrepancies, conflicts and omissions discovered therein. All such errors, discrepancies, conflicts and omissions will be adjusted by the ENGINEER, and adjustment by the CONTRACTOR without prior approval shall be at his own risk. The settlement of any complications arising from such adjustments shall be made by the CONTRACTOR at his own expense and to the satisfaction of the OWNER.

F. OWNERSHIP OF CONTRACT DOCUMENTS

1. All drawings, specifications and memoranda relating to the WORK are the property of the OWNER and are to be carefully used and returned to the OWNER upon completion or cessation of the WORK from any cause.
2. Plans and specifications to be furnished: One (1) PDF set of the Contract Documents (specifications and plans) will be furnished to the CONTRACTOR. Printed sets can be secured from the ENGINEER upon request at cost of reproduction. The CONTRACTOR

shall have available on the project site at all times one (1) printed copy of each of said plans and specifications.

G. ORDER OF WORK

1. The prosecution, order or sequence of the WORK shall be as approved by the ENGINEER, which approval, however, shall in no way affect the responsibility of the CONTRACTOR.

H. PHYSICAL DATA

1. The drawings, which accompany and form a part of the contract, have been prepared on the basis of surveys and observations of the site, and are intended to present an essentially accurate indication of the physical conditions at the site. However, this shall not relieve the CONTRACTOR of the necessity for familiarizing himself with physical conditions at the site, and any discrepancies found in the drawings shall not be grounds for claims by the CONTRACTOR against the OWNER, or for non-performance of WORK specifically provided for under the contract.

I. ENGINEER'S REVIEW AND CONTRACTOR'S INSPECTION

1. The WORK shall be periodically reviewed by the ENGINEER's representatives, but the presence of the ENGINEER's representatives shall not relieve the CONTRACTOR or his responsible agent of responsibility for the proper execution of the WORK.
2. The CONTRACTOR will be required to furnish at his expense such labor, organization and materials which form a part of the ordinary and usual equipment and crew of the CONTRACTOR as may be reasonably necessary in inspecting and supervising the WORK. Should the CONTRACTOR refuse, neglect or delay compliance with this requirement, the specified facilities may be furnished and maintained by the OWNER and the cost thereof will be deducted from any amounts due, or to become due, the CONTRACTOR.
3. Except as specified in this paragraph, or otherwise provided for in these specifications, all expense of inspection will be borne by the CONTRACTOR.
4. It is understood that any instruction or decision given by the ENGINEER through the Resident ENGINEER is to be considered the instruction or decision of the OWNER, in all cases where, under the terms of this contract, decision rests with the ENGINEER.
5. The ENGINEER or his authorized representative shall have access to the WORK at all times.

J. STANDARD TESTS, QUALITY AND GUARANTEES

1. Standard tests, quality and guarantees shall comply with the following:
    a. All materials, supplies and parts and assemblies thereof, entering into the WORK to be performed under these specifications, shall be tested as specified herein or otherwise required, in conformity with the contract and according to the best modern approved methods for the particular type and class of WORK.
    b. Unless waived in writing by the ENGINEER, all tests and trials shall be made in the presence of a duly authorized representative of the ENGINEER. When the presence of the inspector is so waived, sworn statements in duplicate of the tests made and results thereof shall be furnished to the ENGINEER by the CONTRACTOR as soon as possible after completion of tests.
    c. Unless otherwise authorized, directed or specified, where standard published specifications of recognized authorities and organizations are mentioned, the latest revision of such specification current at the time when the WORK is executed shall govern.
    d. All materials and equipment used in the construction of the project shall be subject to adequate inspection and testing in accordance with accepted standards. The laboratory or inspection agency shall be selected by the OWNER. The OWNER will pay for all laboratory inspection service direct and not as a part of the contract.

e. Materials of construction, particularly those upon which the strength and durability of the structure may depend, shall be subject to inspection and testing to establish conformance with specifications and suitability for uses intended.

f. In accordance with the Contract, all materials, parts and equipment furnished and incorporated in the WORK shall be high grade, free from defects and imperfections, of recent manufacture and unused. Workmanship shall be of the highest grade and in accordance with the best modern standard practice.

K. STANDARD PRODUCTS

1. All materials supplied, and articles furnished shall, wherever specified and otherwise wherever practicable, be the standard products of recognized, reputable manufacturers. The standard products of manufacturers other than those specified will be accepted when it is proven to the satisfaction of the ENGINEER, in accordance with the Contract, that they are equal in strength, durability, usefulness and convenience for the purpose intended. Any changes required in the details and dimensions indicated on the drawings, or the substitution of standard products other than those provided for, shall be properly made as approved by the ENGINEER and at the expense of the CONTRACTOR.

END OF SECTION

SECTION 00 60 10
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)

hereinafter called Surety, are held and firmly bound unto

_____
(Name of Owner)

_____
(Address of Owner)

hereinafter called Owner, in the penal sum of _____ Dollars_____Cents ($_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas the Principal entered into a certain Contract with the Owner dated the _____ day of _____, 20____, a copy of which is hereto attached and made a part hereof for the construction of:

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions and agreements of said Contract during the original term thereof, and any extensions thereof which may be granted by the Owner, with or without notice to the Surety, and if he shall satisfy all claims and demands incurred under such contract and fully indemnify and save harmless the Owner from all costs and damages which it may suffer by reason failure to do so, and shall reimburse and repay the Owner all outlay and expense which the Owner may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

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

PROVIDED FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in six (6) counterparts, each one of which shall be deemed an original, this the _____ day of _____, 2026.

Signed, sealed and delivered in
the presence of:

_____
Principal – Contractor

_____ By: _____

_____ _____
As to Principal Title

_____
Surety

By: _____
Attorney-In-Fact
(Power of Attorney to be Attached)

_____ By: _____
Resident Agent

_____ _____
As to Surety Resident Agent Company Name

_____
Resident Agent Company Address

_____

_____

NOTES:

1. Date of Bond must not be prior to date of Contract.
2. If Contractor is a Partnership, all partners should execute bond.
3. 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.

SECTION 00 60 11
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)

hereinafter called Surety, are held and firmly bound unto

City of Anderson
(Name of Owner)

314 Tribble Street, Anderson, SC 29625
(Address of Owner)

hereinafter called Owner, in the penal sum of _____Dollars_____Cents ($_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas the Principal entered into a certain Contract with the Owner dated the _____ day of _____, 20____, a copy of which is hereto attached and made a part hereof for the construction of:

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, subcontractors and corporations furnishing materials for or performing labor in the prosecution of the work provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such work, and all insurance premiums on said work, and for all labor, performed in such work whether by subcontractor or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extensions of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligation

on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work or to the specifications.
PROVIDED FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in six (6) counterparts, each one of which shall be deemed an original, this the _____ day of _____, 2026.

Signed, sealed and delivered in
the presence of:

_____
Principal – Contractor

_____ By: _____

_____ _____
As to Principal Title

_____
Surety

By: _____
Attorney-In-Fact
(Power of Attorney to be Attached)

_____ By: _____
Resident Agent

_____ _____
As to Surety Resident Agent Company Name

_____
Resident Agent Company Address

_____
Resident Agent Address

NOTES:

1. Date of Bond must not be prior to date of Contract.
2. If Contractor is a Partnership, all partners should execute bond.
3. 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.

00 60 20
CONTRACT CHANGE ORDER

Date: _____ Project: _____
Change Order No.: _____ _____
Contract No.: _____ Project No.: _____

Description of and Reason for Change:

Itemization of Proposed Change and Basis for Payment

Original Contract Price	$ _____
Previous Change Orders	$ _____
This Change, (An Addition) (A Deduction) of	$ _____
Proposed Revised Contract Price	**$** _____

Additional funds are to be provided in the following manner:

Extension of Contract Time Required: _____ Days.

Revised Contract Completion Date: _____.

This Change is Acceptable: _____, Contractor

By _____

Recommended: W.K. Dickson & Co., LLC Engineer

By _____

Approval of Change is Requested: _____, Owner

By _____

FEDERALLY REQUIRED TERMS AND CONDITIONS – FEMA HAZARD MITIGATION GRANT PROGRAM

FEDERAL APPLICABILITY

City of Anderson anticipates that this Contract will be financed in whole or in part with Federal funding. As such, Federal laws, regulations, policies, and related administrative practices apply to this Contract. The most recent of such Federal requirements, including any amendments made after the execution of this Contract, shall govern this Contract, unless the Federal Government determines otherwise. This Section identifies the Federal requirements that are applicable to this Contract. The Contractor is responsible for complying with all applicable provisions.

To the extent applicable, the Federal requirements are deemed incorporated into this Contract by reference and shall be incorporated into any subcontract or subcontract executed by the Contractor pursuant to its obligations under this Contract. The Contractor and its subcontractors, if any, hereby represent and covenant that they have complied and shall comply in the future with all applicable provisions of Federal, State, and local laws, regulations, and rules and local policies and procedures, as amended from time to time, relating to the Work to be performed under this Contract. Anything to the contrary herein notwithstanding, all Federal awarding agency-mandated terms shall be deemed to control in the event of a conflict with other provisions contained in this Contract. The Contractor shall not perform any act, fail to perform any act, or refuse to comply with any **City of Anderson** requests, which would cause the **City of Anderson** to be in violation of the Federal awarding agency's terms and conditions.

This Contract will be financed, in whole or in part, by funding provided by programs of the Federal Emergency Management Agency (FEMA). Contractor shall at all times comply with all applicable FEMA regulations, policies, procedures, and directives, including without limitation those listed directly or by reference, as they may be amended or promulgated from time to time during the term of this Contract. Contractor's failure to comply shall constitute a material breach of this Contract.

REMEDIES:

PERFORMANCE AND DEFAULT:

If, through any cause, contractor shall fail to fulfill in timely and proper manner the obligations under The Contract, the **City of Anderson** shall have the right to terminate The Contract by giving written notice to the contractor and specifying the effective date thereof. In that event any or all finished or unfinished deliverable items under The Contract prepared by the contractor shall, at the option of the **City of Anderson** become its property, and the contractor shall be entitled to receive just, and equitable compensation for any acceptable work completed as to which the option is exercised. Notwithstanding, contractor shall not be relieved of liability to the **City of Anderson** for damages sustained by the **City of Anderson** by virtue of any breach of The Contract, and the **City of Anderson** may withhold any payment due the contractor for the purpose of set off until such time as the exact amount of damages due the **City of Anderson**

from such breach can be determined. The **City of Anderson** reserves the right to require at any time a performance bond or other acceptable alternative performance guarantees from the contractor without expense to the **City of Anderson**.

In the event of default by the contractor, the **City of Anderson** may procure the goods and services necessary to complete performance hereunder from other sources and hold the contractor responsible for any excess cost occasioned thereby. In addition, in the event of default by the contractor under The Contract, or upon the contractor filing a petition for bankruptcy or the entering of a judgment of bankruptcy by or against the contractor, the **City of Anderson** may immediately cease doing business with the contractor, immediately terminate The Contract for cause, and may take action to debar the contractor from doing future business with the **City of Anderson**.

TERMINATION FOR CONVENIENCE:
If this contract contemplates deliveries or performance over a period of time, the **City of Anderson** may, for any reason within its sole discretion, terminate this contract at any time by providing 30 days' notice in writing from the **City of Anderson** to the contractor. In that event, any or all finished or unfinished deliverable items prepared by the Vendor under this contract shall, at the option of the **City of Anderson**, become its property. If the contract is terminated by the **City of Anderson** as provided in this section, the **City of Anderson** shall pay for those items for which such option is exercised, less any payment or compensation previously made.

CONTRACT CHANGES:
Contract changes must be in writing and agreed on by the **City of Anderson** and the vendor and will be implemented by contract amendments. The cost of the change, modification, change order, or constructive change must be allowable, allocable, within the scope of its grant or cooperative agreement, and reasonable for the completion of project scope. Contract amendments will be coordinated with the Project Manager and approved by the **City of Anderson** before any changes should occur.

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

(1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:

Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places,

available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

(2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

(3) The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.

(4) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(5) The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(6) The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(7) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order

of the Secretary of Labor, or as otherwise provided by law.

(8) The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance:

Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

The applicant further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work: *Provided,* that if the applicant so participating is a state or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.

The applicant agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

The applicant further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the applicant agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance,

guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case to the Department of Justice for appropriate legal proceedings.

COMPLIANCE WITH THE CONTRACT WORK HOURS AND SAFETY STANDARDS ACT:

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

(2) *Violation; liability for unpaid wages; liquidated damages.* In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States, for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section, in the sum of $27 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.

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

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

CLEAN AIR ACT:
The contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. § 7401 *et seq.*
The contractor agrees to report each violation to the **City of Anderson** and understands and agrees that the **City of Anderson** will, in turn, report each violation as required to assure notification to the Federal Emergency Management Agency (FEMA), and the Environmental Protection Agency Region IV Office.

The contractor agrees to include these requirements in each subcontract exceeding $150,000 financed in whole or in part with federal assistance provided by FEMA.

FEDERAL WATER POLLUTION CONTROL ACT:
The contractor agrees to comply with all applicable standards, orders, or regulations issued pursuant to the federal Water Pollution Control Act, as amended, 33 U.S.C. § 1251 *et seq.*

The contractor agrees to report each violation to the **City of Anderson** and understands and agrees that the **City of Anderson** will, in turn, report each violation as required to assure notification to the South Carolina Emergency Management Division (SCEMD), Federal Emergency Management Agency (FEMA), and the Environmental Protection Agency Region IV Office.

The contractor agrees to include these requirements in each subcontract exceeding $150,000 financed in whole or in part with federal assistance provided by FEMA.

SUSPENSION AND DEBARMENT:
This contract is a covered transaction for purposes of 2 C.F.R. Part 180 and 2 C.F.R. Part 3000. As such, the contractor is required to verify that none of the contractor's principals (defined at 2 C.F.R. § 180.995) or its affiliates (defined at 2 C.F.R. § 180.905) are excluded (defined at 2 C.F.R. § 180.940) or disqualified (defined at 2 C.F.R. § 180.935).

The contractor must comply with 2 C.F.R. Part 180, subpart C and 2 C.F.R. Part 3000, subpart C, and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into.

This certification is a material representation of fact relied upon by **City of Anderson**. If it is later determined that the contractor did not comply with 2 C.F.R. Part 180, subpart C and 2 C.F.R. Part 3000, subpart C, in addition to remedies available to **City of Anderson**, the federal government may pursue available remedies, including but not limited to suspension and/or debarment.

The bidder or proposer agrees to comply with the requirements of 2 C.F.R. Part 180, subpart C and 2 C.F.R. Part 3000, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower-tier-covered transactions.

BYRD ANTI-LOBBYING AMENDMENT, 31 U.S.C. §1352 (AS AMENDED):
Contractors who apply or bid for an award of more than $100,000 shall file the required certification. Each tier certifies to the tier above that it will not and has not used federally appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, officer or employee of Congress, or an employee of a Member of Congress in connection with obtaining any federal contract, grant, or any other award covered by 31 U.S.C. § 1352. Each tier shall also disclose any lobbying with non-federal funds that takes place in connection with obtaining any federal award. Such disclosures are forwarded from tier to tier up to the recipient who in turn will forward the certification(s) to the federal awarding agency.

COPELAND "ANTI-KICKBACK" ACT
The Copeland "Anti-Kickback" Act prohibits workers on construction contracts from giving up wages that they are owed.[18] Additional requirements are listed below, and relevant definitions are at 29 C.F.R. § 3.2. The applicable implementing regulations are intended to assist with enforcement of the:
[12] 2 C.F.R. Part 200, Appendix II, § D.
[13] *Id.*
[14] 29 C.F.R. § 5.5(a)(6).
[15] 40 U.S.C. §§ 3141-3144, 3146-3148; 29 C.F.R. § Part 5.
[16] 29 C.F.R. § 5.5(a).
[17] 29 C.F.R. § 5.5(a)(6).
[18] 40 U.S.C. § 3145.
The Copeland "Anti-Kickback" Act is supplemented by Department of Labor regulations at 29 C.F.R. Part 3 (Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in ants from the United States).

PROCUREMENT OF RECOVERED MATERIALS:
In the performance of this contract, the Contractor shall make maximum use of products containing recovered materials that are EPA-designated items unless the product cannot be acquired—:

- Competitively within a timeframe providing for compliance with the contract performance schedule;
- Meeting contract performance requirements; or
- At a reasonable price.

Information about this requirement, along with the list of EPA-designated items, is available at EPA's Comprehensive Procurement Guidelines webpage:
https://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program

The Contractor also agrees to comply with all other applicable requirements of Section 6002 of the Solid Waste Disposal Act.

The Contactor should, to the greatest extent practicable and consistent with the law, purchase, acquire, or use products and services that can be reused, refurbished, or recycled; contain recycled content, are biobased, or are energy and water efficient; and are sustainable.

PROHIBITION ON CONTRACTING FOR COVERED TELECOMMUNICATIONS EQUIPMENT OR SERVICES:

(a) *Definitions.* As used in this clause, the terms backhaul; covered foreign country; covered telecommunications equipment or services; interconnection arrangements; roaming; substantial or essential component; and telecommunications equipment or services have the meaning as defined in FEMA Policy 405-143-1, Prohibitions on Expending FEMA Award Funds for Covered Telecommunications Equipment or Services (Interim), as used in this clause—

(b) *Prohibitions.*

(1) Section 889(b) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019, Pub. L. No. 115-232, and 2 C.F.R. § 200.216 prohibit the head of an executive agency on or after Aug.13, 2020, from obligating or expending grant, cooperative agreement, loan, or loan guarantee funds on certain telecommunications products or from certain entities for national security reasons.

(2) Unless an exception in paragraph (c) of this clause applies, the contractor and its subcontractors may not use grant, cooperative agreement, loan, or loan guarantee funds from the Federal Emergency Management Agency to:

(i) Procure or obtain any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology of any system;

(ii) Enter into, extend, or renew a contract to procure or obtain any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology of any system;

(iii) Enter into, extend, or renew contracts with entities that use covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system; or

(iv) Provide, as part of its performance of this contract, subcontract, or other

contractual instrument, any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system.

(c) *Exceptions.*

(1) This clause does not prohibit contractors from providing—

(i) A service that connects to the facilities of a third-party, such as backhaul, roaming, or interconnection arrangements; or

(ii) Telecommunications equipment that cannot route or redirect user data traffic or permit visibility into any user data or packets that such equipment transmits or otherwise handles.

(2) By necessary implication and regulation, the prohibitions also do not apply to:

(i) Covered telecommunications equipment or services that:
i. Are *not used* as a substantial or essential component of any system; *and*
ii. Are *not used* as critical technology of any system.

(ii) Other telecommunications equipment or services that are not considered covered telecommunications equipment or services.

(d) *Reporting requirement.*

(1) In the event the contractor identifies covered telecommunications equipment or services used as a substantial or essential component of any system, or as critical technology as part of any system, during contract performance, or the contractor is notified of such by a subcontractor at any tier or by any other source, the contractor shall report the information in paragraph (d)(2) of this clause to the recipient or subrecipient, unless elsewhere in this contract are established procedures for reporting the information.

(2) The Contractor shall report the following information pursuant to paragraph (d)(1) of this clause:

(i) Within one business day from the date of such identification or notification: The contract number; the order number(s), if applicable; supplier name; supplier unique entity identifier (if known); supplier Commercial and Government Entity (CAGE) code (if known); brand; model number (original equipment manufacturer number, manufacturer part number, or wholesaler number); item description; and any readily available information about mitigation actions undertaken or recommended.

(ii) Within 10 business days of submitting the information in paragraph (d)(2)(i) of this clause: Any further available information about mitigation actions undertaken or recommended. In addition, the contractor shall

describe the efforts it undertook to prevent use or submission of covered telecommunications equipment or services, and any additional efforts that will be incorporated to prevent future use or submission of covered telecommunications equipment or services.

(e) *Subcontracts.* The Contractor shall insert the substance of this clause, including this paragraph (e), in all subcontracts and other contractual instruments.

DOMESTIC PREFERENCE FOR PROCUREMENTS:
The Contractor should, to the greatest extent practicable and consistent with law, provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States. This includes, but is not limited to, iron, aluminum, steel, cement, and other manufactured products.

For purposes of this clause: Produced in the United States means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.

ACCESS TO RECORDS:
The Contractor agrees to provide **City of Anderson**, the FEMA Administrator, the Comptroller General of the United States, or any of their authorized representatives access to any books, documents, papers, and records of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts, and transcriptions.

The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.

The Contractor agrees to provide the FEMA Administrator or his authorized representatives access to construction or other work sites pertaining to the work being completed under the contract.

In compliance with section 1225 of the Disaster Recovery Reform Act of 2018, the **City of Anderson** and the Contractor acknowledge and agree that no language in this contract is intended to prohibit audits or internal reviews by the FEMA Administrator or the Comptroller General of the United States.

DHS SEAL, LOGOS AND FLAG:
The contractor shall not use the DHS seal(s), logos, crests, or reproductions of flags or likenesses of DHS agency officials without specific FEMA pre-approval.

COMPLIANCE WITH FEDERAL LAW, REGULATIONS, AND EXECUTIVE ORDERS AND ACKNOWLEDGEMENT OF FEDERAL FUNDING:

This is an acknowledgement that FEMA financial assistance will be used to fund all or a portion of the contract. The contractor will comply with all applicable federal law, regulations, executive orders, FEMA policies, procedures, and directives.

NO OBLIGATION BY FEDERAL GOVERNMENT:
The federal government is not a party to this contract and is not subject to any obligations or liabilities to the non-federal entity, contractor, or any other party pertaining to any matter resulting from the contract.

PROGRAM FRAUD AND FALSE OF FRAUDLENT STATEMENTS OR RELATED ACTS:
The contractor acknowledges that 31 U.S.C. Chap. 38 (Administrative Remedies for False Claims and Statements) applies to the contractor's actions pertaining to this contract.

AFFIRMATIVE SOCIOECONOMIC STEPS:
If subcontracts are to be let, the prime contractor is encouraged to take the steps identified in 2 C.F.R. § 200.321(b)(1)-(5) in an attempt to ensure that small and minority businesses, veteran-owned businesses, women's business enterprises, and labor surplus area firms are considered when possible.

CREATING GOOD JOBS:
Pursuant to FEMA Information Bulletin No. 520 (https://www.fema.gov/sites/default/files/documents/fema_gpd_ib-520.pdf), the contractor will comply with all applicable federal labor and employment laws. To maximize cost efficiency and quality of work, the contractor commits to strong labor standards and protections for the project workforce by creating an effective plan for ensuring high-quality jobs and complying with federal labor and employment laws. The contractor acknowledges applicable minimum wage, overtime, prevailing wage, and health and safety requirements, and will incorporate Good Jobs Principles (https://www.dol.gov/sites/dolgov/files/goodjobs/Good-Jobs-Summit-Principles-Factsheet.pdf) wherever appropriate and to the greatest extent practicable.

BUY CLEAN:
City of Anderson encourages the use of environmentally friendly construction practices in the performance of this Agreement. In particular, **City of Anderson** encourages that the performance of this agreement includes considering the use of low-carbon materials which have substantially lower levels of embodied greenhouse-gas emissions associated with all relevant stages of production, use, and disposal, as compared to estimated industry averages of similar materials or products as demonstrated by their environmental product declaration.

CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY and VOLUNTARY EXCLUSION LOWER TIER COVERED TRANSACTION

(To be submitted with all bids exceeding $25,000.)

(1) The prospective lower tier participant (Bidder/Contractor) certifies, by submission of this bid or proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(2) The prospective Bidder/Contractor also certifies by submission of this bid or proposal that all subcontractors and suppliers (this requirement flows down to all subcontracts at all levels) are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(3) Where the prospective lower tier participant (Bidder/Contractor) is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this bid or proposal.

The lower tier participant (Bidder/Contractor),_____, certifies or affirms the truthfulness and accuracy of this statement of its certification and disclosure, if any.

DATE_____

SIGNATURE_____

COMPANY_____

NAME_____

TITLE_____

State of _____
County of_____
Subscribed and sworn to before me this___ day of_____, 20____.

Notary Public _____

My Appointment Expires_____ [SEAL]

CERTIFICATION REGARDING LOBBYING

(To be submitted with all offers exceeding $100,000; must be executed prior to Award)

The undersigned certifies, to the best of his or her knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any persons for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding to any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying", in accordance with itsinstructions.

3. The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and discloseaccordingly.

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

The Contractor,_____, certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. § 1352, *et seq*., apply to this certification and disclosure, if any.

_____
Signature of Contractor's Authorized Official

Date _____

_____
Printed Name and Title of Contractor's Authorized Official

State of _____
County of_____

Subscribed and sworn to before me this___ day of_____, 20____.

Notary Public _____

My Appointment Expires_____ [SEAL]

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SECTION 01 31 01
PRECONSTRUCTION CONFERENCE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: To help clarify construction contract administration procedures, the Engineer will conduct a Preconstruction Conference prior to start of the Work. Provide attendance by the designated personnel.

B. Related work: Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

A. For those persons designated by the Contractor, his subcontractors, and suppliers to attend the Preconstruction Conference, provide required authority to commit the entities they represent to solutions agreed upon in the Conference.

1.3 SUBMITTALS

A. To the maximum extent practicable, advise the Engineer at least 48 hours in advance of the Conference as to items to be added to the agenda.

B. The Engineer will compile minutes of the Conference and furnish copies of the minutes to the Contractor and the Owner. The Contractor may make and distribute such other copies as he wishes.

1.4 PRECONSTRUCTION CONFERENCE

A. The Conference will be scheduled to be held within 30 working days after the Owner has determined the low bidder and may be held prior to issuance of the Notice to Proceed when required by regulatory agencies having jurisdiction. In any event, the Conference will be held prior to actual start of the work.

B. Attendance:

1. Provide attendance by authorized representatives of the Contractor and major subcontractors.
2. The Engineer will advise other interested parties, including the Owner, and request their attendance.

C. Minimum agenda: Data will be distributed and discussed on:

1. Organizational arrangement of Contractor's forces and personnel and those of subcontractors, materials suppliers, and the Engineer.
2. Channels and procedures for communication.
3. Construction schedule, including sequence of critical work.

4. Contract Documents, including distribution of required copies of Drawings and revisions.
5. Processing of Shop Drawings and other data submitted to the Engineer for review.
6. Processing of field decisions and Change Orders.
7. Rules and regulations governing performance of the Work.
8. Procedures for security, quality control, housekeeping, and related matters.

END OF SECTION

SECTION 01 31 02
PROJECT MEETINGS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: To enable orderly review during progress of the Project, and to provide for systematic discussion of problems, the Engineer will conduct project meetings throughout the construction period.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. The Contractor's relations with his subcontractors and materials suppliers, and discussions relative thereto, are the Contractor's responsibility and normally are not part of project meetings content.

1.2 QUALITY ASSURANCE

A. For those persons designated by the Contractor to attend and participate in project meetings, provide required authority to commit the Contractor to solutions agreed upon in the project meetings.

1.3 SUBMITTALS

A. Agenda items: To the maximum extent practicable, advise the Engineer at least 48 hours in advance of project meetings regarding items to be added to the agenda.

B. Minutes:
1. The Engineer will compile Minutes of each project meeting and will furnish three copies to the Contractor and required copies to Owner.
2. Recipients of copies may make and distribute such other copies as they wish.

PART 2 - PRODUCTS - No products are required in this Section

PART 3 - EXECUTION

3.1 MEETING SCHEDULE

A. Project meetings will be held at a frequency determined by the Engineer.

B. Coordinate as necessary to establish mutually acceptable schedule for meetings.

3.2 MEETING LOCATION

A. The Engineer will establish meeting location. To the maximum extent practicable, meetings will be held at the project site.

3.3 PROJECT MEETINGS

A. Attendance
   1. To the maximum extent practicable, assign the same person or persons to represent the Contractor at project meetings throughout progress of the Work.
   2. Subcontractors, materials suppliers, and others may be invited to attend those project meetings in which their aspect of the Work is involved.

B. Minimum agenda:
   1. Review, revise as necessary, and approve Minutes of previous meetings.
   2. Review progress of the Work since last meeting, including status of submittals for approval.
   3. Identify problems that impede planned progress.
   4. Develop corrective measures and procedures to regain planned schedule.
   5. Complete other current business.

C. Revisions to Minutes:
   1. Unless published Minutes are challenged in writing prior to the next regularly scheduled progress meeting, they will be accepted as properly stating the activities and decisions of the meeting.
   2. Persons challenging published Minutes shall reproduce and distribute copies of the challenge to all Minutes.
   3. Challenge to Minutes shall be settled as priority portion of "old business" at the next regularly scheduled meeting.

END OF SECTION

SECTION 01 32 01
CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: To assure adequate planning and execution of the Work so that the Work is completed within the number of calendar days allowed in the Contract, and to assist the Engineer in appraising the reasonableness of the proposed schedule and in evaluating progress of the Work, prepare and maintain the schedules and reports described in this Section.

B. Related work:
   1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
   2. Requirements for progress schedule: General Conditions.
   3. Construction period: Form of Agreement.

C. Definitions: "Day", as used throughout the Contract unless otherwise stated, means calendar day.

1.2 QUALITY ASSURANCE

A. Employ a scheduler who is thoroughly trained and experienced in compiling construction schedule data, and in preparing and issuing periodic reports as required below.

B. Perform data preparation, analysis, charting, and updating in accordance with standards approved by the Engineer.

C. Reliance upon the approved schedule:
   1. The construction schedule as approved by the Engineer will be an integral part of the Contract and will establish interim completion dates for the various activities under the Contract.
   2. Should any activity not be completed within 15 days after the stated scheduled date, the Owner shall have the right to require the Contractor to expedite completion of the activity by whatever means the Owner deems appropriate and necessary, without additional compensation to the Contractor.
   3. Should any activity be 30 days or more behind schedule, the Owner shall have the right to perform the activity or have the activity performed by whatever method the Owner deems appropriate.
   4. Costs incurred by the Owner and by the Engineer in connection with expediting construction activity shall be reimbursed by the Contractor.
   5. It is expressly understood and agreed that failure by the Owner to exercise the option either to order the Contractor to expedite an activity or to expedite the activity by other means shall not be considered to set a precedent for any other activities.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01 33 01.

B. Preliminary analysis: Within 10 calendar days after the Contractor has received the Notice to Proceed, submit one reproducible copy and four prints of a preliminary construction schedule prepared in accordance with Part 3 of this Section.

C. Construction schedule: Within 10 calendar days after the Contractor has received the Engineer's approval to revisions of a preliminary construction schedule, submit one reproducible copy and four prints of a construction schedule prepared in accordance with Part 3 of this Section.

D. Periodic reports: On the first working day of each month following the submittal described in Paragraph 1.3.C above, submit four prints of the construction schedule updated as described in Part 3 of this Section.

PART 2 - PRODUCTS

2.1 CONSTRUCTION ANALYSIS

A. Graphically show by bar chart the order and interdependence of all activities necessary to complete the work, and the sequence in which each activity is to be accomplished, as planned by the Contractor and his project field superintendent in coordination with all subcontractors whose work is shown on the diagram.
   1. Provide two-line bar chart; one for planned activity, and one for actual completion.

B. Include, but do not necessarily limit indicated activities to:
   1. Project mobilization.
   2. Submittal and approval of shop drawings and samples.
   3. Procurement of equipment and critical materials.
   4. Fabrication of special material and equipment, and its installation and testing.
   5. Final cleanup.
   6. Final inspecting and testing.
   7. All activities by the Engineer that affect progress, required dates for completion, or both, for all and each part of the Work.

PART 3 - EXECUTION

3.1 PRELIMINARY ANALYSIS

A. Contents:
   1. Show all activities of the Contractor under this Work for the period between receipt of Notice to Proceed and submittal of construction schedule.
   2. Show the Contractor's general approach to remainder of the Work.
   3. Show cost of all activities scheduled for performance before submittal and approval of the construction schedule.

3.2 CONSTRUCTION SCHEDULE

A. Provide a construction schedule incorporating all revisions from review of the preliminary analysis.

3.3 PERIODIC REPORTS

A. Provide monthly updates of the approved construction schedule.
   1. Indicate "actual" progress for each activity on the bar chart.
   2. Provide written narrative summary of revisions causing delay in the program, and an explanation of corrective actions taken or proposed.

3.4 REVISIONS

A. Make periodic revisions to the schedule to incorporate delays, early completion, etc.

B. Make only those revisions to approved construction schedule as are approved in advance by the Engineer.

END OF SECTION

SECTION 01 33 01
SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Make submittals required by the Contract Documents and revise and resubmit as necessary to establish compliance with the specified requirements.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these specifications.
2. Individual requirements for submittals also may be described in pertinent sections of these specifications.

C. Work not included:

1. Unrequired submittals will not be reviewed by the Engineer.
2. The Contractor may require his subcontractors to provide drawings, setting diagrams, and similar information to help coordinate the work, but such data shall remain between the Contractor and his subcontractors and will not be reviewed by the Engineer.

1.2 QUALITY ASSURANCE

A. Coordination of submittals:

1. Prior to each submittal, carefully review and coordinate all aspects of each item being submitted.
2. Verify that each item and the submittal for it conform in all respects with the specified requirements.
3. By affixing the Contractor's signature to each submittal, certify that this coordination has been performed.
4. Review and coordinate each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

B. Completeness of submittal:

1. 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.
2. Determine and verify all information relative to Contractor’s responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

C. "Or equal":

1. Where the phrase "or equal" occurs in the Contract Documents, do not assume that the materials, equipment or methods will be considered as equal unless the item has been specifically so approved for this Work by the Engineer.
2. The decision of the Engineer shall be final.

D. The Engineer shall assume that no shop drawing or related submittal comprises a variation unless the Contractor advises the Engineer otherwise in writing.

1.3 SUBMITTALS

A. Within 15 calendar days after the Contractor has received the Owner's notice to proceed, submit:

1. Schedule for submittals including specification section, type of submittal and submittal date.
2. Construction schedule.
3. Schedule of partial payment requests.

B. Make submittals of shop drawings, samples, substitution requests and other items in accordance with the provisions of this Section.

PART 2 - PRODUCTS

2.1 SHOP DRAWINGS

A. Scale and measurements: Make shop drawings accurately to a scale sufficiently large to show all pertinent aspects of the item and its method of connection to the Work.

B. Not Used

C. Manufacturer's literature:

1. Where contents of submitted literature from manufacturers includes data not pertinent to the submittal, clearly show which portions of the contents are being submitted for review.
   a. Cross out or strikethrough all data not pertinent to the submittal.
2. Submit the number of copies which are required to be returned, plus four copies of electrical and three copies of all other submittals which will be retained by the Engineer.

D. Number of copies:

1. Submit all shop drawings electronically in PDF searchable format.

E. Do not begin fabrication of equipment or materials prior to Engineer's approval of shop drawings.

2.2 VARIATIONS

A. With each submittal, provide 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.

B. Provide an explanation of why the item(s) submitted are considered to be equal to the item(s) specified.

C. Failure to submit a written notice will result in rejection of the submittal.

2.3 SAMPLES

A. Provide sample or samples identical to the precise article proposed to be provided. Identify as described under "Identification of submittals" below.

B. Number of samples required:

1. Unless otherwise specified, submit samples in the quantity which is required to be returned, plus one which will be retained by the Engineer.
2. By prearrangement in specific cases, a single sample may be submitted for review and, when approved, be installed in the work at a location agreed upon by the Engineer.

2.4 COLORS AND PATTERNS

A. Unless the precise color and pattern is specifically called out in the Contract Documents, and whenever a choice of color or pattern is available in the specified products, submit accurate color and pattern charts to the Engineer for selection.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW OF SUBMITTALS

A. Before submitting a shop drawing or any related material, Contractor shall:

1. Determine and verify all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto.
2. Determine and verify the suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work
3. Review each such submission for conformance with the means, methods, techniques, sequences, and operations of construction, and safety precautions and programs incidental thereto, all of which are the sole responsibility of Contractor.
4. Approve each such submission before submitting it.
5. Stamp and sign each such submission before submitting it.

B. Shop drawings and related materials shall be returned with comments provided that each submission has been specified and is stamped by the Contractor.

C. Shop drawings or material not specified or which have not been approved by the Contractor shall be returned without comment.

D. Contractor shall stamp each submittal as being review and approved with language similar to the following:

*This shop drawing has been reviewed by [**NAME OF CONTRACTOR**] and approved with respect to the means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incidental thereto. [**NAME OF CONTRACTOR**] also warrants that this shop drawing complies with contract documents and comprises no variations thereto.*

E. 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 the General Conditions 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 the General Conditions.

3.2 IDENTIFICATION OF SUBMITTALS

A. Consecutively number all submittals.

1. When material is resubmitted for any reason, transmit under a new letter of transmittal and with a new transmittal number.
2. On resubmittals, cite the original submittal number for reference.

B. Accompany each submittal with a letter of transmittal showing all information required for identification and checking.

C. On at least the first page of each submittal, and elsewhere as required for positive identification, show the submittal number in which the item was included.

D. Maintain an accurate submittal log for the duration of the work, showing current status of all submittals at all times. Make the submittal log available to the Engineer for his review upon request.

3.3 GROUPING OF SUBMITTALS

A. Unless otherwise specified, make submittals in groups containing all associated items to assure that information is available for checking each item when it is received.

1. Partial submittals may be rejected as not complying with the provisions of the Contract.
2. The Contractor may be held liable for delays so occasioned.

3.4 TIMING OF SUBMITTALS

A. Make submittals far enough in advance of scheduled dates for installation to provide time required for reviews, for securing necessary approvals, for possible revisions and resubmittals, and for placing orders and securing delivery.

B. In scheduling, allow at least twenty-five working days for review by the Engineer following his receipt of the submittal.

3.5 RESUBMITTAL SCHEDULE

A. For submittals marked "Furnish as Corrected" by the Engineer, resubmittal shall be within ninety (90) days of the review date shown on the Engineer's shop drawing review stamp.

B. For submittals marked "Revise and Resubmit", "Submit Specified Item", or "Rejected", resubmittal shall be within thirty (30) days of the review date shown on the Engineer's shop drawing review stamp.

3.6 ENGINEER'S REVIEW

A. Review by the Engineer does not relieve the Contractor from responsibility for errors which may exist in the submitted data.

B. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer.

C. Engineer’s review and approval 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.

D. Engineer’s review and approval 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.

E. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

F. Revisions:

1. Make revisions required by the Engineer.
2. If the Contractor considers any required revision to be a change, he shall so notify the Engineer as provided for in the General Conditions.
3. Make only those revisions directed or approved by the Engineer.
4. Submittals which have been reviewed and returned to the Contractor marked "Revise and Resubmit" or "Rejected" and which are resubmitted and not in an approvable state, will not be reviewed a third time unless payment for the third and any subsequent review is by the Contractor. The engineering costs for review shall be equal to the Engineer's charges to the Owner under the terms of the Engineering Agreement with the Owner.

END OF SECTION

SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Quality control and control of installation.
2. Tolerances.
3. References.
4. Testing and inspection services.
5. Manufacturers' field services.
6. Labeling.
7. Mock-up requirements.
8. Examination.
9. Preparation.

1.2 QUALITY CONTROL AND CONTROL OF INSTALLATION

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

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

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

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

E. Perform Work by persons qualified to produce required and specified quality.

F. Verify field measurements are as indicated on Shop Drawings or as instructed by manufacturer.

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

1.3 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

1.4 REFERENCES

A. For products or Work specified by association, trades, or other consensus standards, comply with requirements of standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current on date for receiving Bids, (date of Owner-Contractor Agreement when there are no Bids), except where specific date is established by code.

C. Obtain copies of standards where required by product Specification Sections.

D. When specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

E. Contractual relationships, duties, and responsibilities of parties in Contract and those of Engineer shall not be altered from Contract Documents by mention or inference otherwise in reference documents.

1.5 TESTING AND INSPECTION SERVICES

A. Employ and pay for services of an independent firm acceptable to Owner to perform specified testing and inspection.
   1. Prior to start of Work, submit testing laboratory name, address, and telephone number, and names of full-time registered Engineer, specialists, and responsible officer.
   2. Submit copy of report of laboratory facilities inspection made by Materials Reference Laboratory of National Bureau of Standards during most recent inspection, with memorandum of remedies of deficiencies reported by inspection.

B. Independent firm will perform tests, inspections, and other services specified in individual Specification Sections and as required by Engineer.
   1. Laboratory: Authorized to operate in State of Project location.
   2. Laboratory Staff: Maintain full-time registered Engineer and necessary specialists on staff to review services.
   3. Testing Equipment: Calibrated at reasonable intervals with devices of accuracy traceable to National Bureau of Standards or accepted values of natural physical constants.

C. Testing and inspections may occur on or off Project site. Perform off-site testing as required by Engineer or Owner.

D. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
   1. Notify Engineer and independent firm 24 hours prior to expected time for operations requiring services.
   2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor’s use.

E. Testing and employment of independent firm does not relieve Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

F. Retesting or reinspection required because of non-conformance to specified requirements shall be performed by same independent firm on instructions by Engineer.
   1. Payment for retesting or reinspection will be paid by the Contractor.
   2. Submit final report indicating correction of Work previously reported as non-compliant.

G. Independent Firm Responsibilities:
   1. Test samples of mixes submitted by Contractor.

2. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.
3. Perform specified sampling and testing of products in accordance with specified standards.
4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
5. Promptly notify Engineer and Contractor of observed irregularities or non-conformance of Work or products.
6. Perform additional tests required by Engineer.
7. Attend preconstruction meetings and progress meetings.

H. Independent Firm Reports: After each test, promptly submit 1 copy of report to Engineer and Owner; and 2 copies to Contractor, and authority having jurisdiction. When requested by Engineer, provide interpretation of test results. Include the following:
1. Date issued.
2. Project title and number.
3. Name of inspector.
4. Date and time of sampling or inspection.
5. Identification of product and specifications section.
6. Location in Project.
7. Type of inspection or test.
8. Date of test.
9. Results of tests.
10. Conformance with Contract Documents.

I. Limits On Independent Firm:
1. May not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. May not approve or accept any portion of the Work.
3. May not assume duties of Contractor.
4. Has no authority to stop the Work.

1.6 MANUFACTURERS' FIELD SERVICES

A. When specified in individual Specification Sections, require material or product suppliers or manufacturers to provide qualified staff personnel to:
1. Observe site conditions.
2. Observe conditions of surfaces.
3. Review installation and quality of Work.
4. Review start-up of equipment.
5. Review testing, adjusting, and balancing of equipment.
6. Initiate instructions when necessary.

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

1.7 LABELING

A. Attach label from agency approved by authority having jurisdiction for products, assemblies, and systems required to be labeled by applicable code.

B. Label Information: Include manufacturer's or fabricator's identification, approved agency identification, and the following information, as applicable, on each label.

1. Model number.
2. Serial number.
3. Performance characteristics.

1.8 MOCK-UP REQUIREMENTS

A. Tests will be performed under provisions identified in this section and identified in respective product Specification Sections.

B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

C. Accepted mock-ups shall be comparison standard for remaining Work.

D. Where mock-up has been accepted by Engineer and is specified in product Specification Sections to be removed; remove mock-up and clear area when directed to do so by Engineer.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

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

C. Examine and verify specific conditions described in individual Specification Sections.

D. Verify utility services are available, of correct characteristics, and in correct locations.

3.2 PREPARATION

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

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

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

END OF SECTION

SECTION 01 42 01
REFERENCE STANDARDS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Throughout the Project Documents, reference is made to specifications and standards issued by nationally recognized professional and/or trade organizations.

1. These referenced standards are generally identified by abbreviating the name of the organization following with the specification/standard number.
2. Unless specifically indicated otherwise, all references to standards refer to the latest edition available at the time of the bidding.

1.2 ABBREVIATIONS

A. Wherever the following abbreviations are used in these Project Documents, they are to be construed the same as the respective expressions represented:

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AISC	American Institute of Steel Construction
ALS	American Lumber Standards
ANSI	American National Standards Institute, Inc.
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
AWPA	American Wood Preservers Association
AWS	American Welding Society
FSS	Federal Specifications and Standards, General Services Administration
IBC	International Building Code
NACE	National Association of Corrosion Engineers
NFPA	National Fire Protection Association
NSF	Formerly: National Sanitary Foundation
OSHA	Occupational Safety and Health Administration
SPIB	Southern Pine Inspection Bureau
SSPC	Steel Structures Painting Council

END OF SECTION

SECTION 01 60 01
PRODUCT HANDLING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Protect products scheduled for use in the work by means including, but not necessarily limited to, those described in this Section.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these specifications.
2. Additional procedures also may be prescribed in other Sections of these specifications.

1.2 QUALITY ASSURANCE

A. Include within the Contractor's quality assurance program such procedures as are required to assure full protection of work and materials.

1.3 MANUFACTURERS' RECOMMENDATIONS

A. Except as otherwise approved by the Engineer, determine and comply with manufacturer's recommendations on product handling, storage and protection.

1.4 PACKAGING

A. Deliver products to the job site in their manufacturer's original container, with labels intact and legible.
1. Maintain packaged materials with seals unbroken and labels intact until time of use.
2. Promptly remove damaged material and unsuitable items from the job site and promptly replace with material meeting the specified requirements, at no additional cost to the Owner.

B. The Engineer may reject as non-complying such material and products that do not bear identification satisfactory to the Engineer as to manufacturer, grade, quality and other pertinent information.

1.5 PROTECTION OF MATERIAL AND WORK

A. General:
1. Carefully and properly protect all materials of every description, both before and after being used in the Work in accordance with manufacturer's recommendations.
2. Provide any enclosing or special protection from weather deemed necessary by the Engineer at no additional cost to the Owner.

B. Partial payments under the Contract will not relieve the Contractor from responsibility.
   1. When materials and work at the site that have been partially paid for are not adequately protected by the Contractor, such materials will be protected by the Owner at the expense of the Contractor and no further partial payment thereon will be made.

C. Maintain finished surfaces clean, unmarred, and suitably protected until accepted by the Owner.

D. No field cutting or other modifications of equipment or materials without written approval of the Engineer.

1.6 STORAGE

A. Store all items of equipment, component parts, etc., in accordance with the manufacturers' recommendations or as may otherwise be necessary to prevent damage or deterioration of any sort.

B. Electrical and control equipment:
   1. Store in a dry area protected from dust and humidity.
   2. Equipment can be protected by a weatherproof cover if shipped to the site no more than two (2) weeks prior to installation and energization.

1.7 REPAIRS AND REPLACEMENTS

A. In the event of damage, promptly make replacements and repairs to the approval of the Engineer and at no additional cost to the Owner.

B. Additional time required to secure replacements and to make repairs will not be considered by the Engineer to justify an extension in the contract time of completion.

END OF SECTION

SECTION 01 73 01
FIELD ENGINEERING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide such field engineering services as are required for proper completion of the Work including, but not necessarily limited to:
   1. Provide all staking required to construct the facility from coordinates established by the Engineer.
   2. Establish proper line and levels for installation of utilities.

B. Related work:
   1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
   2. Additional requirements for field engineering also may be described in other Sections of these Specifications.

1.2 QUALITY ASSURANCE

A. Provide a competent survey party and surveying instruments for staking the work as needed for proper installation.

B. Exercise proper precautions to verify the figures shown on the Drawings prior to laying out any part of the Work.
   1. The Contractor will be held responsible for any errors therein that otherwise might have been avoided.
   2. Promptly inform the Engineer of any error or discrepancies discovered in the Drawings or Specifications in order that proper corrections may be made.

1.3 PROCEDURES

A. Locate and protect control points before starting work on the site.

B. Preserve permanent reference points during progress of the Work.

C. Do not change or relocate reference points or items of the Work without specific approval from the Engineer.

D. Promptly advise the Engineer when a reference point is lost or destroyed, or requires relocation because of other changes in the Work.

END OF SECTION

SECTION 01 73 02
REGULATORY REQUIREMENTS

A. The following requirements of Regulatory Agencies having an interest in this project are hereby made a part of this Contract.

B. The construction of the project, including the letting of contracts in connection therewith, shall conform to the applicable requirements of State, territorial, and local laws and ordinances to the extent that such requirements do not conflict with Federal laws and this subchapter.

C. South Carolina Sales Tax: All applicable South Carolina sales tax shall be to the account of the Contractor.

D. Use of chemicals: All chemicals used during the project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, must show approval of EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with instructions.

E. Safety and Health Regulations: The Contractor shall comply with the Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (PL 91-596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL 91-54).

F. Not Used

G. The Contractor shall comply with Part V of the South Carolina Manual on Uniform Traffic Control Devices for Streets and Highways.

H. Not Used

I. Inspection by Agencies: The representatives of all applicable permitting/approval agencies, including but not limited to the South Carolina Department of Environmental Services, SCDOT, local jurisdiction and other governing agencies, shall have access to the work wherever it is, in preparation or in progress, and the Contractor shall provide proper facilities for such access and inspection.

J. Withholding for non-residents shall comply with the following:
   1. Attention of non-resident Contractors is invited to Code Sections 12-8-540 and 12-8-550 as amended effective July 1, 1994, Section 49, Appropriations Bill, Part II.
   2. If a non-resident Contractor is the successful bidder on this project, he shall be required to provide the Owner with an Affidavit (Form I-312, Nonresident Taxpayer Registration Affidavit Income Tax Withholding) affirming registration with the South Carolina Department of Revenue or the South Carolina Secretary of State's office. (See attached form).
   3. Forms to register for all taxes administered by the South Carolina Department of Revenue may be obtained by calling the License and Registration Section at (803) 737-4872 or writing to South Carolina Department of Revenue, Registration Unit, Columbia, South Carolina 29214-0140.
   4. In the absence of an Affidavit being provided, withholding in the amount of two (2) percent of the contract price will be made by the Owner.

K. Bypassing of wastewater: No wastewater bypassing will be permitted during construction unless a schedule has been approved by the South Carolina Department of Environmental Services, if required pursuant to the terms of the NPDES permit.

1. Schedule work to minimize bypassing.
2. Coordinate all work which will affect operation of the existing treatment facility with the Owner and the Engineer to assure the least interruption possible in operation of the existing facilities.
3. Make no connections to the existing treatment facility diverting flow to the new facility until directed by the Engineer.

END OF SECTION

[Attachment on following page(s)]

1350

STATE OF SOUTH CAROLINA
DEPARTMENT OF REVENUE

NONRESIDENT TAXPAYER REGISTRATION AFFIDAVIT INCOME TAX WITHHOLDING

I-312
(Rev. 10/5/07)
3323

Mail to: The company or individual you are contracting with.

The undersigned nonresident taxpayer on oath, being first duly sworn, hereby certifies as follows:

1. Name of Nonresident Taxpayer: _____

2. Trade Name, if applicable (Doing Business As):

_____

3. Mailing Address: _____

4. Federal Employer Identification Number (FEI): _____

5. _____ Hiring or Contracting with:
Name: _____

Address: _____

_____ Receiving Rentals or Royalties From:
Name: _____

Address: _____

_____ Beneficiary of Trusts and Estates:
Name: _____

Address: _____

6. I hereby certify that the above named nonresident taxpayer is currently registered with (check the appropriate box):
☐ The South Carolina Secretary of State or
☐ The South Carolina Department of Revenue
Date of Registration: _____

7. I understand that by this registration, the above named nonresident taxpayer has agreed to be subject to the jurisdiction of the South Carolina Department of Revenue and the courts of South Carolina to determine its South Carolina tax liability, including estimated taxes, together with any related interest and penalties.

8. I understand the South Carolina Department of Revenue may revoke the withholding exemption granted under Code Sections 12-8-540 (rentals), 12-8-550 (temporarily doing business or professional services in South Carolina), and 12-8-570 (distributions to nonresident beneficiary by trusts or estates) at any time it determines that the above named nonresident taxpayer is not cooperating with the Department in the determination of its correct South Carolina tax liability.

The undersigned understands that any false statement contained herein could be punished by fine, imprisonment or both.

Recognizing that I am subject to the criminal penalties under Code Section 12-54-44 (B) (6) (a) (i), I declare that I have examined this affidavit and to the best of my knowledge and belief, it is true, correct and complete.

_____ (Seal) _____
Signature of Nonresident Taxpayer (Owner, Partner or Corporate Officer, when relevant) Date

If Corporate officer, state title: _____

_____
(Name - Please Print)

33231028

INFORMATION
NONRESIDENT TAXPAYER REGISTRATION AFFIDAVIT

Submit this form to the company or individual you are contracting with.

Do not submit this form to South Carolina Department of Revenue.

PURPOSE OF AFFIDAVIT
A person is not required to withhold taxes for a nonresident taxpayer who submits an affidavit certifying that they are registered with either the South Carolina Secretary of State or the South Carolina Department of Revenue.

REQUIREMENTS TO MAKE WITHHOLDING PAYMENTS
Code Section 12-8-550 requires persons hiring or contracting with a nonresident taxpayer to withhold 2% of each payment made to the nonresident where the payments under the contract exceed $10,000. However, this section does not apply to payments on purchase orders for tangible personal property when those payments are not accompanied by services to be performed in this state.

Code Section 12-8-540 requires persons making payment to a nonresident taxpayer of rentals or royalties at a rate of $1,200 or more a year for the use of or for the privilege of using property in South Carolina to withhold 7% of the total of each payment made to a nonresident taxpayer who is not a corporation and 5% if the payment is made to a corporation.

Code Section 12-8-570 requires trusts or estates making distribution of South Carolina taxable income to a nonresident beneficiary to withhold 7% of the beneficiary's distribution which is attributable to South Carolina taxable income.

Our Internet address is: **www.sctax.org**

33232026

SECTION 01 73 03
PERMITS AND RIGHTS-OF-WAY

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: This section establishes requirements pertaining to the securement and payment for licenses, building permits, rights-of-way, etc., necessary for the construction of the project.

B. Work not included: The Owner will obtain and provide to the Contractor, as required, copies of:

1. Encroachment permits, South Carolina Department of Transportation / railroad companies.
2. Easements obtained to cross private property.
3. Corps of Engineer permits, navigable waters, etc.
4. South Carolina Water Resources permits.
5. South Carolina Department of Environmental Services, Permit to Construct.
6. Office of Ocean and Coastal Resource Management Certification.

C. Related work: Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these specifications.

1.2 SUBMITTALS

A. Submit to the Engineer satisfactory evidence that all necessary licenses, building permits, etc., have been secured prior to commencing the work.

PART 2 - PRODUCTS

No products are required for this work.

PART 3 - EXECUTION

3.1 BUSINESS LICENSE

A. Determine licenses necessary to perform the work at project location.

B. Obtain all necessary licenses at no additional cost to the Owner.

3.2 BUILDING PERMITS

A. Permits of a temporary nature necessary for the prosecution of the Work shall be secured and paid for by the Contractor.

B. Permits for permanent structures or permanent changes in existing facilities shall be secured and paid for by the Owner.

3.3 LAND

A. The necessary land for construction of the project, including easements, etc., will be provided by the Owner.

END OF SECTION

SECTION 01 73 05
TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included:
1. Cooperate with the Owner's selected testing agency and all others responsible for testing and inspecting the work.
2. Provide such other testing and inspecting as are specified to be furnished by the Contractor in this Section and/or elsewhere in the Contract Documents.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these specifications.
2. Requirements for testing may be described in various Sections of these specifications.
3. Where no testing requirements are described, but the Owner decides that testing is required, the Owner may require such testing to be performed under current pertinent standards for testing. Payment for such testing will be made as described in this Section.

C. Work not included:
1. Selection of testing laboratory: The Owner will select a prequalified independent testing laboratory.
2. Payment for initial testing: The Owner will pay for all initial services of the testing laboratory as further described in Article 2.1 of this Section.
3. Tests at point of manufacture as specified in other Sections of these documents are to be made with all costs borne by the Contractor.

1.2 QUALITY ASSURANCE

A. The testing laboratory will be qualified to the Owner's approval in accordance with ASTM E 329.

B. Testing, when required, will be in accordance with all pertinent codes and regulations, and with selected standards of the American Society for Testing and Materials.

1.3 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01 60 01.

B. Promptly process and distribute required copies of test reports and related instructions to assure necessary retesting and replacement of materials with the least possible delay in progress of the work.

PART 2 - PRODUCTS

2.1 PAYMENT FOR TESTING

A. Initial services:
   1. The Owner will pay for initial testing services requested by the Owner.
   2. When initial tests indicate non-compliance with the Contract Documents, the costs of initial tests associated with that non-compliance will be deducted by the Owner from the Contract Sum.
   3. Retesting: When initial tests indicate non-compliance with the Contract Documents, subsequent re-testing occasioned by the non-compliance shall be performed by the same testing agency and all costs there from will be deducted by the Owner from the contract sum.

2.2 CODE COMPLIANCE TESTING

A. Inspections and tests required by codes or ordinances, or by a plan approval authority, and which are made by a legally constituted authority, shall be the responsibility of and shall be paid for by the Contractor, unless otherwise provided in the Contract Documents.

2.3 CONTRACTOR'S CONVENIENCE TESTING

A. Inspecting and testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.

PART 3 - EXECUTION

3.1 COOPERATION WITH TESTING LABORATORY

A. Representatives of the testing laboratory shall have access to the work at all times and at all locations where the work is in progress. Provide facilities for such access to enable the laboratory to perform its functions properly.

3.2 TAKING SPECIMENS

A. All specimens and samples for testing, and deliveries to laboratory, unless otherwise provided in the Contract Documents, shall be taken by the testing personnel. All sampling equipment and personnel will be provided by the testing laboratory. All deliveries of specimens and samples to the testing laboratory will be performed by the testing laboratory.

3.3 SCHEDULES FOR TESTING

A. Establishing schedule:
   1. By advance discussion with the testing laboratory selected by the Owner, determine the time required for the laboratory to perform its tests and to issue each of its findings.
   2. Provide all required time within the construction schedule.

B. Revising schedule: When changes of construction schedule are necessary during construction, coordinate all such changes with the testing laboratory as required.

C. Adherence to schedule: When the testing laboratory is ready to test according to the established schedule, but is prevented from testing or taking specimens due to incompleteness of the work, all extra charges for testing attributable to the delay may be back-charged to the Contractor and shall not be borne by the Owner.

END OF SECTION

SECTION 01 73 32

TESTING PIPING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all labor, materials, equipment, tools, and incidentals required to perform pressure and leakage testing of all new piping systems and existing piping systems that have been relocated or disturbed during construction activities.

B. Section includes:

1. Requirements for performing pressure and leakage testing of new piping systems.
2. Requirements for performing pressure and leakage testing of existing piping systems that have been relocated or disturbed during construction.

C. Owner-Furnished Material: Potable water for hydrostatic testing.

D. Select appropriate testing method for the piping system being tested.

1.2 SUBMITTALS

A. Quality Control Submittals

1. Design Data: Fourteen (14) days prior to pressure and leakage testing, submit detailed outline of proposed sequence of testing piping systems. For hydrostatic testing, include source of water, location of test, and test pressure.
2. Test Report: Submit for each piping system tested. Include location of test point, portion of line to be tested, required test pressure, and date and time of test.

1.3 SEQUENCE AND SCHEDULING

A. Coordinate testing of piping systems with Owner and Engineer. Engineer or Engineer's representative will witness tests.

B. Provide a minimum of 48 hours' notice to Owner and Engineer prior to testing.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 PREPARATION

A. Provide appropriate protection of personnel and equipment while tests are in progress. Provide safety equipment, barricades, and warning signs where necessary.

B. Test in the presence of the Engineer or Engineer's representative.

C. Provide all necessary equipment, piping connections, meters, pressure gauges, tools, materials, and facilities necessary to complete specified tests. Ensure that meters, gauges, and other measuring devices have ranges, accuracies, and ratings appropriate for the application.

D. Maintain a calibration program for meters, gauges and, other measuring devices. Submit calibration reports which show the date of calibration, indicate deviations from the standard, and identify the calibration standard along with pressure test reports.

E. Provide bulkheads, flanges, valves, bracing, blocking, blowoffs, or other temporary materials that may be required.

F. Remove temporary materials after tests are complete.

G. Perform tests on piping after piping is completely installed, including supports, hangers, and anchors.

H. Perform tests on piping before insulation is installed, and before it is permanently covered.

I. Perform tests on piping that is clean and free of soil, sand, or other foreign material.

J. Plug pipe outlets with test plugs. Brace each plug securely to prevent blowouts.

K. Add test fluid slowly.

L. Include regulator set to avoid over-pressurizing and damaging piping.

M. Isolate and test separately portions of the system which require different test pressures.

N. Do not operate valves in either direction if the differential pressure exceeds the rated working pressure of that valve.

O. Perform testing in accordance with local, state, and federal requirements.

3.2 FIELD QUALITY CONTROL

A. Tests:

1. Hydrostatic Testing:

a. Perform hydrostatic testing for potable water piping systems and wastewater forcemains identified in other sections to be hydrostatically tested. Test pressure shall be calculated from paragraph c.1 below.
b. Open vents at high points to purge air pockets while piping system is filling.
c. Test Pressure:

1) Test piping system to 1.5 times the system working pressure or 150 psi, whichever is greater, unless specified otherwise in piping material specifications.

d. Test Restrictions:

1) Maintain test pressure at the highest point in the section of pipe being tested to at least 1.25 times the working pressure at the lowest point in that section.
2) Do not exceed pressure ratings of pipe, valve, appurtenances, or thrust restraint design pressures.

e. Testing:

1) Flush line to be tested thoroughly before testing to remove soil and other foreign material and to expel air from the line.
2) After section of piping to be tested has been flushed and filled with water, apply test pressure by means of force pump of such design and capacity that required pressure can be applied and maintained without interruption for duration of test.
3) Measure test pressure by means of tested and properly calibrated pressure gauge acceptable to the Engineer.
4) Maintain test pressure within 5.0 psi for a sufficient length of time to permit the Engineer to observe piping under test, but not less than 2 hours. A test in which the pressure drops more than 5.0 psi during the test period will be considered a failed test, and that section of line will not be accepted.

f. Determining Leakage:

1) Pump make-up water into the test section in order to maintain the test pressure within 5.0 psi. Measure the amount of make-up water added during the test period by using a metering system, approved by the Engineer, to determine actual leakage in that section of line. Metering system shall measure in gallons.
2) At the end of the test period, if no make-up water has been added because the pressure has been maintained within 5.0 psi of the test pressure, add

make-up water to return the system to the test pressure. The amount of make-up water added is considered actual leakage for that section of line.

g. Testing Allowance:

1) Maximum allowable leakage for buried piping with mechanical joints or push-on joints shall be determined by one of the following two methods:

Length of pipe:

$$L = \frac{SDP^{1/2}}{133{,}200}$$

Where:
L = Leakage (gallons per hour)
S = Length of pipe tested (feet)
D = Diameter of pipe (inches)
P = Average test pressure (psig)

or

Number of joints:

$$L = \frac{NDP^{1/2}}{7{,}400}$$

Where:
L = Leakage (gallons per hour)
N = Number of joints tested
D = Diameter of pipe (inches)
P = Average test pressure (psig)

h. If actual leakage during test period exceeds testing allowance, the pressure test is considered a failure and the section of line being tested will not be accepted.

i. If repairs are required, repeat pressure test until pipe installation conforms to specified requirements and is acceptable to the Engineer.

j. Regardless of pressure and leakage test results, repair all piping systems showing visual evidence of weeping or leaking at no additional cost to the Owner.

2. Low-Pressure Air Testing:

a. General:

1) Perform low-pressure air testing for gravity sewer and drainage systems identified in other sections to be low-pressure air tested.
2) Test pipe sections between adjacent manholes.
3) Record time for air pressure to drop 1 psig.
4) For pipe diameters of 4 inches through 36 inches, comply with Schedule 1, at the end of this Section.
5) Pipe diameters above 36 inches will not be accepted by means of low-pressure air test.
6) Ignore length of laterals.

b. Preparation:

1) Isolate pipe section to be tested by plugging each end with airtight plug. Plug ends of branches, laterals, and wyes, which are included in test section.
2) Brace plugs to prevent slippage and blowout due to internal pressure.
3) Provide one plug having inlet tap or other provision for connecting supply air hose.
4) Connect one end of air hose to plug used for air inlet, and other end to portable air control equipment.
5) Provide air control equipment consisting of valves and pressure gauges to control rate at which air flows into test section and gauges to monitor air pressure inside pipe.
6) Connect air hose between source of compressed air and control equipment.

c. Testing:

1) If pipe to be tested is submerged in groundwater, determine height of groundwater above spring line of pipe at each end of test section and compute average. For every foot of groundwater above pipe's spring line, increase test pressures by 0.43 psig.
2) Add air slowly to test section until pressure inside pipe is raised to 4.0 psig greater than average backpressure of groundwater that may be over pipe.
3) After pressure of 4.0 psig obtained, control supply of air so internal pressure maintained between 3.5 and 4.0 psig (above average groundwater back pressure) for minimum of 2 minutes to allow temperature of air to come into equilibrium with temperature of pipe walls.
4) Determine rate of air loss by time/pressure drop method.

a) After temperature has stabilized for 2-minute period, disconnect air supply. Allow pressure to decrease to 3.5 psig. At this pressure, start stopwatch to determine time required for pressure to drop 1.0 psig. Compare time required for loss of 1.0 psig with Schedule 1. If time is equal to or greater than time indicated in schedule, or if pressure does not drop 1.0 psi within the indicated time, test is considered acceptable.

3. High Pressure Air Testing:

a. Perform high-pressure air testing of piping systems as specified in other sections. Test pressure shall be as specified in other sections.
b. Perform preliminary test at pressures not greater than 25 psig. Examine for leakage at joints with soap solution and visual detection of soap bubbles. Correct visible leaks.
c. Perform final test at test pressure.

1) Gradually increase pressure in system in small increments until test pressure reached.

2) Maintain test pressure for a minimum of 10 minutes, with additional time if necessary to conduct soap bubble leakage examination at each joint.

d. Ensure that piping system shows no evidence of leakage. If evidence of leakage is observed, repair the leak and repeat the test.

4. Test Report:

a. Prepare and submit test report for each piping system tested. Include the following information in test report.

1) Date of test.
2) Description and identification of piping system tested. Include pipe diameter and material and length of system.
3) Type of test performed.
4) Test fluid.
5) Test pressure.
6) Type and location of leaks detected.
7) Corrective action taken to repair leaks.
8) Results of retesting.
9) Section of line tested.
10) Copy of calibration certification for measuring devices used in the test.

SCHEDULE 1 Minimum Specified Time Required for a 1.0 psig Pressure Drop for Size and Length of Pipe Indicated for Q = 0.0015											
Pipe Dia (in.)	Minimum Time (min:sec)	Length for Minimum Time (ft)	Time for Longer Length (sec)	Specification Time for Length (L) Shown (min:sec)							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	3:46	597	.380 L	3:46	3.46	3:46	3.46	3:46	3.46	3:46	3.46
6	5:40	398	.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33
27	25:30	88	17.306 L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15
33	31:10	72	25.852 L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46
42	39:48	57	41.883 L	69:48	104:42	139:37	174:30	209:24	244:19	279:13	314:07
48	45:34	50	54.705 L	91:10	136:45	182:21	227:55	273:31	319:06	364:42	410:17
54	51:02	44	69.236 L	115:24	173:05	230:47	288:29	346:11	403:53	461:34	519:16
60	56:40	40	85.476 L	142:28	213:41	284:55	356:09	427:23	498:37	569:50	641:04

Note: If there has been no leakage (zero psig drop) after one hour of testing, the test section shall be accepted and the test complete.

END OF SECTION

SECTION 01 77 01
CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included shall be providing compliance with the requirements of the General Conditions of these Specifications for administrative procedures in closing out the project work.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Other requirements for technical services are stated in other sections of these Specifications.
3. Contractor's Affidavit.
4. Technical Services.
5. Start-up Services.
6. Project Record Documents.

1.2 SUBSTANTIAL COMPLETION

A. The Contractor shall notify the Engineer that, in his opinion, the project is substantially complete. A written statement listing items complete shall be submitted.

B. Upon receipt of the Contractor's notice, the Engineer shall make an observation to determine if substantial completion is provided.

C. If, in the Engineer's opinion, the project is not substantially complete, a written notice to the Contractor shall follow outlining reasons and deficiencies in work that comprised the Engineer's decision. The Engineer's decision shall be final.

1.3 FINAL OBSERVATION

A. The Engineer will make a final observation for the Contractor after all items noted in the substantial completion observation have been corrected. The Contractor shall notify the Engineer in writing when a final observation is needed. Incomplete and/or defective work shall be given to the Contractor by written notice.

1.4 REOBSERVATION

A. Re-observation required due to failure by the Contractor to make previously noted corrections will be performed by the Engineer.

B. Cost for such observations will be due to and payable by the Contractor at a rate equal to charges to the Owner for similar work.

C. Re-observations will continue until the work is acceptable to the Engineer.

1.5 COMPLETION BY CONTRACTOR

A. When the Engineer finds the Contractor's work acceptable, the Contractor shall be given such notice and should proceed with closeout submittals.

B. Closeout submittals shall contain at least the following:
   1. Project record documents.
   2. Equipment operation and maintenance manuals and copies of start-up reports.
   3. Warranties and bonds.
   4. Spare parts, keys and manuals.
   5. Evidence of payment and release to liens per General Conditions.
   6. Contractor's Affidavit.

1.6 FINAL PAYMENT

A. Final payment to the Contractor will be made upon completion of the previous items and others required by these specifications. A final statement shall be forwarded to the Engineer. The statement shall address:
   1. Previous change orders.
   2. Unit prices (if applicable).
   3. Deductions for uncorrected work.
   4. Deductions for liquidated damages.
   5. Deductions for re-testing work.
   6. Deductions for re-observation.
   7. Adjusted contract sum.
   8. Previous payments.
   9. Amount due.

B. When required, the Engineer will prepare a contract change order for adjustments not previously made.

END OF SECTION

SECTION 01 78 39
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included:
1. Throughout progress of the Work, maintain an accurate record of changes in the Contract Documents, as described in Article 3.1 below.
2. Upon completion of the Work, deliver the recorded changes to the Engineer.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these specifications.
2. Other requirements affecting Project Record Documents may appear in pertinent other Sections of these specifications.

1.2 QUALITY ASSURANCE

A. Delegate the responsibility for maintenance of Record Documents to one person on the Contractor's staff as approved by the Engineer.

B. Accuracy of records shall be such that future search for items shown on the Project Record Documents may rely reasonably on the information provided under this Section of the Work.

1.3 SUBMITTALS

A. The Engineer's approval of the current status of Project Record Documents may be a prerequisite to the Engineer's approval of requests for progress payment and request for final payment under the Contract.

B. Prior to submitting each request for progress payment, secure the Engineer's approval of the current status of the Project Record Documents.

C. Prior to submitting request for final payment, submit the final Project Record Documents to the Engineer and secure his approval.

1.4 PRODUCT HANDLING

A. Maintain the job set of Record Documents completely protected from deterioration and from loss and damage until completion of the Work and transfer to the Engineer.

B. In the event of loss of recorded data, use means necessary to again secure the data to the Engineer's approval.
1. Such means shall include, if necessary in the opinion of the Engineer, removal and replacement of concealing materials.

2. In such case, provide replacements to the standards originally required by the Contract Documents.

PART 2 - PRODUCTS

2.1 JOB SET DOCUMENTS

A. Promptly following receipt of the Owner's Notice to Proceed, secure from the Engineer, at no charge to the Contractor, one complete set of all Documents comprising the Contract.

PART 3 - EXECUTION

3.1 MAINTENANCE OF JOB SET

A. Immediately upon receipt of the job set described in above paragraph titled “JOB SET DOCUMENTS”, identify each of the Documents with the title, "RECORD DOCUMENTS - JOB SET".

B. Preservation:
1. Considering the Contract completion time, the probable number of occasions upon which the job set must be taken out for new entries and for examination, and the conditions under which these activities will be performed, devise a suitable method for protecting the job set to the approval of the Engineer.
2. Do not use the job set for any purpose except entry of new data and for review by the Engineer.
3. Maintain the job set at the site of Work as that site is designated by the Engineer.

C. Field work and making entries on Job Set Drawings:
1. Use erasable colored pencil, preferably red (not ink or indelible pencil) to delineate changes.
2. Show by station number location of all fittings, manholes, valves, wye locations, etc.
3. Reference all fittings and valves at least to two aboveground items reasonably safe from being relocated and indicate such references on the drawings.
4. Reference all pipelines from the center of the parallel roadway at least every 100 feet or where changes occur in the direction of the pipeline.
5. Reference all bores from the center of the roadway to the beginning and end of the casing and ductile iron pipe. Depths of bury must also be provided.
6. Reference all stream crossings and their distance from the center of the parallel roadway and the bridge or other obstruction. A profile of the stream crossing shall also be provided to show the depth of the pipeline under the stream.
7. Field measure and reference all fittings and valves to two aboveground items reasonably safe from being relocated and indicate such references on the drawings.
8. Show location of electrical conduit, pull boxes, irrigation lines, etc.
9. Gravity sewers and storm sewers
    a. Provide AutoCAD file with full survey grade electronic data for each structure.

b. Provide ground elevation, top elevation and invert elevations for each structure (include topography for all included storm drainage system such as detention ponds, swales, etc.)
c. Comply with Section 01 73 01.

D. Submittal:
1. Submit "marked-up" set of drawings to the Engineer.
2. Make any necessary additions as required by the Engineer.

END OF SECTION

SECTION 31 10 01
SITE CLEARING AND GRUBBING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Remove trees, underbrush, undesirable growth, stumps, roots, etc., from the area to the limits shown on the Drawings, as specified herein, and as needed to meet the requirements of the construction shown in the Contract Documents.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in other divisions of these Specifications.
2. Section 314001 - Erosion and Sediment Control.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Use equipment adequate in size, capacity and numbers to accomplish the work in a timely manner.

C. Comply with requirements of governmental agencies having jurisdiction.

PART 2 - PRODUCTS - No products are required for this work.

PART 3 - EXECUTION

3.1 AREA INCLUDED

A. All areas included within the limits as indicated on the Drawings.

3.2 PROCEDURES

A. Clearing and grubbing: The entire area within the limit lines described above shall be cleared and grubbed. Remove all vegetation, trees, brush, stumps, etc., from the area. All debris from this operation shall be disposed of off the Owner's property.

B. Selective clearing shall be done in areas designated by the Engineer. Selective clearing shall consist of removing vegetation, brush, stumps, etc., from the area. Selected trees shall be left standing and care shall be taken not to damage trees to be left. All debris from this operation shall be disposed of off the Owner's property. Grubbing will not be required in areas designated for selective clearing.

C. Removal of trees and shrubs: All trees to be removed shall be felled in such a manner as to avoid injury to remaining trees and to other features not proposed for removal. Trees shall be cut up and the trunks, limbs, and other debris shall be removed from the site. Undesirable shrubs and small trees shall be selectively removed as directed.

D. Burning is not allowed.

E. Stumps and roots: All stumps and roots larger than 2" in diameter shall be completely removed by grubbing except in areas of building site, parking areas and drives, they may be cut off not less than 18" below any subgrade. The area of operation then shall be cleared of resulting debris and matted roots, weeds and other extraneous matter and such shall be hauled away from the site. Generally, all material that cannot be compacted to 90% maximum density in lawn areas and 95% of maximum density elsewhere shall be removed.

F. Protection of trees: It may become desirable to save certain trees in areas where cut or fill is eighteen inches or less and in parking areas. Consequently, the Contractor shall obtain approval from Engineer prior to removal of significant trees from such areas. The Contractor shall protect existing trees to remain during construction by constructing barricades around such trees as directed.

G. Erosion control: Construct and maintain erosion control as shown on the Drawings and in accordance with Section 314001: Erosion and Sediment Control, and the local City's requirements.

3.3 MEASUREMENT AND PAYMENT

A. No separate measurement or direct payment will be made for the work under this Section and all costs for same shall be included in the price bid for the project.

END OF SECTION

SECTION 31 20 01
SITE GRADING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Cut, fill, excavate, backfill, compact, and grade the stream channels, streambanks, floodplain areas, and adjacent disturbed areas as necessary to bring the site to the lines and grades shown on the drawings.

1. The work includes, but is not necessarily limited to:
   Stream channel excavation and grading.
   Streambank shaping and stabilization.
   Excavation and formation of floodplain benches and overbank areas.
   Dressing of graded stream corridors and disturbed areas.
   Site preparation associated with stream restoration improvements.
   Construction and grading of channel, floodplain, and restoration features shown on the plans.
2. Classification: All excavation is unclassified and excavation of every description, regardless of material encountered within the grading limits of the project, shall be performed to the lines and grades indicated.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in other divisions of these specifications.
2. Site Clearing and Grubbing.
3. Erosion and Sediment Control.

C. Definitions:

1. Open areas: Open areas shall be those areas that do not include building sites, paved areas, street right-of-way and parking areas.
2. Maximum density: Maximum weight in pounds per cubic foot of a specific material.
3. Optimum moisture: Percentage of water in a specific material at maximum density.
4. Rock excavation: Excavation of any hard natural substance which requires the use of explosives and/or special impact tools such as jack hammers, sledges, chisels or similar devices specifically designed for use in cutting or breaking rock, but exclusive of trench excavating machinery. To be considered as rock excavation, the material shall be continuous; individual boulders or rocks in soil will not be considered rock excavation.
5. Muck: Materials unsuitable for foundation because of organic content, saturation to the extent that it is somewhat fluid and must be removed by dragline, dredge or other special equipment, are designated as muck. No extra payment will be made for muck removal.
6. Unsuitable material: Unsuitable material is defined as earth material unsatisfactory for its intended use and as classified by the soils technician. In addition to organic matter, sod, muck, roots and rubbish, highly plastic clay soils of the CH and MH descriptions, and organic soils of the OL and OH descriptions, as defined in the Unified Soil Classification System shall be considered as unsuitable material.

7. Suitable material: Where the term suitable material is used in specification sections pertaining to earthwork, it means earth or materials designated as being suitable for their intended use by soils technicians or the Engineer. Suitable material shall be designated as meeting the requirements of the Unified Soil Classification System types SW, GW, GC, SC, SM, ML, CL or as designated in these specifications.
8. Select material: Select material is defined as granular material to be used where indicated on the drawings or where specified herein consisting of soils conforming to the Unified Soil Classification types SW, SM, GW or GM or as otherwise approved by the Engineer as select fill. Select material shall contain no stones or rubble larger than 1-1/2" in diameter.
9. Crushed stone (gravel): Crushed stone shall be No. 57 aggregate or equal conforming to ASTM C-33.
10. Excavation: Excavation is defined as unclassified excavation of every description regardless of materials encountered.

D. The Contractor must determine for himself the volume of material required by the site.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Comply with requirements of governmental agencies having jurisdiction.

C. A testing laboratory retained by the Owner will make such tests as are deemed advisable. The Contractor shall schedule his work so as to permit a reasonable time for testing before placing succeeding lifts of fill material and shall keep the laboratory informed of his progress. The cost of the initial tests shall be paid for by the Owner. Subsequent tests required as a result of improper compaction shall be paid for by the Contractor.

1.3 PRODUCT HANDLING

A. Comply with pertinent provisions of the contract documents.

1.4 JOB CONDITIONS

A. Notification of intent to excavate:
1. South Carolina Underground Utility Damage Prevention Act (S.C. Code Ann, 58-35-10, CT-SEQ, Supp. 1978) requires persons to ascertain the location of underground public utility property prior to excavation or demolition in certain situations. The Act also requires such persons to give timely notice of intent to excavate or demolish prior to commencing such operations. Failure to comply could subject the violator to a civil penalty of up to one thousand dollars ($1,000) for each violation of the Act.
2. Notification of intent to excavate may be given by calling this toll free number: 1-800-922-0983.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Soil material used as fill, backfill, subgrade for structures or pavements, embankments, or site grading shall consist of suitable material as found available on site until such supply of on-site material is depleted.
   1. Provide suitable material free from organic matter and deleterious substances, containing no rocks or lumps over 6" in greatest dimension, and with not more than 15% of the rocks or lumps larger than 2-1/2" in their greatest dimension.
   2. Do not permit rocks having a dimension greater than 1" in the upper 6" of fill or embankment.

B. Should the quantity of suitable on-site material be insufficient to complete the work, suitable borrow material as approved by the Engineer shall be provided by the Contractor at no additional expense to the Owner.

C. Select materials may be provided from on-site if acceptable material as approved by the Engineer is available on site. Otherwise approved select material shall be provided by the Contractor from an off-site source.

2.2 TOPSOIL

A. Use topsoil consisting of material removed from the top 3" to 6" of existing on-site soils.

B. Use topsoil containing no stones, roots or large clods of soil.

C. Stockpile topsoil separate from other excavated material.

2.3 WEED KILLER

A. Provide a dry, free-flowing, dust free chemical compound, soluble in water, capable of inhibiting growth of vegetation and approved for use on this work by governmental agencies having jurisdiction.

2.4 EQUIPMENT

A. Use equipment adequate in size, capacity and numbers to accomplish the work in a timely manner without undue waste or damage of material.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Clearing and grubbing: Clear and grub areas to be graded prior to commencement of the grading operations.

B. Where so directed by the Owner, protect and leave standing designated desirable trees.

C. Complete any demolition and/or removal work as may be required prior to grading operations.

D. Dispose of all clearing, grubbing and demolition debris and other deleterious material off the project site. Vegetation, roots, brush, rubbish, stumps, etc. may be burned on-site where permitted by local authorities and regulations and approved by the Engineer.

E. Topsoil: Strip topsoil to a depth of 3" to 6" without contamination from the subsoil and stockpile topsoil separate from other excavated materials.
   1. Transport and deposit topsoil in storage piles convenient to areas that are to receive topsoil or in other locations as indicated or approved by the Engineer.
   2. Deposit topsoil in areas that are already graded and will not be disturbed by on-going construction.
   3. Dispose of unsuitable or unusable stripped material off-site or as otherwise directed by the Engineer.

F. Sampling and preliminary testing:
   1. Prior to beginning the grading operations, the Contractor shall submit to the Engineer his proposed sequence of excavation operations.
   2. Based upon the sequence of excavation, samples of the fill materials will be obtained as excavation proceeds and tested for grain size permeability and moisture density relationship using the Standard Proctor Method (ASTM D698, Method A).
   3. Allow sufficient time for completion of laboratory tests before any fill operations begin, using the soils being tested.

3.3 FINISH ELEVATIONS AND LINES

A. Construct areas outside of building or structure lines true to grades shown.
   1. Where no grade is indicated, shape finish surface to drain away from buildings or structures, as approved by the Engineer.

B. Degree of finish shall be that ordinarily obtainable from bladegrader, supplemented with hand raking and finishing.

C. Finish surfaces to within 0.10' above or below the established grade or approved cross section.

3.4 GENERAL PROCEDURES

A. Existing utilities:
   1. Unless shown to be removed, locate and protect active utility lines shown on the drawings or otherwise made known to the Contractor prior to excavating. If damaged, repair or replace at no additional cost to the Owner.

2. If active utility lines are encountered and are not shown on the drawings or otherwise made known to the Contractor, promptly notify the Engineer and take necessary steps to assure that service is not interrupted.
3. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost to the Owner.
4. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Engineer and secure his instructions.
5. Do not proceed with permanent relocation of utilities until written instructions are received from the Engineer.

B. Protection of persons and property:
1. Barricade open holes and depressions occurring as part of this Work, and post warning lights on property adjacent to or with public access.
2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout and other hazards created by operations under this Section.

C. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.

D. Maintain access to adjacent areas at all times.

E. Excavate and backfill in a manner and sequence that will provide proper drainage at all times.

3.5 EXCAVATING (CUTS)

A. Perform excavating of every type of material encountered within the limits of the Work to the lines, grades and elevations indicated and specified herein.

B. Provide sloping, sheeting, shoring, and bracing for excavations conforming with 29CFR1926 Subpart P-Excavations and the Contract Documents.

C. Suitable excavated materials:
1. Use all suitable materials removed from the excavation as far as practicable in the formation of the embankments, subgrades, shoulders, building sites and other places as directed.
2. Surplus suitable materials from excavations shall be wasted on the site as indicated, spreading and leveling as directed.

D. Unsuitable excavated material: Remove from the site and dispose of all unsuitable material unless otherwise approved by the Engineer.

E. Rock excavation:
1. Notify the Engineer upon encountering rock or similar material which cannot be removed or excavated by conventional earth moving or ripping equipment.
2. Do not use explosives without written permission from the Engineer.

3. When explosives are permitted, use only experienced powdermen or persons who are licensed or otherwise authorized to use explosives. Store, handle and use explosives in strict accordance with all regulatory bodies and the "Manual of Accident Prevention in Construction" of the Associated General Contractors of America, Inc.
4. The Contractor shall be solely responsible for any damage resulting from the use of explosives.
5. The Contractor is responsible for securing all permits required in performing this work.

F. Unauthorized excavation:
1. Excavation of material to depths below the grades indicated unless so directed by the Engineer will be deemed unauthorized excavation.
2. Unauthorized overexcavation shall be backfilled and compacted without any additional expense to the Owner.

G. Authorized overexcavation: In the event that it is necessary to remove unsuitable material to a depth greater than that shown on the drawings or otherwise specified, the Contractor shall remove, replace and compact such material with suitable material as directed by the Engineer at no additional expense by the Owner.

3.6 FILLING AND BACKFILLING

A. Use fills formed of suitable material placed in layers of not more than 8" in depth measured loose and rolled and/or vibrated with suitable equipment until compacted.

B. Do not place rock that will not pass through a 6" diameter ring within the top 12" of the surface of the completed fill or rock that will not pass through a 3" diameter ring within the top 6" of the completed fill.

C. Do not use broken concrete or asphaltic pavement in fills.

D. Selection of borrow material:
1. Material in excess of that available on the site shall be suitable material furnished by the Contractor from private sources selected by the Contractor. The material shall be approved by the Engineer before use. All expenses involved in securing, developing, transporting and placing the material shall be borne by the Contractor.

E. Placing and compacting:
1. Place backfill and fill materials in layers not more than 8" in loose depth.
2. Before compacting, moisten or aerate each layer as necessary to provide the optimum moisture content.
3. Compact each layer to required percentage of maximum density for the area.
4. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
5. Place backfill and fill materials evenly adjacent to structures, to required elevations.
6. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around the structures to approximately the same elevation in each lift.

F. Moisture control:
1. Do not use soil material that is either too dry or too wet to achieve proper compaction.
2. Where subgrade or layer of soil material is too dry to achieve proper compaction, uniformly apply water to surface of soil material such that free water does not appear on the surface during or subsequent to compacting operations.
3. Remove and replace, or scarify and air dry, soil material that is too wet to permit compacting to the specified density.
4. Soil material that has been removed because it is too wet to permit compacting may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value as determined by moisture-density relation tests approved by the Engineer.

G. Compaction requirements:
1. Compact soils to not less than the following percentages of maximum dry density as determined in accordance with ASTM D698, Method A (Standard Proctor).
2. Fill beneath roadway:

Top 12" of subgrade	100%
All other fill material	95%

3. Embankments:

Top 12" of subgrade	98%
All other fill material	95%

4. Fill beneath walkways:

Top 12" of subgrade	95%
All other fill material	90%

5. Lawn and unpaved open areas:

All other fill material	90%

3.7 FINISH GRADING

A. General:
1. Uniformly grade the areas within limits of grading under this Section, including adjacent transition areas.
2. Smooth the finished surfaces within specified tolerance.
3. Grade with uniform levels or slopes between points where elevations are shown on the drawings, or between such points and existing grades.
4. Where a change of slope is indicated on the drawings, construct a rolled transition section having a minimum radius of approximately 8'0", unless adjacent construction will not permit such a transition, or if such a transition defeats positive control of drainage.

B. Grading adjacent to structures: Grade areas adjacent to buildings to achieve drainage away from the structures and to prevent ponding.

C. Ditches and gutters and swales:
1. Cut accurately to the cross sections, grades and elevations shown.
2. Maintain excavations free from detrimental quantities of leaves, sticks, trash and other debris until completion of the work.

3. Dispose of excavated materials as specified herein; do not in any case deposit materials within 3'0" of the edge of a ditch.

3.8 FIELD QUALITY CONTROL

A. Secure the Engineer's construction review and observation and approval of subgrades and fill layers before subsequent construction is permitted thereon.

B. Field density determinations will be made, at no cost to the Contractor, to ensure that the specified densities are being obtained. Field density tests will be performed as determined by the Engineer, considering the following:
   1. At areas to receive paving, at least one field density test for every 5,000 sq. ft. of subgrade area, but not less than three tests.
   2. In each compacted fill layer, one field density test for every 5,000 sq. ft. of overlaying paved area, but not less than three tests.
   3. In fill beneath structures, one field density test for every 2,500 sq. ft. in each layer.
   4. Other tests as deemed necessary by the Engineer.

C. If, in the Engineer's opinion based on reports of the testing laboratory, subgrade or fills which have been placed are below specified density, provide additional compacting and testing until specified requirements are met.
   1. Additional testing will be provided by the Owner's selected testing laboratory and all costs for the additional testing will be borne by the Contractor.

D. Proofrolling:
   1. The Contractor shall proofroll subgrade of areas to receive paving, structures on fill or impervious lining material.
      a. Make not less than 3 passes of a 25 to 50 ton rubber tired roller over the full area.
      b. Unstable, soft or otherwise unsuitable materials revealed by the proofrolling shall be removed and replaced with satisfactory materials, compacted as specified herein.

3.9 PLACING TOPSOIL

A. Upon completion of site grading and other related site work, topsoil shall be uniformly spread over the graded or improved areas. Topsoil shall be evenly distributed to conform to final grade elevations shown on the plans.

B. Place, level and lightly compact topsoil to a depth of not less than 6".

C. Maintain topsoil free of roots, rocks, debris, clods of soil and any other objectionable material which might hinder subsequent grassing or mowing operations.

D. Any surplus materials shall be removed from the site, unless the owner approves areas on-site for disposal.

3.10 MAINTENANCE

A. Protection of newly graded areas:
   1. Protect newly graded areas from traffic and erosion, and keep free from trash and weeds.
   2. Repair and re-establish grades in settled, eroded and rutted areas to the specified tolerances.

B. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape, and compact to the required density prior to further construction.

3.11 MEASUREMENT AND PAYMENT

A. No separate measurement or direct payment will be made for the work under this Section and all costs for same shall be included in the price bid for the project.

END OF SECTION

SECTION 31 23 16.13

TRENCHING, BACKFILLING AND COMPACTING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Excavating, backfilling, and compacting trenches for waterlines and sewer lines.

1.2 DEFINITIONS

A. Backfill: Soil materials used to fill an excavation.

1. Initial Trench Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Trench Backfill: Backfill placed over initial trench backfill to fill a trench.

B. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.

C. Borrow: Satisfactory tested and approved soil imported from off-site for use as fill or backfill.

D. Excavation: Removal of material encountered above subgrade elevations.

1. Additional Excavation: Excavation below subgrade elevations as directed by Engineer. Additional excavation and replacement material will be compensated according to Contract provisions for changes in the Work.
2. Bulk Excavation: Excavations more than 10 feet in width and pits more than 30 feet in either length or width.
3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, will be without additional compensation.

E. Fill: Soil materials used to raise existing grades.

F. Rock: Igneous, metamorphic, and sedimentary rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material exceeding 1 cubic yard for bulk excavation or 3/4 cubic yard for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:

1. Trench Excavation of Rock: Any material which cannot be excavated with a Caterpillar 325 or equivalent and occupying an original volume of at least 1/2 cubic yard or more.

2. Bulk Excavation of Rock: Any material which cannot be excavated with a single tooth ripper drawn by a crawler tractor having a minimum fly wheel power rated at not less than 310 horsepower (Caterpillar D-8R Series II, or equivalent) and occupying an original volume of at least one cubic yard or more.
3. Intermittent drilling that may be performed to increase production but is not necessary to permit excavation of the material encountered will be classified as earth excavation.

G. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

H. Subbase Course: Layer that is placed and compacted between the subgrade and base course for asphalt paving, or between the subgrade and a concrete pavement or walk.

I. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

J. Utilities: On-site and offsite underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.3 SUBMITTALS

A. Product Data: For the following:

1. Each type of plastic warning tape.
2. Drainage fabric.
3. Separation fabric.

B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

1. Classification according to ASTM D2487 of each on-site or borrow soil material proposed for fill and backfill.
2. Laboratory compaction curve according to ASTM D698 for each on-site or borrow soil material proposed for fill and backfill.

C. Blasting plan approved by authorities having jurisdiction, for record purposes.

D. Information on experience and qualification of explosive specialists as requested.

E. Three (3) copies of blasting insurance certificates prior to blasting.

F. Seismic survey agency report, for record purposes.

1.4 QUALITY ASSURANCE

A. Comply with applicable requirements of NFPA 495, “Explosive Materials Code.”

B. Seismic Survey Agency: An independent testing agency, acceptable to authorities having jurisdiction, experienced in seismic surveys and blasting procedures to perform the following services:

1. Report types of explosive and sizes of charge to be used in each area of rock removal, types of blasting mats, sequence of blasting operations, and procedures that will prevent damage to site improvements and structures on Project site and adjacent properties.
2. Seismographic monitoring services during blasting operations.

C. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E329 to conduct soil materials and rock-definition testing, as documented according to ASTM D3740 and ASTM E548.

1.5 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt existing utilities serving facilities occupied and used by Owner or others unless permitted in writing by Engineer, and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Engineer not less than 48 hours in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Engineer's written permission.
3. Contact utility-locator service for area where Project is located before excavating.
4. Locate existing underground and above ground utilities in the areas of work before starting earthwork operations. Where utilities are to remain in place, provide adequate means of protection during earthwork operations.
5. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult Engineer immediately for directions. Cooperate with the Owner, and public and private utility companies, in keeping their respective services and facilities in operation. Repair damaged utilities to the satisfaction of the utility owner at Contractor’s expense.
6. Adhere to all requirements listed in specification Section 31 10 01 – Site Clearing and Grubbing, concerning existing utilities.

B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials that have been sampled, tested, and certified when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: ASTM D2487 soil classification groups GW, GP, GM, SW, SP, and SM, or a combination of these group symbols; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: ASTM D2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT, or a combination of these group symbols.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Backfill and Fill: Satisfactory soil materials.

E. Subbase: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; with at least 90 percent passing a 1-1/2 inch sieve and not more than 12 percent passing a No. 200 sieve.

F. Base: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

G. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

H. Bedding: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; except with 100 percent passing a 1-1/2 inch sieve and not more than 8 percent passing a No. 200 sieve.

I. Drainage Fill: Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

J. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and 0 to 5 percent passing a No. 4 sieve.

K. Sand: ASTM C33; fine aggregate, natural, or manufactured sand; with 100 percent passing a No. 4 sieve and 0 to 5 percent passing a No. 200 sieve.

L. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 ACCESSORIES

A. Detectable Warning Tape: Provide acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum 6 inches wide and 4 mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

B. Drainage Fabric: Nonwoven geotextile, specifically manufactured as a drainage geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D4759 and referenced standard test methods:

1. Grab Tensile Strength: 110 lbf; ASTM D4632.
2. Tear Strength: 40 lbf; ASTM D4533.
3. Puncture Resistance: 50 lbf; ASTM D4833.
4. Water Flow Rate: 150 gpm per sq. ft.; ASTM D4491.
5. Apparent Opening Size: No. 50; ASTM D4751.

C. Separation Fabric: Woven geotextile, specifically manufactured for use as a separation geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D4759 and referenced standard test methods:

1. Grab Tensile Strength: 200 lbf; ASTM D4632.
2. Tear Strength: 75 lbf; ASTM D4533.
3. Puncture Resistance: 90 lbf; ASTM D4833.
4. Water Flow Rate: 4 gpm per sq. ft.; ASTM D4491.
5. Apparent Opening Size: No. 30; ASTM D4751.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine the areas and conditions under which excavation, filling and grading are to be performed and notify the Engineer, 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 in an acceptable manner.

3.2 PREPARATION

A. Protect structures, utilities, walks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

C. Notify engineer in writing upon encountering rock and before blasting operations begin.

D. Provide temporary and/or permanent erosion-control measures as necessary to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties, walkways, roads, streams, lakes, etc.

3.3 DEWATERING

A. See specification Section 31 23 19 – Dewatering.

3.4 EXPLOSIVES

A. The responsible use of explosives by qualified personnel is permitted, subject to approval by the Engineer. Obtain written permission from authorities having jurisdiction before bringing explosives to Project site or using explosives on Project site.

1. Do not damage adjacent structures, property, or site improvements or weaken the bearing capacity of rock subgrade when using explosives. Any damage to adjacent structures or utilities will be repaired immediately at no cost to Owner.
2. Do not perform blasting adjacent to existing buildings or structures. Remove all rock at such locations by use of non-blasting methods.
3. Warn all persons in vicinity prior to blasting.
4. Blast with only such quantities and strengths of explosives and in such manner as will break the rock approximately to the intended lines and grades and yet will leave the rock not to be excavated in an unshattered condition. Take care to avoid excessive cracking of the rock upon or against which any structure will be built, and to prevent injury to existing pipes or other structures and property above and below ground.
5. If rock below the required grade is shattered due to blasting and the Engineer determines that the shattered rock is unfit for foundations, remove shattered rock and replace with stabilization stone. Cost of removal of shattered rock and replacement with stabilization stone shall be borne by the Contractor.
6. Keep explosives on site only in such quantities as may be needed for the work under way and only during such time as they are being used. Store explosives in a secure manner and separate from all tools. Safely store caps or detonators away from the explosives. When the need for explosives has ended, promptly remove from the premises all such materials remaining.

3.5 EXCAVATION, GENERAL

A. Classified Excavation: Excavation to subgrade elevations classified as earth and rock. Payment for rock excavation will be made by adjusting the Contract Sum according to unit prices included in the Contract Documents.

1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; and soil, boulders, and other materials not classified as rock or unauthorized excavation.

    a. Intermittent drilling, blasting (if permitted), ram hammering, or ripping of material not classified as rock excavation for the purpose of increasing production will be classified as earth excavation.

2. Rock excavation includes removal and disposal of rock.

    a. Do not excavate rock until it has been classified and measured by Engineer.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades to within plus or minus 0.10 feet.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations shown on plans.

1. Excavate trenches to allow installation of top of pipe below frost line.
2. As the excavation approaches pipes, conduits, and other underground structures, discontinue digging by machinery and excavate using hand tools.
3. Excavate test pits where necessary to determine the exact location of pipes or other underground structures prior to proceeding with general excavation.

B. Excavate trenches to uniform widths to provide clearance of 12 inches on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to an elevation 12 inches higher than top of pipe or conduit, unless otherwise indicated.

C. Where rock or other unsuitable material is encountered, excavate to a minimum depth of 6 inches below the required elevation. Backfill and compact to proper subgrade with washed stone (#57) or sand and compact to 90 percent of maximum density as determined by ASTM D698.

D. Do not backfill trenches until tests and inspections have been completed and backfilling authorized by the Engineer. Use care in backfilling to avoid damage or displacement of pipe systems.

E. Trench Bottoms: Excavate trenches 4 inches deeper than specified bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe.

1. Excavate trenches 6 inches deeper than specified elevation when rock or other unyielding and/or suitable bearing material is encountered to allow for bedding course.

F. Trench Within Paved Areas:

1. When trenching across roadways, open only one-half of the road width in order to maintain traffic. When trenching parallel with the roadways, maintain vehicular accessibility for local traffic. Do not leave trench made in the traveled portion of the roadway open overnight.
2. Exercise utmost care to minimize the width of pavement removed. Avoid indiscriminate removal. Do not permit the pavement to slough off into the excavation. Saw-cut pavement to provide uniform edge. For pipes and conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.

G. If pipe is to be placed in embankments or other recently filled material, first place fill to the finished grade or to a height of at least 3 feet above the top of the pipe. Obtain required compaction of fill material prior to trench excavation.

3.8 APPROVAL OF SUBGRADE

A. Notify Engineer when excavations have reached required subgrade.

B. If Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

1. Payment for additional excavation and replacement material will be according to Contract provisions for changes in the Work.

C. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer.

3.9 STORAGE OF SOIL MATERIALS

A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.10 TRENCH BACKFILL

A. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

B. Backfill trenches excavated under footings and within 18 inches of bottom of footings; fill with concrete to elevation of bottom of footings.

C. Provide 4-inch thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase.

D. Place and compact initial backfill of subbase material, free of particles larger than 1 inch, to a height of 12 inches over the utility pipe or conduit.

   1. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.

E. Coordinate backfilling with utilities testing.

F. Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed.

G. Place and compact final backfill of satisfactory soil material to final subgrade.

H. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

I. In unpaved areas, deposit and compact the remainder of the backfill with mechanical tampers. Deposit layers having a maximum uncompacted thickness of 12 inches in unpaved areas. In areas to be paved or repaved, deposit the entire depth of backfill in layers having a maximum uncompacted thickness of 6 inches, and compact by hand or mechanical tampers to 98 percent maximum density as determined by the Standard Proctor Method ASTM D698.

J. In areas to be paved, density tests will be performed by a testing laboratory for the purpose of verifying the specified compaction. Frequency of tests will be one for every 100 feet of trench cut, with a minimum of two tests. It is the intent of this specification to secure a condition in which no further settlement of trenches will occur. When backfilling is completed, the roadway base for the pavement replacement may be placed immediately. It will be the responsibility of the Contractor to restore the surface to the original grade wherever settlement occurs.

K. Perform trenching, backfilling and compaction within State Highways rights-of-way in accordance with the requirements of the State of South Carolina Department of Transportation in addition to the requirements of these specifications.

3.11 MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent or more and is too wet to compact to specified dry unit weight.

3.12 COMPACTION OF BACKFILLS AND FILLS

A. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil to not less than the following percentages of maximum dry density according to ASTM D698:

1. Under pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill material at 98 percent.
2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 90 percent.
3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 90 percent.

3.13 GRADING

A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Lawn or Unpaved Areas: Plus or minus 0.10 feet.
2. Walks: Plus or minus 0.05 feet.
3. Pavements: Plus or minus 0.05 feet.

3.14 SUBBASE AND BASE COURSES

A. Under pavements and walks, place subbase course on prepared subgrade and as follows:

1. Place base course material over subbase.
2. Compact subbase and base courses at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D698.
3. Shape subbase and base to required crown elevations and cross-slope grades.
4. When thickness of compacted subbase or base course is 6 inches or less, place materials in a single layer.
5. When thickness of compacted subbase or base course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

B. Pavement Shoulders: Place shoulders along edges of subbase and base course to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 98 percent of maximum dry density weight according to ASTM D698.

3.15 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing. Notify testing agency at least 24 hours in advance of requiring testing.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

C. Testing agency will test compaction of soils in place according to ASTM D1556, ASTM D2937, and ASTM D3017, as applicable. Tests will be performed at the following locations and frequencies:

1. Trench Backfill: At each compacted initial and final backfill layer, at least one test for each 150 feet or less of trench length, with a minimum of two tests.

D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.16 PROTECTION

A. Provide temporary erosion and sediment control measures to prevent the silting of streams and existing drainage facilities.

B. Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

C. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Engineer, reshape and recompact.

D. Where settling occurs before Project correction warranty period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible. Saw cut edges of area to be patched, where applicable.

3.17 RESTORATION OF SURFACE IMPROVEMENTS

A. Restore roadways, including shoulders, alleys and driveways of stabilized soil or gravel, grass plots, sod, shrubbery, ornamental trees, signs, fences, mailboxes, or other surface improvements on public or private property which have been damaged or removed in excavating, to conditions equal or better than the conditions existing prior to beginning work. Seed and mulch shoulders as specified in Section 32 92 19 – Seeding.

B. Compact materials for unpaved roadways, road shoulders, alleys, or driveways, to a minimum of 95 percent of the maximum density as determined by ASTM D698. Include the cost of this work and furnishing new materials in the cost of the applicable items of work as no separate payment will be made, unless a separate bid item is provided.

3.18 EXCAVATION NEAR EXISTING UTILITIES AND STRUCTURES

A. Attention is directed to the fact that there may be existing pipe, drains and other utilities in locations along the proposed work.

B. Where information is available as to the location of existing pipes, drains and other utilities, the approximate locations have been indicated on the drawings; however, the completeness or accuracy of the information given is not guaranteed.

C. As the excavation approaches pipes, conduits, or other underground structures, discontinue digging by machinery and excavate by means of hand tools. Such manual excavation when incidental to normal excavation is included in the work to be done under items involving normal excavation.

D. Excavate test pits where necessary to determine the exact location of pipes or other underground structures prior to proceeding with trench excavation. Such test pits are considered as incidental to other excavation.

3.19 PAVEMENT REMOVAL AND REPLACEMENT

A. Remove asphalt pavement by saw-cutting on a straight line with edges as nearly vertical as possible. Remove concrete pavement or asphaltic concrete pavement by cutting with a concrete saw in as straight line and as nearly vertical as possible. Provide materials to replace State Highway paving that conform to the specifications required by the State of South Carolina Department of Transportation. Provide other asphalt pavement replacement that conforms to the requirements of the applicable Department of Transportation Specifications for Type I asphaltic concrete surface course.

B. Prior to replacing concrete or asphalt pavement, provide a stabilized gravel or concrete base. The base for concrete or asphalt pavements on state primary roads consists of 10 inches of 3,000 psi concrete (see Standard Details for Type A Pavement Replacement). The base course for concrete or asphalt pavements on state or county secondary roads consists of 6 inches of McAdam base material stabilized with five percent (5%) Portland cement (see Standard Details for Type B Pavement Replacement). Compact stabilized aggregate base courses to a minimum of 95 percent of the maximum density as determined by ASTM D698.

C. Replace non-asphalt pavement of like material and thickness. Replace asphalt or built-up asphalt pavement with like material or concrete as directed by the Engineer. Where asphalt or built-up asphalt pavement is replaced by concrete, provide a minimum of 6 inches concrete thickness and 6 by 6 No. 6 gauge welded wire fabric reinforcement. Provide 3,000 psi design strength concrete for pavement replacement.

D. Install pavement replacement to the thicknesses and dimensions as shown on the drawings or otherwise specified.

E. Unless base is sealed or other temporary paving applied over areas to be repaved, replace pavement not later than three weeks after completion of backfill.

3.20 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste material, including unsatisfactory soil, rock, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION

SECTION 31 32 01
WOVEN COIR FABRIC

PART 1 GENERAL

1.1 SUMMARY

A. Section includes all labor, equipment, materials necessary for furnishing, placing, maintenance, removal, inspection, monitoring, and reporting on woven coir fabric erosion and sedimentation controls.

1.2 DEFINITIONS

A. Coir Fabric: Coir Blanket and/or Coir Mattress.

B. Coir Blanket: 100 percent natural, biodegradable, organic blanket woven from machine-spun bristle coir twines.

C. 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.

D. Overlap: Distance measured perpendicular from overlapping edge of one sheet to underlying edge of adjacent sheet.

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 1-1/4-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 Owner.

1.3 SUBMITTALS

A. If requested by Owner, submit description of proposed method of geotextile deployment, and provisions for holding fabric in-place and permanently secured.

B. If requested by Owner, 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 Owner, 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.

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 SEQUENCHING

A. Prior to fabric installation, prepare ground surface as specified in Section 32 91 19 – Landscape Grading.

B. Notify Owner whenever fabrics are to be placed. Do not place fabric without Owner's approval of underlying materials.

PART 2 PRODUCTS

2.1 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 the Table below. Equivalent substitute Products to those listed in the Table will be acceptable only with written approval from Owner.

Table – Physical Property Requirements for Coir Fabrics

PROPERTY	TEST METHOD	COIR BLANKET
Weight (oz./sq. yd)	ASTM D3776	17.8
Weight (grams/sq. m)	ASTM D3776	600
Dry Tensile Strength (lbs/ft) Machine direction Cross direction	ASTM D4595	 1130 1040
Wet Tensile Strength (lbs/ft) Machine direction Cross direction	ASTM D4595	 910 870
Elongation at Failure Wet Machine Direction Cross Direction Open Area Thickness (in.)	 ASTM D4595 ASTM D4595 Calculated ASTM D1777	 32% 26% 58% 0.35
% Open area	Calculated	58
Thickness (inch)	ASTM D1777	0.35
Recommended slope	-	2:1
Recommended flow velocity (fps)	-	10
Recommended shear stress (lbs/sq. ft)	-	4
Functional Longevity (years)		4 – 6

2.2 SECURING STAKES

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.
4. Use 2” by 4” biodegradable wood saw diagonally to produce 2 stout stakes as shown in the Contract Documents.

PART 3 EXECUTION

3.1 LAYING COIR FABRIC

A. Lay and maintain fabric smooth and free of tension, folds, wrinkles or creases.

B. Seed and mulch shall be placed under fabric prior to placement

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.

3.2 SHEET ORIENTATION ON SLOPES

A. Orient fabric with long dimension of each sheet perpendicular to the direction of flow on channel banks.

3.3 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.

3.4 SECURING FABRIC

A. Secure fabric during installation as shown on the Contract Documents, using trenches and 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. Where fabric butts up to boulder structures and/or wood instream structures, secure fabric with a trench and stakes along the upslope edge and parallel to the instream structure. Fabric shall not overlap instream structure and be unsecured.

E. Where fabric meets the waterline/toe of slope of the channel, no trench is required. Secure fabric with stakes as indicated on shown on the Contract Documents and/or in accordance with manufacturer's written recommendations.

3.5 REPAIRING FABRIC

A. Repair or replace torn, punctured, flawed, deteriorated, or otherwise damaged fabric with new unused fabric.

B. Repair Procedure:
   1. Place patch of undamaged fabric over damaged area and at least 18 inches in all directions beyond damaged area, minimum of four (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.

PART 4 MEASUREMENT AND PAYMENT

4.1 COIR FABRIC (COIR BLANKET, COIR MATTRESS)

A. Method of Measurement: Coir fabric shall be measured per square yard complete in place.

B. Basis of Payment:
   1. The unit price shall include all labor, equipment, materials necessary for furnishing, placing, maintenance, removal, inspection, monitoring, and reporting on the erosion and sedimentation controls.
   2. No additional payment shall be made for or maintenance or replacement of coir fabric.
   3. No separate payment if individual materials are included with Stream Stabilization Structure pay items as described in Sections 31 80 02 through 31 80 20.

END OF SECTION

SECTION 31 32 19.16
GEOTEXTILE SOIL STABILIZATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Furnishing all labor, equipment, and materials necessary for placing, maintenance, removal, inspection, monitoring, and reporting on the erosion and sedimentation controls for Geotextiles.

1.2 DEFINITIONS

A. Fabric: Geotextile, a permeable geosynthetic comprised solely of textiles.

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 Engineer and Owner whenever geotextiles are to be placed. Do not place geotextile without Engineer's 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.

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.

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 furnished 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 Log In-Stream Structures
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	ASTM D4632	200 lbs, minimum
Grab Elongation	ASTM D4632	10% to 35%
Bursting Strength	ASTM D 3786	500 psi, minimum
Fungus Resistance	ASTM G21	No Growth
Puncture Strength	ASTM D4833	80 lbs, MinARV
Ultraviolet Radiation Resistance	ASTM D4355	140 lbs 70 percent strength retention, MinARV after 500 hours
Minimum Roll Width		72 inches

Table – 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^2	50-150 gal/min/ ft^2
Grab Tensile Strength	ASTM D4632	65 lbs	80 lbs
Grab Elongation	ASTM D4632	40%	50%
Bursting Strength	ASTM D3786	500 psi	185 psi
Fungus Resistance	ASTM G21	No Growth	No Growth
Puncture Strength	ASTM D4833	30 lbs	55 lbs
Ultraviolet Radiation Resistance	ASTM D4355	140 lbs 70 percent strength retention, MinARV after 500 hours	70 percent strength retention, MinARV after 500 hours
Minimum Roll Width	--	72 inches	12-1/2 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 1-1/2 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 Engineer, also may be used instead of overlap at joints for applications that do not require stress transfer.
   1. Seam Efficiency:
      a. Minimum 70 percent.
      b. Verified by preparing and testing minimum of one set of nondestructive Samples per acre of each type and weight of geotextile installed.
      c. Tested according to ASTM D4884.
   2. Types:
      a. Preferred: "J" type seams.
      b. Acceptable: Flat or butterfly seams.
   3. Stitch Count: Minimum 3 to maximum 7 stitches per inch.
   4. Stitch Type: Double thread chain stitch according to ASTM D6193.
   5. Sewing Machines: Capable of penetrating 4 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 Engineer.

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:

Slope	Maximum Pin Spacing
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 Engineer and Owner. Do not cover installed geotextile until after Engineer provides authorization to proceed.

B. If tears, punctures or other geotextile damage occurs during placement of overlying Products, remove overlying Products as necessary to expose damaged geotextile. Repair damage as specified in Article Repairing Geotextile.

3.6 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:
   a. 0 foot for greater than 200-pound rock.
   b. 2 feet for less than 200-pound rock.

3.7 SILT FENCE APPLICATIONS (NOT USED)

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 Engineer.

3.9 REPLACING CONTAMINATED GEOTEXTILE

A. Protect geotextile from contamination that would interfere, in Engineer's opinion, with its intended function. Remove and replace contaminated geotextile with clean geotextile. See Construction Notes on Contract Documents.

PART 4 MEASUREMENT AND PAYMENT

4.1 GEOTEXTILE FABRIC (WOVEN TYPE 1, NON-WOVEN TYPE 2, AND NON-WOVEN TYPE 3)

A. Method of Measurement:
   1. Geotextile shall be measured for the actual square yards of land covered, measured as installed in place.

2. 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.
3. 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 20.

B. Basis of Payment:
1. 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 directed by Engineer.
2. Geotextiles installed as part of other structures are excluded from this basis of payment.
3. Payment shall be compensation for all maintenance of the geotextile, including repairs or replacement of geotextile.

END OF SECTION

SECTION 31 40 01
EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide protection of the environment during the construction of this project to reduce soil erosion and siltation to the lowest reasonably achievable level.

1.2 GENERAL

A. Exercise every reasonable precaution, throughout the life of the project, to prevent the eroding of soil and the silting of rivers, streams, lakes, reservoirs, other water impoundments, ground or roadway surfaces, or other property. Erosion control practices to be used for this project are shown on the drawings and are to conform to South Carolina Department of Health and Environmental Control regulations.

PART 2 - PRODUCTS

2.1 CRUSHED STONE

A. Provide No. 1 aggregate (ASTM C 33) as defined in Section 815 of the SCDOT Standard Specifications for Highway Construction, Latest Edition, for the stabilized construction entrance and exit.

B. Provide #57 crushed stone for temporary sediment barriers around inlets and for temporary stone check dams.

2.2 GRASSING

A. Comply with Section 32 92 19 - Seeding

2.3 SILT FENCE (NOT USED)

2.4 EROSION CONTROL BLANKET

A. Comply with Section 31 32 01 - Woven Coir Fabric.

2.5 RIP-RAP (NOT USED)

2.6 FILTER FABRIC (Temporary Stone Check Dam) (NOT USED)

2.7 SEDIMENT TUBES

A. Use sediment tubes as designated on the plans to control erosion along contours, around inlets, and in drainage conveyance swales.

B. Use sediment tubes manufactured by an experienced manufacturer producing tubes for erosion control.

C. Tube fill is to be composed of 100% weed free materials consisting of a mix of some or all of the following: curled excelsior wood, natural coconut fibers, hardwood mulch and agricultural straw.

D. Tubular netting is to be constructed of a flexible outer netting that will contain the fill materials and sediment. Netting is to be constructed from seamless high density polyethylene, polyester, and/or ethyl vinyl acetate, photodegradable materials, treated with ultraviolet stabilizers.

E. Tubes size should comply with construction plans detail.

PART 3 - EXECUTION

3.1 GENERAL

A. Construct and maintain all erosion control measures until the substantial completion of the project.

3.2 TEMPORARY CONSTRUCTION ENTRANCE/EXIT

A. Construct a gravel area or pad at points where vehicles enter and leave a construction site.

B. Clear the entrance and exit area of all vegetation, roots, and other objectionable material and properly grade and place gravel to the grade and dimensions shown on the plans.

C. Construct drainage channels to carry water to a sediment trap or other suitable outlet.

D. Use geotextile fabrics to improve stability of the foundation in locations subject to seepage or high water table.

E. Maintain the gravel pad in a condition to prevent mud or sediment from leaving the construction site by periodic top dressing with two inches of stone.

F. After each rainfall, inspect any structure used to trap sediment and clean it out as necessary.

G. Immediately remove objectionable materials spilled, washed, or tracked onto public roadways.

3.3 TEMPORARY GRASSING

A. Provide a temporary cover for erosion control on disturbed areas that will remain unstabilized for a period of more than 30 days in accordance with Section 32 92 19.

B. This practice applies to cleared areas, diversions, dams, temporary sediment basins, temporary road banks, and topsoil stockpiles where vegetation is needed for less than 1 year.

C. Provide grassing on slope 5% or greater within 14 days of disturbance. Comply with Section 32 92 19.

3.4 SILT FENCE (NOT USED)

3.5 INLET PROTECTION (NOT USED)

3.6 EROSION CONTROL BLANKET

A. Provide on areas as shown on the plans or on all embankments with slopes indicated in the plans.

3.7 TEMPORARY STONE CHECK DAMS (NOT USED)

3.8 SEDIMENT TUBES

A. Construct small U-shaped trench that is 20% of depth of tube perpendicular to stormwater flow pattern.

B. Anchor tube in trench according to manufacturers recommendations.

C. Compact the upstream soil surface adjacent to the tube.

D. Backfill sediment tube with coarse filter material on the upstream side.

E. Follow manufactures recommendation on installation.

F. Maintain, repair and/or replace sediment tubes as required to maintain their effectiveness throughout the project.

3.9 MAINTENANCE

A. Place all erosion control devices or measures prior to any land disturbing activity within the drainage area they are located.

B. Inspect erosion control devices and clean or otherwise remove silt buildup as necessary once a week or 24-hours following a rain event of $\geq$ 0.1".

3.10 REMOVAL

A. Remove temporary structures after protected areas have been stabilized.

3.11 MEASUREMENT AND PAYMENT

A. No separate measurement or direct payment will be made for the items under this Section and all costs for same shall be included in the lump sum price bid for the project.

END OF SECTION

SECTION 31 80 02
IN-STREAM STRUCTURE MATERIALS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes furnishing all labor, equipment, materials, tools, and appliances as required for stockpiling and installation of in-stream structures as herein specified, shown or ordered.

1.2 DEFINITIONS

A. Structure Materials:
   1. Fieldstone Boulders: Angular quarzitic 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 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 Engineer 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 Engineer approval.
   6. River Pebble shall be a mixture of angular and rounded stones ranging in size from 1/2 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 Engineer approval.
   7. Logs shall be made of hardwood species and at least 12 inches in diameter.
   8. 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 Engineer.

1.3 SUBMITTALS

A. As requested by Engineer, 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 Engineer. 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: 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. 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 SCDOT qualified product. Native, on-site rocks may be used pending approval of Engineer.

B. Any rock for use in an In-Stream and Stormwater Treatment Structure is subject to being approved individually on-site by Engineer 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 16 – 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 Field Stone Boulders or Granite Quarry Stone Boulders, as specified in the Contract Documents or directed by Engineer. 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 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-inch Min	18-inch Min	24-inch Min	30-inch Min
Width	24-inch Min	28-inch Min	30-inch Min	42-inch Min
Length	36-inch Min	42-inch Min	48-inch Min	60-inch Min

C. Abrasion Resistance: Maximum 35 percent wear as determined in accordance with ASTM C535.

D. Bulk Density: Maximum 165 pounds per dry cubic foot.

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.

Table 2 – Required Stone, Typical Sizes

	Minimum	Mean	Maximum
River Cobble	8-inch	10-inch	12-inch
Riffle Rock	3-inch	6-inch	8-inch
River Pebble	1/2-inch	1-inch	2-inch

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 Engineer.

B. Log diameter shall be no less than 12 inches and no greater than 24 inches unless otherwise approved by Engineer.

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 – Geotextile Soil Stabilization.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION OF IN-STREAM MATERIALS

A. In-Stream materials shall be installed in accordance with specification Sections 31 80 02 through Section 31 80 20. If no in-stream structure specification is referenced, then the Contractor shall follow the general installation notes listed below, as instructed by Engineer 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 lift 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 Engineer and shall be eligible for payment as Spoil Removal. 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 Section 31 32 19.16 – Geotextile Soil Stabilization.

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 Engineer. Grout voids between the stones as directed by Engineer 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 Engineer.

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 LOG – ON-SITE

A. Method of Measurement: 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 Engineer.

B. Basis of Payment:
   1. 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.
   2. 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.
   3. No separate payment if individual materials are included with Stream Stabilization Structure pay items as described in Sections 31 80 02 through 31 80 20.

4.2 BOULDERS (FIELDSTONE, GRANITE QUARRY STONE)

A. Method of Measurement: Boulders shall be measured per boulder, as required in the Contract Documents or as otherwise directed by Engineer.

B. Basis of Payment:
   1. 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.
   2. 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.
   3. Payment will not be approved without submission of weight delivery tickets.
   4. Costs associated with this activity are included in the Unit Price Schedule.
   5. No separate payment if individual materials are included with Stream Stabilization Structure pay items as described in Sections 31 80 02 through 31 80 20.

END OF SECTION

SECTION 31 80 07
J-HOOK VANE AND BOULDER VANE

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: "J" shaped rock structure with an outside rock arm, inside rock arm, rock center (hook), and 2 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 SCDOT Standard Specifications Section 876.
   3. No. 3 and No. 57 stone shall be in accordance with SCDOT Standard Specifications Section 801.
   4. 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 pending approval of Engineer.

D. Geotextiles: The term geotextile may also be referred to as woven filter fabric on the Drawings.

1.3 SUBMITTALS

A. If requested by Engineer, 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 Engineer. 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, and be 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. The size of equipment to be used to install the structures. Include bucket dimensions and the minimum trench width required to maneuver.
   5. 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 SCDOT qualified product. Native, on-site rocks may be used pending approval of Engineer.

B. Any rock for use in J-Hook Vane and/or Boulder Vane is subject to being approved individually on-site by Engineer 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.

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 Structure Materials.

2.2 OTHER ROCKS

A. Stones shall be as specified in Section 31 80 02 – In-Stream Structure Materials.

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 GEOTEXTILES

A. Geotextiles shall be as specified in Section 31 32 19.16 – Geotextile Soil Stabilization.

PART 3 EXECUTION

3.1 CONSTRUCTING STRUCTURES

A. Notify Engineer at least one week prior to construction of J-Hook Vane and/or Boulder Vane structure. Engineer 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. 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 lift 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 Engineer and shall be eligible for payment as Spoil Removal. 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. 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 Engineer. Grout voids between the stones as directed by Engineer.

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 geotextile 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 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 Engineer.

PART 4 MEASUREMENT AND PAYMENT

4.1 J-HOOK VANE

A. Method of Measurement: 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 Engineer. Contractor shall notify Engineer for measurement inspection of structure prior to backfill. Payment for structure submitted without measurement inspection by Engineer will not be accepted.

B. Basis of Payment:
   1. 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, 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 Engineer.
   2. No separate measurement of materials shall be made under this item for coarse backfill, fabric, anchors, crest/footer stones, rip rap, stone, and/or other incidental items.

4.2 BOULDER VANE

A. Method of Measurement: 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 Engineer. Contractor shall notify Engineer for measurement inspection of structure prior to backfill. Payment for structure submitted without measurement inspection by Engineer will not be accepted.

B. Basis of Payment:
   1. 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, 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 Engineer.
   2. No separate measurement of materials shall be made under this item for coarse backfill, fabric, anchors, crest/footer stones, rip rap, stone and/or other incidental items.

END OF SECTION

SECTION 31 80 17
SOIL ENCAPSULATED LIFTS (SELs)

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 (SELs) as herein specified, shown or ordered.

1.2 DEFINITIONS

A. 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 boulder toe, installed as shown in the Contract Documents.
   2. Coir Fiber Block: Structural portion of a lift, typically 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.

C. Structure Materials:
   1. Boulder toe shall be in accordance with per Section 31 80 21 – Boulder Toe Protection.
   2. Live Stakes shall be 2-foot to 3-foot dormant cuttings of vegetation.
   3. Dead Stout Stakes shall be in accordance with Section 31 32 01 – Woven Coir Fabric.
   4. Coir Fabric shall be in accordance with Section 31 32 01 – Woven Coir Fabric.
   5. Over excavation shall be excavation required for the installation of SELs outside the limits of excavation for the proposed channels. Over excavation shall be limited as described on the Contract Documents.

1.3 SUBMITTALS

A. As requested by Engineer, submit:
   1. Description and location of proposed sources of rock material.
   2. Samples which shall be delivered to Site at location designated by Engineer. Incorporate Samples into Work after material placement is nearly complete. Samples that may be requested include
      a. Rock:
         i. Boulder toe.
         ii. 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: 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. The size of equipment to be used to install the structures. Include bucket dimensions and the minimum trench width required to maneuver.
5. Description of soil encapsulated in coir fabric.

1.4 QUALITY ASSURANCE

A. Rock Source: Quarries shall have produced rock and have performed satisfactorily on other projects and be a South Carolina approved quarry. Native, on-site rocks may be used pending approval of Engineer.

B. Rock for use in a SEL Structure will be approved on-site by Engineer prior to placement and/or acceptance of the Work.

1.5 SCHEDULING AND SEQUENCING

A. Complete rough grading as specified in Section 31 20 01 – Site Grading and in accordance with the Contract Documents, typical sections and details.

PART 2 PRODUCTS

2.1 ROCKS

A. Boulder toe shall be in accordance with per Section 31 80 21 – Boulder Toe Protection

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 below.

E. Equivalent substitute Products to those listed in the Table below will be acceptable only with approval from Engineer.

Table – Physical Property Requirements for Coir Woven Geotextile

Property	Test Method	Coir Fiber Block (for SELs)
Weight (lbs/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.
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

PART 3 EXECUTION

3.1 CONSTRUCTING SOIL ENCAPSULATED LIFTS

A. Notify Engineer at least one week prior to construction of SELs. Engineer must be present on-site before Contractor may proceed with construction of SELs.

B. Install Boulder toe base.

C. Place a layer(s) of coir fabric over the 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 3 feet.

D. Place the soil and coir fiber block on the fabric and compact.

E. Seed the compacted soil where it will be exposed to sunlight.

F. 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.

G. SELs shall be completed until the bank height is reached as shown on the Contract Documents.

PART 4 MEASUREMENT AND PAYMENT

4.1 SOIL ENCAPSULATED LIFTS (SEL) WITHOUT COIR BLOCK

A. Method of Measurement: SELs with coir fiber block shall not be measured and shall be included with the primary stream stabilization structure line items.

B. Basis of Payment:
   1. No separate payment. Payment included with the primary stream stabilization structure line item shall represent full payment for 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 Engineer.
   2. 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.

4.2 SOIL ENCAPSULATED LIFTS (SEL) WITH COIR BLOCK

A. Method of Measurement: SELs with coir fiber block shall not be measured and shall be included with the primary stream stabilization structure line items.

B. Basis of Payment:
   1. No separate payment. Payment included with the primary stream stabilization structure line item shall represent full payment for 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 Engineer.
   2. 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.

END OF SECTION

ECTION 31 80 21
BOULDER TOE PROTECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. The Work shall consist of transporting and placing of rock for construction of boulder toe protection, including the furnishing and placing bedding and filter materials where specified, to the lines and grades as shown on the Drawings.

B. Related Requirements:

1. Section 31 32 19.16 – Geotextile Soil Stabilization

2. Section 31 20 01 – Site Grading

1.2 UNIT PRICE – MEASUREMENT AND PAYMENT

A. Boulder Toe Protection:

1. Basis of Measurement: Boulder Toe Protection shall be measured by the actual linear foot installed in place of the face of the structure or as otherwise directed by Engineer. No separate measurement of materials shall be made under this item for footer boulders/stones, crest stones, geotextile, backfill, rip rap and/or other incidental items.

2. 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, 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 Engineer.

1.3 REFERENCES

A. ASTM International:

1. ASTM D 75, Standard Practice for Sampling Aggregates

2. ASTM D 4992, Standard Practice for Evaluation of Rock to be Used for Erosion Control

3. ASTM D 5312, Standard Test Method for Evaluation of Durability of Rock for Erosion Control Under Freezing and Thawing Conditions

4. ASTM D 5313, Standard Test Method for Evaluation of Durability of Rock for Erosion Control Under Wetting and Drying Conditions

B. Federal Highway Administration (FHWA):

1. "Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects", FP-14 (FHWA Standard Specifications)

C. U.S. Army Corps of Engineers (USACE):

1. COE CRD-C 144, Standard Test Method for Resistance of Rock to Freezing and Thawing

1.4 MATERIAL SPECFICATIONS

A. Rock:

1. Rock fragments shall be dense, sound and free from cracks, seams, and other defects conductive to accelerated weathering. Rock size as specified on the Drawings.

2. The rock fragments shall be angular to subangular in shape. The least dimension of each individual rock fragment shall be not less than one-third the greatest dimension of the fragment.

3. Rock shall be selected and handled as necessary to meet the grading requirements as shown on the Drawings.

4. When filter or bedding aggregate is specified, it shall be selected to meet the grading requirements as shown on the Drawings.

5. The rock shall be obtained from a designated source or sources on-site as selected by the Engineer. The rock grading requirements shall be checked for compliance after the rock has been placed.

B. Bedding or Filter Material:

1. Bedding or filter material must conform to the requirements and meet the gradation stated on the Drawings.

C. Geotextile

1. Geotextile must meet the requirements as specified on the Drawings and Section 31 32 19.16. Geotextile must be supplied separate from and not affixed to the blocks or mattresses.

1.5 SUBMITTALS

A. Provide material submittals to the Engineer that verify that all materials to be incorporated into the Work conform to this specification and the Drawings, at least 14 days prior to delivery of materials.

B. Submit the following to the Engineer, for review and approval, prior to shipment of materials to the Site:

C. Proposed source(s) of rock-toe wall boulder stone.

D. Written documentation (including certification of gradation) signed by the material producers, indicating that the rock-toe wall boulder stone meet or exceed the specified requirements.

1.6 QUALITY ASSURANCE

A. Engineer will be responsible for construction quality assurance (QA). Engineer's QA measures will include on-site review of construction operations including, but not limited to, observation of placement of the revetment system.

1.7 PROJECT CONDITIONS

A. Work shall be performed in low-flow and/or dry conditions when possible. It is preferred that work occurs during the dry season (or otherwise upstream controls managed to minimize flow) and equipment access work areas using load mats, where necessary, to prevent excessive compaction of existing soils. Contractor shall monitor weather conditions and plan construction activities accordingly to avoid in-stream work during rain events and minimize exposure of disturbed soils to rainfall.

B. Work shall be performed in a manner that does not disturb existing utilities or other facilities not indicated to be removed or abandoned.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

A. Quality control measures are required during construction of the rock-toe wall as specified in the following paragraphs.

B. Check Surveys

C. Contractor's surveyor shall perform surveys to verify that rock-toe wall is placed to the lines, grades and thicknesses established for the Work.

D. The surveys shall be conducted in the presence of an authorized representative of the Engineer, unless this requirement is waived by the Engineer.

E. Use appropriate survey instruments and methods to provide survey accuracy acceptable to the Engineer.

3.2 PREPARATION OF SUBGRADE

A. Subgrade preparation includes excavation, earthfill, installation of rock-toe wall material,

and geotextile installation.

B. The subgrade trench surfaces on which the toe-rock is to be placed shall be cut or filled and graded to lines and grades shown on the Drawings.

C. The excavated material may be used as backfill unless otherwise specified.

D. Compact the subgrade to the density specified on the Drawings and Section 31 20 01. Earthfill necessary to prepare the subgrade must be of the type and class specified on the Drawings or Section 31 20 01. Complete the subgrade to within plus or minus a half inch of the grade shown on the Drawings.

E. Compact bedding or filter material to the density specified on the Drawings and Section 31 20 01. Grade the surface to within plus or minus a quarter inch of the grade shown on the Drawings.

F. Do not place rock, filter, bedding, or geotextiles until the subgrade preparation is completed and inspected by the Engineer.

G. Install geotextile on finish surface of the subgrade as indicated on the Drawings and as specified in Section 31 20 01 and 31 32 19.16.

3.3 ROCK-TOE PLACEMENT

A. After the toe trench has been excavated and the geotextile has been installed, the Engineer will inspect and approve the subgrade prior to the placement of rock. Geotextile fabric shall be placed within the trench with a minimum of one-half of the toe rock the bottom edge of the geotextile fabric. The geotextile fabric can be temporarily pinned to the stream channel bank to prevent the fabric from falling during the installation of the toe-rock.

B. Installation of geotextile shall be completed and coincide with the installation of the toe-rock and within the same day.

C. The rock shall be delivered and placed in a manner that will insure that the rock in place shall be reasonably homogeneous with the larger rocks uniformly distributed and firmly in contact one to another with the smaller rocks and spalls filling the voids behind the larger rocks. Some hand placement of rock may be required to achieve the final placement. Chinking utilizing smaller stone and cobble may be necessary to fill the voids between two adjacent toe-rock to prevent large voids in the face of the rock-toe wall. All voids grater than 4-inches shall be chinked from the stream bank side of the rock-toe-wall.

D. The individual toe-rock shall be placed and positioned in a best-fit manner to provide contact with adjacent rocks and in-stream rock structures and sufficiently anchor the geotextile fabric. The upstream toe-rock edge shall extend no greater than two inches past (towards the center of stream channel) the adjacent downstream toe-rock. The first row (footer) toe-rock shall extend no greater than two inches past (towards the center of the stream channel) the toe-rock paced directly above (header). To the maximum extent practicable the joints in the first row (footer) shall be offset from the upper row (header).

E. Placement of rock-toe wall shall be performed using equipment and methods that will not

cause damage to the geotextile, bedding material or disturbance to adjacent utility lines. The rock shall be constructed to the full course thickness in one operation and in such a manner as to avoid serious displacement of the underlying materials.

F. The most upstream and downstream ends of the rock toe-wall shall be sufficiently tied to the surrounding grade to create a smooth transition. The rock-toe wall shall be buried within the channel banks a minimum of three feet beyond the interface with the end of the exposed rock-toe wall and the adjacent stream channel.

G. When complete and prior to back-fill, the rock-toe wall shall be free standing and void of any sections they may topple over with minimal effort.

H. Upon receiving authorization from the Engineer, proceed with backfill of the rock-toe wall. Refer to Section 31 20 01. Ensure that the geotextile fabric is held tight to the back of the rock toe wall during backfill operations to ensure adequate coverage. Backfill shall continue until the level is flush with the top of the rock-toe wall. Once achieved the geotextile fabric shall be folded back towards the channel bank away from the stream channel a minimum of 24 inches and backfill measures shall continue until the desired slope is achieved as shown on the Drawings.

I. When the Drawings specify filter or bedding behind the rock, the material shall be spread uniformly to the depth specified. The surface of such layers shall be finished reasonable free of mounds, dips, or windrows.

J. No equipment shall be operated directly on the completed rock-toe wall.

K. Based on the results of surveying, areas of the rock-toe wall that are not constructed to the required thickness, lines and grades shown on the Drawings, within allowed tolerance specified above, shall be adjusted using methods approved by the Engineer. The limits of reworking will be determined by the Engineer.

L. Maintain the rock-toe wall until acceptance by the Engineer. Any material displaced by any cause shall be replaced to the required lines and grades without additional cost to the Project.

3.4 BEDDING GROUT (NOT USED)

END OF SECTION

SECTION 32 01 90
LANDSCAPE MAINTENANCE

PART 1 GENERAL

1.1 SUMMARY

A. Scope: Landscape maintenance shall start from date of acceptance of installed landscaping for a period of 12 months.

B. Section includes mowing, blowing, edging, pruning, fertilizing, pesticide application, deer spraying, and debris removal.

C. Related Sections:
1. Section 32 92 19 – Seeding, applies to this section for the application of seed, with additions and modifications herein.
2. Section 32 92 23 – Sodding, applies to this section for the installation of sod, with additions and modifications herein.
3. Section 32 93 00 – Plants, applies to this section for installation of trees, shrubs, groundcover, vines, bulbs, perennials, mulch, topdressing, staking, guying, and weed barrier requirements, with additions and modifications herein.

1.2 REFERENCES

A. The publications listed below form a part of these Specifications to the extent referenced. Publications are referred to in the text by the basic designation only.
1. American Standard for Nursery Stock.
2. Standards of Practice of the American Association of Nurserymen.
3. Standard of practice for all state associations of nurserymen.

1.3 DEFINITIONS

A. Pesticide: Fumigant, herbicide, insecticide, fungicide, and rodenticide.

B. Stand of Turf: 95 percent groundcover of the established species.

1.4 SUBMITTALS

A. All material shall be subject to approval and inspection by the Owner and Landscape Architect. Submit the following in accordance with 01 33 01 –Shop Drawings, Product Data and Samples.
1. Product Data:
a. Fertilizers: Include physical characteristics, application instructions, and recommendations.
b. Pesticides: Include physical characteristics, application instructions, and recommendations.
2. Test Reports:
a. Topsoil Composition Tests: Provide certified reports of inspections and laboratory tests prepared by an independent testing agency, including analysis and

interpretation of test results. Tests and analysis shall be performed by agricultural experiment station or any agricultural laboratory recommendations by the USDA.

3. Manufacturer's Instructions.
4. Landscape Maintenance Program: Contractor shall submit, within these guidelines and Specifications, a written and comprehensive landscape maintenance program. This program shall be submitted to the Owner and Landscape Architect for approval.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Pesticides:
   1. Delivery: Deliver to the Site in original containers with legible label and material safety data sheet indicating Environmental Protection Agency (EPA) registration number and manufacturer's registered uses.
   2. Storage: Do not store with other maintenance material. Store herbicides "downwind" relative to the airflow in the storage building, from other pesticides. Do not store with plants.

B. Fertilizer, Gypsum, Iron, and Mulch:
   1. Delivery: Deliver to the Site in original containers bearing manufacturer's chemical analysis, name, trade name or trademark, and indication of conformance to state and federal laws. Instead of containers, fertilizer, gypsum, and mulch may be furnished in build with a certificate indicating the above information.
   2. Storage: Store in dry locations and away from contaminants.
   3. Handling: Do not drop or dump fertilizers from vehicles. Bulk mulch should be located on a dry area with proper drainage in a temporary storage area. Location of temporary storage area shall be approved by Owner and Landscape Architect.

PART 2 PRODUCTS

2.1 PRODUCTS

A. See Paragraph 1.1, C., above: Related Sections, of this section.

PART 3 EXECUTION

3.1 TURF MAINTENANCE

A. Promotion of Turf Growth: Turf shall be maintained in a manner that promotes proper health, growth, rich natural green color, and neat uniform manicured appearance free of bare areas, ruts, holes, weeds, pests, dead vegetation, debris, and unwanted vegetation that present an unsightly appearance. Mow, remove excess clippings, eradicate weeds, water, fertilize, overseed, roll, aerate, topdress, and perform other operations necessary to promote turf growth.

B. Mowing: Turf shall be mowed at a uniform finished height. Maintain turfed areas to an average height of three inches. The height of turf is measured from the soil. Mowing of turf shall be performed in a manner that prevents scalping, rutting, bruising, unevenness, and rough cutting. Each successive mowing shall be at approximate 45-degree angles to the previous mowing

where practical. Prior to mowing, all rubbish, debris, trash, leaves, rocks, paper, and limbs or branches on a turf area shall be picked up and disposed. Adjacent paved areas shall be swept/blown clean.

C. Turf Edging: Perimeter of planter bed edges, sidewalks, driveways, curbs, and other paved surfaces shall be edged. Uniformly edge these areas to prevent encroachment and to provide a clear cut division line between planter beds, turf, and groundcover. Edging is to be accomplished in a manner that prevents scalping, rutting, bruising, unevenness, and rough cutting. Edging shall be performed on the same day that turf is mowed. Use of string line trimmers is permitted in "soft" areas such as an edge between turf grass and a planter bed. Care shall be exercised to avoid damages to any plants.

D. Turf Trimming: Trimming around trees, fences, poles, walls, irrigation valve boxes, and other similar objects is to be accomplished to match the height and appearance of surrounding mowed turf growth. Trimming shall be performed on the same day the turf is mowed. Care shall be exercised to avoid girdling trees located in turf areas. Any plants damaged during mowing or trimming will be replaced at the Contractor's expense.

E. Post-Fertilizer Application: See Sections 32 92 19 – Seeding.

F. Turf Watering: The Contractor shall perform irrigation in a manner that promotes the health, growth, color, and appearance of cultivated vegetation and that complies with all federal, state, and local water agencies and authorities' directives. The Contractor shall be responsible for preventing overwatering, water run-off, erosion, and ponding due to excessive quantities or rate of application. The Contractor shall abide by state, local, or other water conservation regulations or restrictions in force.

G. Overseeding of Turf Areas: See Sections 32 92 19 – Seeding.

H. Turf Clearance Area: Trees located in turf areas shall be maintained with a growth-free clearance of 18 inches from the tree trunk base. The use of mechanical weed whips to accomplish the turf growth-free bed area is prohibited.

I. Policing: The Contractor shall police all landscaped areas. Policing includes removal of leaves, branches, and limbs regardless of length or diameter, dead vegetation, paper, trash, cigarette butts, garbage, rocks, or other debris. Policing shall extend to both sides of fencing or walls. Collected debris shall be promptly removed and disposed of at an approved disposal Site.

J. Drainage System Maintenance: The Contractor shall remove all obstructions from surface and subsurface drain lines to allow water to flow unrestricted in swales, gutters, catch basins, storm drain curb inlets, and yard drains. Remove grates and clear debris in catch basins. Open drainage channels are to be maintained free of all debris and vegetation at all times. Edges of these channels shall be clear of any encroachments by vegetation.

K. Replanting: Replant in accordance with Sections 32 92 19 – Seeding and within specified planting dates for the areas which do not have a satisfactory stand of turf.

3.2 PLANT MAINTENANCE (TREES, SHRUBS, PLANT BEDS)

A. Watering: Provide sufficient water to maintain health and vigor of all plants. Check regularly and refill as necessary, water in gator bags.

B. Weeding: During the growing season, weed mulched areas and cultivate twice a month. Remove weeds from Site.

C. Spraying: Spray trees and shrubs to cover all twigs with an anti-desiccant between November 15th and 30th, at a time when the temperature is over 50 degrees F as approved by the Owner. Protect abutting cars, pedestrians, structures, Site improvements, and construction from damage or staining.

D. Pruning: Prune plants only as required to remove dead growth, to develop a natural shape, and/or to remove obstructions. Do not shear plants.

E. Fertilizing: See Section 32 93 00 – Plants.

3.3 PESTICIDE APPLICATION

A. See Section 32 93 00- Plants, Section 32 92 19 – Seeding.

B. Reporting Procedure: Apply pesticides in accordance with EPA label restrictions and recommendations and federal and state laws. The Contractor shall maintain a label book of pesticides used, including all appropriate Material Safety Data Sheets (MSDS), and have it readily available at all times for inspection. Pesticides shall always be stored in original containers having EPA-registered labels or in containers meeting EPA label requirements.

3.4 DEER SPRAYING

A. See Section 32 93 00 – Plants.

B. If browsing occurs repeatedly and if damage is not deterred by chemical spraying, notify Landscape Architect in order to implement an alternative method of control.

END OF SECTION

SECTION 32 91 19
LANDSCAPE GRADING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Final grade topsoil for finish landscaping.
2. Testing Topsoil.
3. Supplying Topsoil.
4. Scarifying substrate surface.
5. Placing and lightly compacting topsoil.
6. Removing excess topsoil from Site.

B. Related Sections:
1. Section 31 20 01 – Site Grading
2. Section 32 92 19 – Seeding.
3. Section 32 92 23 – Sodding.
4. Section 32 93 00 – Plants: Topsoil fill for trees, plants, and ground cover.

1.2 UNIT PRICE – MEASUREMENT AND PAYMENT

A. Topsoil:
1. Basis of Measurement: By Tons.
2. Basis of Payment: Includes loading, unloading, scarifying, spreading, plowing, harrowing, rolling, shaping, watering, maintaining, hauling, and priming.

1.3 REFERENCES (NOT USED)

A. South Carolina Department of Transportation (SCDOT) Standard Specifications, latest version, published by SCDOT.

1.4 SUBMITTALS

A. Section 01 33 01 – Shop Drawings, Product Data and Samples.

B. Test Results: Submit results of topsoil tests to determine soil amendments required.

C. Samples: Submit to testing laboratory for independent test, in air-tight containers, 10-pound Sample of topsoil.

D. Materials Source: Submit name and location of imported materials source.

1.5 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Furnish each topsoil material from single source throughout the Work.

C. Maintain one copy on-site.

PART 2 PRODUCTS

2.1 MATERIAL

A. Topsoil: Original surface soil typical of the area, which is capable of supporting native plant growth; free of large stones, roots, waste, debris, contamination or other unsuitable material, which may be detrimental to plant growth; pH value of 5.4 to 7.0.

B. Suitable material excavated from Site, amended per requirements of tests is acceptable.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting Work.

B. Verify building and trench backfilling have been inspected.

C. Verify substrate base has been contoured and compacted.

3.2 PREPARATION

A. Protect landscaping and other features remaining as final Work.

B. Protect existing structures, fences, sidewalks, utilities, paving, and curbs.

3.3 SUBSTRATE PREPARATION

A. Eliminate uneven areas and low spots.

B. Remove debris, roots, branches, stones, in excess of 1 inch in size. Remove contaminated subsoil.

C. Scarify surface to depth of 6 inches where topsoil is scheduled. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

3.4 PLACING TOPSOIL

A. Place topsoil in areas where seeding, sodding, and planting is required to thickness as scheduled. Place topsoil during dry weather.

B. Fine grade topsoil to eliminate rough or low areas. Maintain profiles and contour of subgrade.

C. Remove roots, weeds, rocks, and foreign material while spreading.

D. Manually spread topsoil close to plant material, buildings, and pavement to prevent damage.

E. Lightly compact placed topsoil.

F. Remove surplus subsoil and topsoil from Site.

G. Leave stockpile area and Site clean and raked, ready to receive landscaping.

3.5 TOLERANCES

A. Section 01 40 00 – Quality Requirements (Sports Field): Tolerances.

B. Top of Topsoil: Plus or minus 1/2 inch.

3.6 PROTECTION OF INSTALLED WORK

A. Section 01 77 01 – Contract Closeout: Requirements for protecting finished Work.

B. Prohibit construction traffic over topsoil. Scarify and regrade disturbed areas.

3.7 SCHEDULES

A. Compacted topsoil thicknesses:
   1. Seeded Areas: 6 inches.
   2. Sodded Areas: 4 inches.
   3. Shrub Beds: 18 inches.
   4. Flower Beds: 12 inches.
   5. Trees: As indicated on Drawings.

END OF SECTION

SECTION 32 92 19
SEEDING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Fertilizing.
2. Seeding.
3. Hydroseeding.
4. Mulching.
5. Maintenance.

B. Related Sections:
1. Section 32 91 19 – Landscape Grading: Preparation and placement of topsoil in preparation for the Work of this Section.
2. Section 32 92 23 – Sodding.
3. Section 32 93 00 – Plants.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Seeding:
1. Basis of Measurement: By square yard.
2. Basis of Payment: Includes fertilizing, seeding, watering, mowing, and maintenance to specified time limit.

1.3 REFERENCES

A. ASTM International: ASTM C602 - Standard Specification for Agricultural Liming Materials.

1.4 DEFINITIONS

A. Weeds: Vegetative species other than specified species to be established in given area.

1.5 SUBMITTALS

A. Section 01 33 01 Shop Drawings, Product Data and Samples.

B. Product Data: Submit data for seed mix, fertilizer, mulch, and other accessories.

C. Test Reports: Indicate topsoil nutrient and pH levels with recommended soil supplements and application rates.

D. Manufacturer’s Certificate: Certify Products meet or exceed specified requirements.

E. Invoices or proof of purchase to verify quantities specified.

F. Operation and Maintenance Data: Include maintenance instructions, cutting method, and maximum grass height; and, types, application frequency, and recommended coverage of fertilizer.

1.6 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Maintain copy of document on-site.

C. Fertilizer: Conform to State fertilizer law. Representative samples of the topsoil shall be submitted to an approved laboratory for determination for exact fertilizer requirements.

D. Quality and size: Comply with current edition of "Horticultural Standards" for number one nursery stock as adopted by American Association of Nurserymen.

1.7 QUALIFICATIONS

A. Seed Supplier: Company specializing in manufacturing Products specified in this Section with minimum 3 years documented experience.

B. Installer: Company specializing in performing Work of this Section with minimum 5 years documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver grass seed mixture in sealed containers showing percentage of seed mix, germination, inert matter and weeds; year of production; net weight; date of packaging; and location of packaging. Seed in damaged packaging is not acceptable.

B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.9 MAINTENANCE SERVICE

A. Section 01 77 01 – Contract Closeout: Requirements for maintenance service.

B. Maintain seeded areas for 12 months from Date of Substantial Completion.

PART 2 PRODUCTS

2.1 TOPSOIL MATERIALS

A. Conform to Section 32 91 19 – Landscape Grading. Original surface soil typical of the area, which is capable of supporting native plant growth; free of large stones, roots, waste, debris, contamination or other unsuitable material, which may be detrimental to plant growth; pH value of 5.4 to 7.0.

2.2 SEED MIXTURE

A. Furnish materials in accordance with South Carolina Department of Environmental Services (SCDES).

B. Seed Mixture and Rate:

Tall fescue	50 lbs/acre
Bermuda, Common	10 lbs/acre
Sericea lespedeza	75 lbs/acre
Ambro virgata or appalow lespedeza	75 lbs/acre

2.3 ACCESSORIES

A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.

B. Fertilizer: Commercial grade; recommended for grass; of proportion necessary to eliminate deficiencies of topsoil, as indicated in analysis. When test is not available, use 10-10-10 mixture of Nitrogen, phosphoric acid, and soluble potash.

C. Lime: ASTM C602, Class T or Class O agricultural limestone containing a minimum 80 percent calcium carbonate equivalent.

D. Water: Clean, fresh and free of substances or matter capable of inhibiting vigorous growth of grass.

E. Erosion Fabric: Jute matting, open weave.

F. Herbicide: As required to combat type of weeds encountered.

G. Stakes: Softwood lumber, chisel pointed.

H. String: Inorganic fiber.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 – Administrative Requirements: Verification of existing conditions before starting Work.

B. Verify prepared soil base and topsoil are ready to receive the Work of this Section.

3.2 FERTILIZING

A. Apply lime at application rate recommended by soil analysis. Work lime into top 6 inches of soil.

B. Apply fertilizer at application rate recommended by soil analysis.

C. Apply after smooth raking of topsoil and prior to roller compaction.

D. Do not apply fertilizer at same time or with same machine used to apply seed.

E. Mix fertilizer thoroughly into upper 2 inches of topsoil.

F. Lightly water soil to aid dissipation of fertilizer. Irrigate top level of soil uniformly.

3.3 SEEDING

A. Apply seed evenly in two intersecting directions at the rates shown above. Rake in lightly.

B. Do not seed areas in excess of that which can be mulched on same day.

C. Planting Season:
   1. Mountain Region:
      a. Tall Fescue: March 1 – April 15, August 1 – November 1.
      b. Bermuda, Common: N/A.
      c. Lespedeza: All Year
   2. Piedmont Region:
      a. Tall Fescue: August 15 – November 1.
      b. Bermuda, Common: October 1 – March 1, March 1 – July 1.
      c. Lespedeza: All Year

D. Do not sow immediately following rain, when ground is too dry, or when winds are over 12 mph.

E. Roll seeded area with roller not exceeding 112 lbs/linear foot.

F. Immediately following seeding and rolling, apply mulch to thickness of 1/8 inch. Maintain clear of shrubs and trees.

G. Apply water with fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.

3.4 HYDROSEEDING

A. Apply fertilizer, mulch and seeded slurry with hydraulic seeder at rate of 6 lbs per 1,000 square feet evenly in one pass.

B. Apply water with fine spray immediately after each area has been hydroseeded. Saturate to 4 inches of soil and maintain moisture levels two to four inches.

3.5 SEED PROTECTION

A. Identify seeded areas with stakes and string around area periphery. Set string height to 12 inches. Space stakes at 5 feet on center.

B. Cover seeded slopes where grade is greater than 3 H:1 V with erosion fabric. Roll fabric onto slopes without stretching or pulling.

C. Lay fabric smoothly on surface, bury top end of each section in 6 inch deep excavated topsoil trench. Overlap edges and ends of adjacent rolls minimum 12 inches. Backfill trench and rake smooth, level with adjacent soil.

D. Secure outside edges and overlaps at 36-inch intervals with stakes.

E. Lightly dress slopes with topsoil to ensure close contact between fabric and soil.

F. At sides of ditches, lay fabric laps in direction of water flow. Lap ends and edges minimum 6 inches.

3.6 MAINTENANCE

A. Mow grass at regular intervals to maintain at maximum height of 2-1/2 inches. Do not cut more than 1/3 of grass blade at each mowing. Perform first mowing when seedlings are 40 percent higher than desired height.

B. Neatly trim edges and hand clip where necessary.

C. Immediately remove clippings after mowing and trimming. Do not let clippings lay in clumps.

D. Water to prevent grass and soil from drying out.

E. Roll surface to remove minor depressions or irregularities.

F. Control growth of weeds. Apply herbicides. Remedy damage resulting from improper use of herbicides.

G. Immediately reseed areas showing bare spots.

H. Repair washouts or gullies.

I. Protect seeded areas with warning signs during maintenance period.

3.7 SCHEDULE

A. See construction drawings for schedules in different areas.

END OF SECTION

SECTION 32 93 00
PLANTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Trees, plants, and ground cover.
   2. Mulch.
   3. Fertilizer.
   4. Pruning.
   5. Maintenance.

B. Related Sections: Section 32 91 19 - Landscape Grading: Preparation and placement of topsoil in preparation for the Work of this Section.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Plants:
   1. Basis of Measurement: By each.
   2. Basis of Payment: Includes preparation of subsoil and topsoil, placing topsoil, planting, watering, and maintenance to specified time period.

1.3 REFERENCES

A. American National Standards Institute:
   1. ANSI A300 - Tree Care Operations - Tree, Shrub and Other Woody Plant Maintenance - Standard Practices.
   2. ANSI Z60.1 - Nursery Stock.

B. National Arborist Association: NAA - Certification documentation for tree pruning Qualifications.

1.4 DEFINITIONS

A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

B. Plants: Living trees, plants, and ground cover specified in this Section, and described in ANSI Z60.1.

1.5 SUBMITTALS

A. Section 03 33 01 Shop Drawings, Product Data and Sample.

B. Product Data: Submit list of plant material sources, data for fertilizer and other accessories.

C. Submit minimum 10-ounce Sample of mulch.

D. Planting Schedule: Indicate dates for each type of landscape Work during normal seasons for such Work in area of Site. Correlate with specified maintenance periods to provide maintenance from Date of Substantial Completion.

E. Operation and Maintenance Data: Include maintenance instructions recommending procedures to be established by Owner for maintenance of landscape Work during one full year.

1.6 CLOSEOUT SUBMITTALS

A. Section 01 77 01 Contract Closeout: Requirements for submittals.

B. Operation and Maintenance Data: Include pruning objectives, types, and methods; types, application frequency, and recommended coverage of fertilizer.

1.7 QUALITY ASSURANCE

A. Tree Pruning: ANSI A300 Pruning Standards for Woody Plants.

B. Conform to all State laws and to all requirements and regulations of the South Carolina Department of Agriculture.

C. Maintain one copy of document on-site.

1.8 QUALIFICATIONS

A. Nursery: Company specializing in growing and cultivating plants with 3 years documented experience.

B. Installer: Company specializing in installing and planting plants 5 years documented experience.

C. Tree Pruner: Company specializing in performing Work of this Section with person certified by National Arborist Association.

D. Maintenance Services: Performed by installer.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

B. Protect and maintain plant life until planted.

C. Deliver plant life materials immediately prior to placement. Keep plants moist.

D. Plant material damaged as a result of delivery, storage or handling will be rejected.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Do not install plant life when ambient temperatures may drop below 35 degrees F or rise above 90 degrees F.

B. Do not install plant life when wind velocity exceeds 30 mph.

1.11 WARRANTY

A. Furnish one year warranty for trees, plants, and ground cover.

B. Replacements: Plants of same size and species as specified, planted in the next growing season, with a new warranty commencing on date of replacement.

1.12 MAINTENANCE SERVICE

A. Section 01 77 01 Contract Closeout: Requirements for maintenance service.

B. Maintain plant life immediately after placement and continue for maintenance period after date of substantial completion.

C. Maintenance Time Period: Warranty period: 24 months.

D. Maintenance includes:
1. Cultivating and weeding plant beds and tree pits.
2. Applying herbicides for weed control. Remedying damage resulting from use of herbicides.
3. Remedying damage from use of insecticides.
4. Irrigating sufficient to saturate root system.
5. Pruning, including removal of dead or broken branches.
6. Disease control.
7. Maintaining wrapping, guys, turnbuckles, and stakes. Adjust turnbuckles to keep guy wires tight. Repair or replace accessories when required.
8. Replacing mulch.

1.13 TREES, PLANTS, AND GROUND COVER

A. Planting Stock:
1. Species: In accordance with Standardized Plant Names, official code of American Joint Committee on Horticulture Nomenclature.
2. Identification: Label individual plants or each bundle of plants when tied in bundles.
3. Plants: No. 1 Grade conforming to “American Standard for Nursery Stock” of American Association of Nurserymen (AAN); well-branched, vigorous, and balanced root and top growth; free from disease, injurious insects, mechanical wounds, broken branches, decay, and other defects.
4. Trees: Furnish with reasonably straight trunks, well balanced tops, and single leader.

5. Deciduous Plants: Furnish in dormant state, except those specified as container grown.

B. Trees, Plants, and Ground Cover: Species and size identifiable in plant schedule, grown in climatic conditions similar to those in locality of the Work.

1.14 SOIL MATERIALS

A. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained Site; free of subsoil, clay or impurities, plants, weeds and roots; minimum pH value of 5.4 and maximum 7.0; organic matter to exceed 1.5 percent, magnesium to exceed 100 units; phosphorus to exceed 150 units; potassium to exceed 120 units; soluble salts/conductivity not to exceed 900 ppm/0.9 mmhos/cm in soil.

B. Plant Soil Mix: Uniform mixture of 1 part peat and 3 parts topsoil by volume.

1.15 SOIL AMENDMENT MATERIALS

A. When soil tests indicate soil amendment, apply soil conditioners or fertilizers to amend soil to specified conditions.
1. Tree Fertilizer: Containing 50 percent of elements derived from organic sources; of proportion necessary to eliminate deficiencies of topsoil, as indicated in analysis or as shown on Drawings.

B. Peat Moss: Shredded, loose, sphagnum moss; free of lumps, roots, inorganic material or acidic materials; minimum of 85 percent organic material measured by oven dry weight, pH range of 4 to 5; moisture content of 30 percent.

C. Bone Meal: Raw, finely ground, commercial grade, minimum of 3 percent nitrogen and 20 percent phosphorous.

D. Lime: Ground limestone, dolomite type, minimum 95 percent carbonates.

E. Water: Clean, fresh, and free of substances or matter capable of inhibiting vigorous growth of plants.

1.16 MULCH MATERIALS

A. Mulching Material: Composted, shredded hardwood bark, dark brown in color.

1.17 ACCESSORIES

A. Wrapping Materials: Burlap.

B. Stakes: Softwood lumber, pointed end. Mild steel angle, galvanized, pointed end.

C. Cable, Wire, Eye Bolts and Turnbuckles: Non-corrosive, of sufficient strength to withstand wind pressure and resulting movement of plant life.

D. Plant Protectors: Rubber sleeves over cable to protect plant stems, trunks, and branches.

PART 2 EXECUTION

2.1 EXAMINATION

A. Verify existing conditions before starting Work.

B. Verify prepared subsoil and planters are ready to receive Work.

C. Saturate soil with water to test drainage.

2.2 PREPARATION OF SUBSOIL AND TOPSOIL

A. Conform to Section 32 91 19 – Landscape Grading.

2.3 PLANTING

A. Place plants for best appearance.

B. Set plants vertical.

C. Remove non-biodegradable root containers.

D. Set plants in pits or beds, partly filled with prepared plant mix, at minimum depth as indicated on Drawings under each plant. Loosen and remove burlap, ropes, and wires, from top half of root ball.

E. Place bare root plant materials so roots lay in natural position. Backfill soil mixture in 6-inch layers. Maintain plant life in vertical position.

F. Saturate soil with water when pit or bed is half full of topsoil and again when full.

2.4 PLANT RELOCATION AND REPLANTING

A. Relocate plants as indicated on Drawings or directed by Engineer.

B. Ball or pot removed plants when temporary relocation is required.

C. Replant plants in pits or beds, as described for new plants above.

2.5 PLANT SUPPORT

A. Brace plants vertically with plant protector wrapped guy wires and stakes to the following:

Tree Caliper	Tree Support Method
1 inch	1 stake with one tie
1 – 2 inches	2 stakes with two ties

Tree Caliper	Tree Support Method
2 – 4 inches	3 guy wires with eye bolts and turn buckles
Over 4 inches	4 guy wires with eye bolts and turn buckles

2.6 TREE PRUNING

A. When pruning trees is required, lightly prune trees in accordance with ANSI A300 Maintenance Pruning Type: Crown Cleaning.

2.7 FIELD QUALITY CONTROL

A. Section 01 40 00 – Quality Requirements (Sports Field): Field inspecting, testing, adjusting, and balancing.

B. Plants will be rejected when ball of earth surrounding roots has been disturbed or damaged prior to or during planting.

2.8 SCHEDULE

A. Plant Schedule: See schedule in Construction Drawings.

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 32 93 11
LIVE STAKING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:
1. Furnishing installing and maintaining live stakes and associated materials for vegetated bank stabilization where shown on the Drawings.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Plants:
1. Basis of Measurement: By each.
2. Basis of Payment: Includes preparation of subsoil and topsoil, placing topsoil, planting, watering, and maintenance to specified time period.

1.3 REFERENCES

A. American National Standards Institute:
1. ANSI A300 - Tree Care Operations - Tree, Shrub and Other Woody Plant Maintenance - Standard Practices.
2. ANSI Z60.1 - Nursery Stock.

B. National Arborist Association: NAA - Certification documentation for tree pruning Qualifications.

C. South Carolian Department of Transportation Standard Specifications

1.4 SUBMITTALS

A. Submit the following, for review and approval, prior to shipment of products to the Site:
1. Manufacturer's product data sheets and samples for specified coir fiber matting.
2. Certificates of Conformance or Compliance: Before delivery, notarized certificates attesting that live stakes to be furnished meet the requirements specified.
3. Digital photographs of all live stakes to be furnished.

B. Submit the following for review at time of shipment of materials to the Site:

1. Certification from live stakes supplier verifying type and purity.

C. Notify Engineer at least 60 hours in advance of anticipated delivery date of planting materials to be furnished by Contractor. Submit legible copy of invoice, showing kinds and sizes of materials included for each shipment.

D. At completion of the Work, submit a written Material and Installation Warranty as

specified in subsection 1.9.

1.5 QUALITY ASSURANCE

A. Proposed materials shall be approved by the Engineer as specified prior to delivery and use of the materials in the construction.

B. Perform Work in accordance with South Carolina Standard Specifications.

1.6 QUALIFICATIONS

A. Nursery: Company specializing in growing and cultivating plants with 3 years documented experience.

B. Installer: Company specializing in installing and planting plants 5 years documented experience.

C. Tree Pruner: Company specializing in performing Work of this Section with person certified by National Arborist Association.

D. Maintenance Services: Performed by installer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

B. Protect and maintain plant life until planted.

C. Deliver plant life materials immediately prior to placement. Keep plants moist.

D. Plant material damaged as a result of delivery, storage or handling will be rejected.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Do not install plant life when ambient temperatures may drop below 35 degrees F or rise above 90 degrees F.

B. Do not install plant life when wind velocity exceeds 30 mph.

1.9 MATERIAL AND INSTALLATION WARRANTY

A. Provide a written one-year Material and Installation Warranty for all plants purchased and installed by Contractor. Warranty period shall extend for two growing seasons after inspection and acceptance. Warranty shall include replacement of dead or unhealthy plants within the one-year warranty period in accordance with the requirements of subsection 1.10.

1.10 MAINTENANCE

A. Protect installed coir fiber matting and live stakes from damage. Install warning signs and protective barriers around live staking areas as required.

B. Begin maintenance immediately after planting. Live stakes shall be weeded, pruned, cultivated, and otherwise maintained and protected until acceptance. Settled live stakes shall be reset to proper grade and position, and all dead plant material removed. Correct defective work as soon as possible after it becomes apparent, weather and season permitting.

C. If a substantial number of plants are sickly or dead at time of final inspection, acceptance will not be granted. Contractor's responsibility for maintenance of plants shall be extended until replacements are made and established.

D. Remove and replace dead, defective and rejected live stakes as required before final acceptance. Replacements shall be live stakes of same kind and size as specified. Replacement of live stakes that may be necessary shall be at no additional cost to the Project.

E. Areas damaged during process of live stake planting work shall be repaired as specified in applicable specification sections.

F. Remove fences, signs, barriers, and other temporary protective devices upon final completion and acceptance of the Work.

1.11 SOIL MATERIALS

A. Soil planting mix to be placed in areas requiring native live staking shall meet the following requirements for topsoil as determined based on results of specified soil analysis. Topsoil shall be obtained from approved off-site sources. Topsoil shall be natural, friable, fertile, fine loamy soil possessing characteristics of representative topsoil in the vicinity that produces heavy growth. Topsoil shall have a pH range of 5.8 to 7.0, free from subsoil, objectionable weeds, litter, stiff clay, stones larger than one-inch in diameter, stumps, roots, trash, toxic substances, or any other material which may be harmful to plant growth or hinder planting operations.

1.12 SOIL AMENDMENT MATERIALS

A. When soil tests indicate soil amendment, apply soil conditioners or fertilizers to amend soil to specified conditions.
   1. Tree Fertilizer: Containing 50 percent of elements derived from organic sources; of proportion necessary to eliminate deficiencies of topsoil, as indicated in analysis or as shown on Drawings.

B. Peat Moss: Shredded, loose, sphagnum moss; free of lumps, roots, inorganic material or acidic materials; minimum of 85 percent organic material measured by oven dry weight, pH range of 4 to 5; moisture content of 30 percent.

C. Bone Meal: Raw, finely ground, commercial grade, minimum of 3 percent nitrogen and 20 percent phosphorous.

D. Lime: Ground limestone, dolomite type, minimum 95 percent carbonates.

E. Water: Clean, fresh, and free of substances or matter capable of inhibiting vigorous growth of plants.

1.13 LIVE STAKING

A. Live staking plant material shall consist of a native riparian stream bank live staking mix as indicated on the Drawings. Specified species may be substituted upon approval of the Engineer. All live staking plant material shall be harvested locally (within the same physiographic ecoregion and plant hardiness zone) or purchased from a local nursery, with approval from the Engineer. All live stake plant material shall be dormant at time of acquisition and planting.

PART 2 EXECUTION

2.1 SITE PREPARATION

A. Redirect runoff away from the areas where live stakes are to be installed.

B. Place soil planting mix in live staking areas to the thicknesses and limits indicated on the Drawings and as approved by the Engineer.

C. Grade surface of installation areas, shaping and smoothing the soil. Remove soil clods, rocks, roots, trash, and other obstructions so that the coir fiber matting will have direct contact with soil surface.

2.2 PLANTING

A. Coir fiber matting shall be installed where live staking plant material is to be planted as shown on the Drawings. Work includes providing all materials, excavating and backfilling, and placing and securing coir fiber matting.

B. Provide a smooth soil surface free from stones, clods, or debris that will prevent the contact of the matting with the soil. Place the matting immediately upon final grading. Take care to preserve the required line, grade, and cross-section of the area covered.

C. Unroll the matting and apply without stretching such that it will lie smoothly but loosely on the soil surface. Install as shown on the Drawings. Bury the top slope end of each piece of matting in a narrow trench at least six inches deep and tamp firmly. Where one roll of matting ends and a second roll begins, overlap the end of the upper roll over the buried end of the second roll so there is a six-inch overlap. Fold over and bury matting to the full depth of the trench; close and tamp firmly. Overlap matting at least six inches where two or more widths of matting are installed side by side.

D. Wooden stakes, may be used as anchors in accordance with the Drawings and as approved

by the Engineer. Place anchors across the matting at ends and junctions, at intervals shown on the Drawings. Place anchors along the outer edges and down the center of each strip of matting. Place anchors along all lapped edges. Refer to the Drawings for anchoring pattern. The Engineer may require adjustments in the trenching or anchoring requirements to fit individual site conditions.

E. During preparation of the live stakes, the basal ends shall be cleanly cut at an angle to facilitate easy insertion into the soil, while the tops shall be cut square or blunt for tamping. All limbs shall be removed from the sides of the live cutting prior to installation.

F. Live stakes shall be installed within 48 hours of cutting. Outside storage locations shall be continually shaded and protected from wind and direct sunlight. Live cut plant material shall remain moist at all times before planting.

G. Stakes shall be spaced according to the Drawings. Live stakes shall be installed according to the configuration presented on the Drawings.

H. Tamp live stakes perpendicularly into the finished bank slope with a dead blow hammer, with buds oriented in an upward direction. Stakes shall be tamped until approximately 3/4 of the stake length is in the ground. The area around each live stake shall be compacted by foot after the live stake has been installed.

I. A length of not more than ½ inch shall be cut cleanly off of the top of each live stake with loppers at an angle of approximately 15 degrees (from the horizontal) following installation. Any stakes that are split or damaged during installation shall be removed and replaced.

J. Seasonal Limitations: Live stakes shall be installed at any time during their dormant period when the ground is not frozen. Live stakes shall not be installed after dormancy is broken or after sprouting. Stakes that begin sprouting before planting will be rejected.

2.3 SCHEDULE

A. Plant Schedule: See schedule in Construction Drawings.

END OF SECTION

SECTION 33 05 13.10

MANHOLES, FRAMES AND COVERS

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all labor, materials, equipment, tools, and incidentals required to install manholes, frames, and covers as shown on the Drawings and specified herein.

B. This Section includes the following:

1. Modular precast concrete manhole sections with tongue-and-groove joints, frames, covers, anchorage, and accessories.

1.2 SYSTEM DESCRIPTION

A. Design Requirements

1. Design precast components to resist all loadings including but not limited to soil, surcharge, hydrostatic, vertical live load, wind, and seismic forces as applicable.

2. Uplift:

a. Design integral precast base sections to resist flotation, as required.
b. Use groundwater elevation shown on the Drawing for flotation calculation.

1) If groundwater elevations are not shown on the Drawings, use either 100-year flood elevation or top of manhole structure as basis for flotation calculation.
2) Provide factor of safety against flotation of 1.1 (minimum).

3. Precast Tops:

a. Design manholes to support AASHTO HS-20 loadings unless noted otherwise.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures.

B. Shop Drawings:

1. Fabrication and/or layout drawings including:

a. Detailed diagrams showing typical components and dimensions.
b. Itemize on separate schedule, sectional breakdown of each structure with all components and refer to drawing identification number or notation.
c. Indicate elevations for all piping entering each structure.

C. Product Data:

1. Manhole covers.
2. Component construction.
3. Features.
4. Configuration.
5. Standard Dimensions.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Product Supplier:

a. At least five (5) years' experience in design and construction of precast concrete utility structures.

2. Professional Engineer in charge of structural design:

a. Licensed to practice engineering in the state of South Carolina.

1.5 DELIVERY, STORAGE AND HANDLING

A. Do not ship materials until shop drawings are approved by Engineer in writing.

B. Properly handle and store all materials so that no damage or deterioration will occur during shipment or prolonged delay from the time of shipment until installation is completed and ready for operation.

C. Materials damaged during shipping, storage or installation will not be accepted.

PART 2 - PRODUCTS

2.1 Manufacturers:

A. CEMEX.

B. MST.

C. Tindall.

D. Or approved equal.

2.2 MATERIALS

A. Manhole Sections: Reinforced precast concrete in accordance with ASTM C478 with gaskets in accordance with ASTM C923.

B. Grout: As specified in Section 03 60 00.

C. Reinforcement, ASTM C478.

1. Reinforcing Bars:

a. ASTM A615, Grade 60, deformed.

2. Plain-Steel Welded Wire Fabric:

a. ASTM A185, fabricated from as-drawn steel wire into flat sheets.

D. Joint Material: Flexible Butyl Rubber Rope, Federal Specification SS-S-00210.

2.3 SANITARY SEWER MANHOLES

A. Integral Base.

B. Pipe Connection:

1. Flexible synthetic rubber boot, ASTM C923.

a. Cast-in or pressed-on types permitted.
b. Install cast-in type boot during pouring of manhole section.

C. Invert:

1. Provide channels in invert to direct flows from incoming to outgoing pipes.
2. Depth of channel equal to diameter of outgoing sewer as minimum.
3. Channels shall be “U” shaped in cross-section.
4. May be factory or field installed.
5. Install channels to preclude interference with operation of flexible boot or installation of sewer pipes.

D. Joints:

1. Tongue and groove.

E. Lid and Frame:

1. Cast Iron

a. ASTM A48.
b. Class 30B cast iron construction.
c. Machined flat bearing surface.
d. Removable lid, closed lid design.
e. Live load rating of H20.
f. Lid molded with identifying name. (i.e., sewer, electric, storm drain, etc.)

2. Composite

a. Fiber reinforced polymer.
b. Furnish unit with solid non-ventilated lid with pick bar, two paddle locks, and live load rating of H20
c. Ensure minimum clear opening of 24 inches diameter.
d. Furnish 2600 Series as manufactured by East Jordan Iron Works or approved equal.

F. Manhole Steps:

1. Polypropylene plastic encased Grade 60 steel reinforcement.
2. Provide steps conforming to ASTM C478 and OSHA standards.
3. Deform embedded portion of steps. Embed a minimum of 3 3/8 inches and anchor integrally into manhole or structure walls.
4. Provide maximum distance from surface to first rung not greater than 16 inches and maximum spacing on remaining rungs is 16 inches OC.
5. Minimum step width of 12 inches.
6. Grout in steps shall withstand 300 pounds live loading applied vertically and 200 pounds pull-out.

G. Adjusting Rings:

1. Precast concrete with sufficient steel reinforcement to prevent cracking in normal handling and use.
2. Mating Faces:

a. Smooth.
b. Parallel.
c. Free from cracks, chips, spalls, or casting irregularities interfering with watertight mating to structure top or casting.
d. Provide grooves in faces to contain extrudable preformed plastic gasket material when possible.

3. Thickness Range:

a. 2 inches minimum.
b. 8 inches maximum.

H. Gasket Material:

1. Flexible Boots:

a. ASTM C923.
b. Synthetic rubber resistant to sanitary sewage.
c. Cast-in or pressed-on type is acceptable.Mastic Joint Sealer:

a. Preformed butyl rubber material in flexible rope form.
b. Meet or exceed requirements of ASTM C990.
c. Manufacturers:

1) EZ-Stik by Press Seal Gasket Company.
2) Or approved equal.

2.4 CONFIGURATION

A. Shaft Construction:

1. Concentric with eccentric cone top section.
2. Lipped male/female dry joints.
3. Sleeved to receive pipe or conduit, as required.

B. Shape: Cylindrical for sanitary sewer manholes; square or rectangular for storm sewer or electrical manholes.

C. Clear Inside Dimensions: As indicated.

D. Design Depth: As indicated.

E. Clear Lid Opening: 24 inches diameter or as indicated.

F. Minimum Wall Thickness: 5 inches.

G. Minimum Base Thickness:

1. 12 inches for cast-in-place.
2. 6 inches for precast base.

H. Pipe and Conduit Entry: Provide openings as indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that items provided by other sections of Work are properly sized and located.

B. Verify that built-in items are in proper location and ready for roughing into Work.

C. Verify that excavation for manholes is correct.

3.2 PREPARATION

A. Coordinate placement of inlet and outlet pipe or duct sleeves required by other sections.

3.3 PLACING MANHOLE SECTIONS

A. Excavate, backfill, and compact in accordance with Section 31 23 16.13 – Trenching, Backfilling and Compaction.

B. Connect pipes using flexible boots in accordance with boot manufacturer's instructions.

1. Center pipe in boot.
2. Ensure watertight connections.

C. Place preformed butyl rubber sealant between manhole sections.

D. Place succeeding manhole sections so steps remain in true vertical alignment.

E. Place appropriate top section, cone, or flat top.

F. Place one adjusting ring (only) on manhole top. Select thickness of adjusting ring to bring completed manhole to elevation shown on drawing.

1. Place extruded preformed plastic gasket material between adjusting ring and manhole top, and between adjusting ring and manhole frame.
2. Avoid use of overly thick gasket material, which will likely produce after-settlement of manhole frame due to long-term cold flow of gasket materials.
3. For ungrooved adjusting ring, provide two rows of 1/2 inch by 1/2 inch or 3/4 inch by 3/4-inch gasket material.
4. For grooved adjusting rings, provide size gasket material recommended by ring manufacturer. Single or multiple grooved rings permitted. Where multiple grooved rings used, place gasket material in each groove.

G. Install manhole frame and cover.

H. Pour manhole invert.

1. Provide poured-in-place channels (if manholes not furnished with precast inverts) to direct flows from incoming pipes to outgoing pipes. Channels shall smoothly blend flows.
2. Make channel "U" shaped. Width and depth equal to size of outlet sewer.
3. To maintain flexibility of pipe connection boot, plug annular space between pipe and boot which falls in area where invert to be poured with extrudable preformed plastic gasket material. Plug shall prevent concrete from entering space between pipe and boot.
4. Invert channels may be placed after manhole base section (and connecting pipes) backfilled.

3.4 CONNECTION TO EXISTING MANHOLES

A. Core drill hole and install rubber boot for connections less than or equal to 24 inches in diameter.

B. For connection greater than 24 inches, drill pattern of holes no greater than outside diameter of new pipe plus 2 inches and break out material defined by pattern.

3.5 FIELD QUALITY CONTROL

A. Precast reinforced concrete bases, risers, tops, adjusting rings, and gray or ductile iron castings shall be subject to rejection for failure to conform to Specifications.

B. Individual sections of bases, risers, and tops may be rejected for the following.

1. Fractures or cracks passing through bell, except for single end crack not exceeding joint depth.
2. Excessive patching.
3. Grouted pipe openings.
4. Defects indicating imperfect proportioning, mixing, and molding.
5. Surface defects indicating honeycombed or open texture.
6. Damaged ends, where such damage prevents making satisfactory joint
7. Manhole steps out of line, not properly spaced or damaged
8. Continuous crack having surface width of 0.01 inch or more and extending for length of 12 inches or more, regardless of position.

C. Installation may be rejected for the following.

1. Use of individual components subject to rejection.
2. Failure to conform to installation requirements.
3. Visible infiltration.
4. Variation from true vertical alignment by more than 2 percent of depth.

3.6 TESTING MANHOLES

A. Vacuum test all manholes in accordance with ASTM C1244.

B. Attain a vacuum of 10 inches of Hg and measure the amount of time it takes for the pressure to drop to 9 inches of Hg. Time for pressure drop should be less than or equal to the minimum test time outlined in Table 1.

C. Test line sections in accordance with Section 01 73 32 – Testing Piping Systems.

Table 1
Vacuum Test Time

Specification time (sec) required for loss of vacuum from 10" Hg to 9" Hg for size and depth manhole indicated.

Depth (ft.)	Manhole Diameter (in.)								
	30	33	36	42	48	54	60	66	72
	Time (sec)								
8	11	12	14	17	20	23	26	29	33
10	14	15	18	21	25	29	33	36	41
12	17	18	21	25	30	35	39	43	49
14	20	21	25	30	35	41	46	51	57
16	22	24	29	34	40	46	52	58	67
18	25	27	32	38	45	52	59	65	73
20	28	30	35	42	50	53	65	72	81
22	31	33	39	46	55	64	72	79	89
24	33	36	42	51	59	64	78	87	97
26	36	39	46	55	64	75	85	94	105
28	39	42	49	59	69	81	91	101	113
30	42	45	53	63	74	87	98	108	121

END OF SECTION

SECTION 33 31 13.05

GRAVITY SEWER INSTALLATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Install the gravity sewer piping systems as shown on the Drawings and as specified herein.

B. Provide all materials of the sizes shown, new and of current manufacture and complete with all accessories.

1.2 RELATED WORK

A. Section 01 73 32 - Testing Piping Systems.

B. Section 31 23 16.13 - Trenching, Backfilling and Compacting.

C. Section 33 31 13.20 - Ductile Iron Pipe - Gravity Sewers.

D. Section 33 31 13.30 - Polyvinyl Chloride Gravity Sewer Pipe.

E. Section 33 31 13.18 – Centrifugally Cast Fiberglass Reinforced Polymer Mortar Gravity Sewer Pipe

1.3 SUBMITTALS

A. Submit pipe elevations as specified.

B. Submit reports on pressure and leakage tests for all pipelines.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Underground Piping:

1. Install underground piping so that gravity sewers are separated horizontally from existing or proposed waterlines by a minimum of ten (10) feet, measured from edge to edge of pipe.
2. For cases in which it is impractical to provide a ten (10) foot minimum separation, install the pipe in such a manner that the waterline is in a separate trench or on an undisturbed earth shelf located on one side of the sewer line and at an elevation which places the bottom of the waterline at least eighteen (18) inches above the top of the sewer line.
3. For cases in which sewer lines cross waterlines, install the pipe in such a manner that a minimum vertical distance of eighteen (18) inches is provided between the two pipes, whether above or below. Install the crossing pipe so that the joints in the sewer pipe shall be equidistant and as far as possible from the joints in the waterline. If a waterline crosses under a sewer line, provide adequate structural support for the sewer line to maintain line and grade.
4. If it is not possible to provide the minimum horizontal and vertical separations described above, the pipe must be installed in accordance with one of the following methods. All materials shall meet the requirements set forth in the Contract Documents.

    a. Construct the sewer line with ductile iron pipe (DIP) and pressure test to 150 psi to assure watertightness before backfilling.

    or

    b. Encase one pipe in a watertight casing pipe which extends ten (10) feet on each side of the crossing, measured perpendicular to the other pipe. The casing pipe shall be of materials approved by SCDES for use in waterline construction.
    c. In either case, the distance between the sewer line and water line and the joints of each shall be maximized. Allow enough distance to make repairs on either line without causing damage.

5. Begin the pipe-laying operation immediately after excavation is started and use every means to keep pipe laying closely behind the trenching. The Engineer may stop the trenching when, in his opinion, the trench is open too far in advance of the pipe laying operation.
6. Inspect each pipe for defects prior to lowering into the trench and swab or brush out to prevent dirt or foreign material from getting into the finished line. Keep water out of the pipe and the pipe closed by means of a plug whenever work is not in progress. Handle pipe carefully to avoid breakage.
7. Lay pipe in the best manner adapted to securing speed and good results and in accordance with the manufacturer's instructions and recommendations. Lay pipe to the line and grade indicated on the Drawings with spigot ends pointing downgrade. If the maximum trench width specified is exceeded for any reason other than by order of the Engineer, install, at no additional cost to the Owner, graded rock, pipe encasement or other bedding

as may be required by the Engineer to support the load of the backfill. Tamp backfill as specified.

8. Install pipe and fittings with factory-made joints in strict accordance with the pipe manufacturer's recommendations and the approval of the Engineer.
9. Provide gravel or graded stone for pipe bedding in accordance with ASTM D2321.
10. Make all joints watertight and immediately repair any leaks or defects discovered. Remove and replace all cracked, broken and damaged piping. Take up, clean and re-lay any pipe which has been disturbed after being laid. Remove superfluous material from inside the pipe by means of an approved follower or scraper after joints are made.
11. Use a laser instrument to ensure that the pipe is installed on the proper grade. On short runs of pipe, batter boards may be used in lieu of the laser. Where the laser is used, check the instrument setting for each 100 feet of pipe laid to verify that the grade and line agrees with the design grade and alignment. Where batter boards are used, set them over the ditch at intervals not to exceed 25 feet or closer if, in the opinion of the Engineer, conditions should warrant. Offsets may be used where approved by the Engineer. Ensure that no less than three batter boards are in position at all times on any one grade line, set to correct alignment and grade during the actual laying of pipe.
12. Dewater and clean all installed sewers prior to inspection.

B. Minimum Cover:

1. All sewers shall be constructed with a minimum of three (3) feet of cover. Where required to install sewer pipe with less than three (3) feet of cover, use ductile iron in accordance with Section 33 31 13.20 – Ductile Iron Pipe - Gravity Sewers. Install according to the sectional dimensions shown on the Drawings and to the length as shown, or as directed by the Engineer.

C. Connection to Manholes:

1. Manholes shall have a minimum inside diameter as noted on drawings. The minimum manhole access diameter shall be 22 inches.

3.2 INSPECTION, PRESSURE, AND LEAKAGE TESTS

A. Watertight Construction:

1. Build all gravity sewers, manholes and service connections practically watertight and adhere rigidly to the Specifications for material and workmanship. Give special care and attention to securing watertight construction.

B. Testing:

1. Low pressure air test all gravity sewer lines in accordance with Section 01 73 32 - Testing Piping Systems
2. For PVC gravity sewer perform air test in accordance with ASTM F 1417.
3. Include the expense of the above tests in the Unit Prices Bid per foot of sewer line under each respective size and depth category.

4. The Owner may inspect any section of the sewer lines by television equipment before the Project is completed.

C. Repair:

1. Uncover and repair all leaks evident at the surface, or evident by visual observation, regardless of the total leakage as indicated by the test.
2. Remove and replace all pipes and other materials found defective under the test at no additional expense to the Owner.
3. Repeat tests until leakage has been reduced below the allowable amount.

3.3 FLUSHING

A. Gravity Sewers:

1. After the pipelines have been installed and tested, thoroughly flush each run of pipe to remove all debris and foreign matter.
2. Perform flushing of Gravity Sewers by discharging sufficient quantities of clean flushing water into the upstream manhole on the new line. Pump the water from the downstream manhole and discharge to an approved disposal point. Do not allow silt or foreign material to be discharged into the operating wastewater system. Remove accumulated debris from manholes.

3.4 CROSS CONNECTION CONTROL

A. There shall be no physical connections between a public or private potable water supply system and a sewer or appurtenance thereto which may permit the passage of any sewage or polluted water into the potable supply. No potable water pipe shall pass through or come into contact with any part of a sewer manhole.

END OF SECTION

SECTION 33 31 13.20

DUCTILE IRON PIPE - GRAVITY SEWERS

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all labor, materials, equipment, tools, and incidentals required to install complete ductile iron piping for sewers as shown on the Drawings and specified herein.

B. This Section includes the following:

1. Install piping as shown on the Drawings. Engineer reserves the right to make such modifications in locations to avoid interference between pipes or for other reasons.

1.2 DEFINITIONS

A. Where the word “pipe” is used it shall refer to pipe, fittings and all related appurtenances unless otherwise shown or noted.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 00 – Submittal Procedures.

B. Product Data:

1. Manufacturer's specifications, catalog cuts and literature:

a. Pipe.
b. Inside linings.
c. Push-on joints.

C. Shop Drawings:

1. Manufacturer’s drawings and cut sheets showing all important details of construction, including dimensions.
2. Tabulated laying schedule showing station, invert elevation, pipe class, joint type, and fittings.

D. Manufacturer Certificate:

1. Prior to shipment of pipe, submit an affidavit of compliance from the manufacturer stating that the pipe, fittings, lining, and exterior coatings for this project have been manufactured and tested in accordance with ANSI, AWWA, and ASTM standards.

E. Test Reports:

1. Submit three (3) certified copies of the tests made by the manufacturer or by a reliable commercial laboratory to the Engineer with each shipment of pipe.
2. Test reports in accordance with Section 01 73 32 – Testing Piping Systems.

F. Submit anticipated production and delivery schedule.

1.4 QUALITY ASSURANCE

A. Furnish all similar items specified under this Section from a single manufacturer which is regularly engaged in the production of such materials. Proper functioning of the items as furnished is the sole responsibility of the manufacturer.

B. This section is intended to give a general description of the project requirements. It does not cover all details since they may vary in accordance with the exact requirements of the items provided. They are, however, intended to cover the furnishing, delivery, installation, field testing and field calibration of all materials and appurtenances as required. Furnish and install all additional appurtenances necessary for the proper operation of the proposed installation not specifically mentioned in these Specifications or shown on the Drawings at no additional cost to the Owner.

C. Hydrostatically test each length of ductile iron pipe supplied at the point of manufacture, in accordance with AWWA C151.

D. Mark all pipe and fittings with the following information:

1. Manufacture date.
2. Size.
3. Type, class or wall thickness.
4. Standard to which it is manufactured: AWWA, ASTM, etc.

1.5 DELIVERY, STORAGE AND HANDLING

A. Do not ship materials until shop drawings are approved by Engineer in writing.

B. Properly protect unpainted finished iron surfaces to prevent rust and corrosion.

C. Properly handle and store all materials so that no damage or deterioration will occur during shipment or prolonged delay from the time of shipment until installation is completed and ready for operation.

D. Materials damaged during shipping, storage or installation will not be accepted.

1.6 WARRANTY

A. Provide manufacturer's and Contractor's warranties for all materials supplied under this Section.

B. Provide materials that are free from defects in workmanship, design and materials. If any part of the materials should fail during the warranty period, replace it and restore the unit(s), at no additional expense to the Owner.

C. The Manufacturer's warranty period shall run concurrently with the Contractor's warranty period. No exception to this provision will be allowed.

D. Warranty Period: One (1) year, unless otherwise specified. Begin warranty period as outlined in the General Conditions and Division 1.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. American Cast Iron Pipe Company.

B. McWane Ductile.

C. United States Pipe and Foundry Company.

D. Or approved equal.

2.2 MATERIALS

A. Pipe:

1. Design in accordance with ANSI A21.50/AWWA C150, latest revision.
2. Manufacture in accordance with ANSI A21.51/AWWA C151, latest revision.
3. Minimum rated working pressure of 150 psi unless noted otherwise on the Drawings.
4. Determine earth loads from the standard tables in the manual based on the minimum working pressure and cover shown on the Drawings, trench type 5, and width d+2 feet.

B. Pipe Joints:

1. Provide ductile iron pipe with push-on joints conforming to ANSI A21.11/AWWA C111, latest revision.
2. Gauge pipe ends (spigot end, bell, and socket) for all pipe with suitable gauges at sufficiently frequent intervals to ensure compliance to the standard dimensions of ANSI/AWWA C151/A1.5, latest addition. Manufacturer must have a recommended ovality tolerance for 18 inches and larger size pipe. Each end of each pipe 18 inches

and larger shall be measured and approved by manufacturer's quality assurance inspector to meet such out of round tolerances. Provide manufacturer's certification that ovality has been measured and controlled in accordance with manufacturer's standard.

C. Fittings:

1. For ductile iron pipe, provide mechanical joint type below ground fittings manufactured of ductile iron and conforming to the requirements of ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53, latest revision. Provide fittings compatible with the pipe designed for 350 psi working pressure, unless noted otherwise on the Drawings. Provide linings and coatings of the fittings as specified for the pipe.
2. Restrain mechanical joint fittings using EBAA Iron, Inc., Megalug or approved equal. Use twist-off nuts to ensure proper actuation of mechanical joint restraining devices.

D. Lining:

1. Provide standard cement lining and bituminous seal coat for the interior of ductile iron pipe and fittings in accordance with ANSI A21.4, latest revision (AWWA C104).

2. Protecto 401 or approved equal lining where noted on drawings.

E. Exterior Finish:

1. Provide the standard bituminous coat on the exterior of pipe and fittings in accordance with AWWA C151.

F. Gaskets:

1. Provide gaskets made of synthetic rubber type and suitable for service at maximum operating temperature of 100 degrees Fahrenheit.

G. Joint Lubricants:

1. Provide joint lubrication as recommended by the manufacturer of the pipe and meeting the requirements of NSF 61.
2. Do not use lubricants which support microbiological growth, including vegetable shortening, for pipe joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine all materials for compliance with requirements for installation tolerances and other conditions affecting performance.

3.2 INSTALLATION

A. Install in strict accordance with manufacturer's written instructions and approved submittals.

B. Install in accordance with Section 33 31 13.05 – Gravity Sewer Installation.

C. When pipe laying is not in progress, temporarily close open ends of the pipe using a watertight plug to prevent contamination.

D. Maintain pipe interior dry and broom clean throughout construction period.

E. Perform field cuts in accordance with manufacturer's written instructions.

F. Repair cement lining damaged during construction in accordance with manufacturer's written instructions.

G. Seal and protect field cut ends in accordance with manufacturer's written instructions.

3.3 FIELD QUALITY CONTROL

A. Pressure Testing:

1. Pressure test piping in accordance with Section 01 73 32 – Testing Piping Systems.

END OF SECTION

SECTION 33 31 13.30

POLYVINYL CHLORIDE GRAVITY SEWER PIPE

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all labor, materials, equipment, tools, and incidentals to install PVC pipe and related accessories as shown on the Drawings and specified herein.

B. This Section includes the following:

1. Polyvinyl chloride pipe for underground gravity sewer.
2. Fittings.
3. Accessories.
4. Installation.

1.2 DEFINITIONS

A. Where the word “pipe” is used, it refers to pipe, fittings and all related appurtenances, unless otherwise shown or noted.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 00 – Submittal Procedures.

B. Product Data:

1. Manufacturer’s specifications, catalog cuts, and literature:

a. Pipe.
b. Mechanical and push-on joints.
c. Standard fittings.
d. Special fittings.

C. Shop Drawings:

1. Manufacturer’s drawings and cut sheets showing all important details of construction, including dimensions.

D. Manufacturers Certificate:

1. Prior to shipment of pipe, submit an affidavit of compliance from manufacturer stating that the pipe for this project has been manufactured and tested in accordance with ANSI, AWWA, and ASTM standards for use with sanitary sewer service. These shall include:

   a. Quick Burst Test, ASTM D1599.
   b. Drop Impact Test, ASTM D2444.

E. Test Reports:

1. Submit three (3) certified copies of the tests made by the manufacturer or by a reliable commercial laboratory to the Engineer with each shipment of pipe.
2. Submit results of pressure and leakage tests specified in Section 01 73 32 – Testing Piping Systems.

F. Submit anticipated production and delivery schedule.

1.4 DELIVERY AND STORAGE

A. Do not ship materials until shop drawings are approved by Engineer in writing.

B. Protect stored pipe units by dunnage in the same way they were protected while loaded on the truck. String out or store pipe flat to protect against bending.

C. Cover pipe with canvas or other opaque material to protect it from prolonged exposure to the sun, if pipe is to be stored outside longer than 15 days.

D. Materials damaged during shipment, storage, or installation will not be accepted.

1.5 WARRANTY

A. Provide manufacturer's and Contractor's warranties for all materials supplied under this Section.

B. Provide materials that are free from defects in workmanship, design, and materials. If any part of the materials should fail during the warranty period, replace and restore the unit(s) at no additional expense to the Owner.

C. Ensure that the Manufacturer's warranty period runs concurrently with the Contractor's warranty period. No exception to this provision will be allowed.

D. Warranty Period: One (1) year, unless otherwise specified. Begin warranty period as outlined in the General Conditions and Division 1.

PART 2 - PRODUCTS

2.1 PVC PIPE (4 inches through 15 inches)

A. Provide Type PSM-SDR-26 (PS115) PVC pipe conforming to the requirements of ASTM D3034 and ASTM D1784, latest revision, having elastomeric gasket bell ends and elastomeric seals. Provide pipe in standard 14/20-foot lengths. Provide pipe marked with SDR Type, ASTM Designation and size.

B. Provide PVC pipe with elastomeric gasket joints conforming to ASTM D3212 and ASTM F477. The gasketed joints shall be designed to prevent infiltration or exfiltration and meeting the test requirements specified. Use joint lubrication as furnished by the manufacturer. Install joints in accordance with the manufacturer's instructions and recommendations.

C. Where plastic pipe is connected to pipes of other materials, provide Hymax couplings or approved equal.

D. Fittings and Specials:
   1. Provide ductile iron short body fittings and specials conforming to the requirements of ANSI Standard A21.10, latest revision.
   2. Provide ductile iron fittings with mechanical or push-on type joints designed in accordance with ANSI Standard A21.11, latest revision. Provide bolts and nuts of ductile iron conforming to ANSI Standard A21.11. Provide fittings that are cement mortar lined and bituminous coated in accord with ANSI Standard A21.4, latest revision.
   3. Provide fittings that have the standard bituminous coating on the exterior.

2.2 GASKETS

A. Provide gaskets of synthetic rubber, suitable for service at maximum operating temperature of piping system as specified in piping system specification section. Do not use natural rubber or other material which will support microbiological growth for any gaskets, O-rings, and other products used for jointing pipes, setting meters or valves, or other appurtenances which will expose the material to the water.

2.3 JOINT LUBRICANTS

A. Provide joint lubrication as recommended by the manufacturer of the pipe.

B. Do not use lubricants that support microbiological growth, such as vegetable shortening, for slip-on joints.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install PVC pipe for gravity sewers in accordance with the requirements of ASTM D2321, Section 33 31 13.05 – Gravity Sewer Installation and the manufacturer's recommendations.

3.2 FIELD QUALITY CONTROL

A. Testing:
   1. Test piping in accordance with Section 01 73 32 – Testing Piping Systems.

END OF SECTION

SECTION 33 31 31

SANITARY SEWER FLOW CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all labor, materials, equipment, tools and incidentals to accomplish sanitary sewer flow control.

B. This Section describes sanitary sewer flow control including plugging or blocking of sewers and bypass pumping.

C. Provide pump systems capable of pumping raw sewage. Coordinate all sewer flow control with Engineer.

1.2 SUBMITTALS

A. Submit a Work plan to the Engineer for review, including written descriptions of the procedures and equipment used in the operations for the sewer flow control. Include with the plan schedules, locations, road crossing details, capacities of equipment and other incidentals necessary to provide sewer flow control. Bypass pumping operations shall not begin until this plan has been approved by the Engineer and Owner.

B. Include with the plan the following details:

1. Staging areas for pumps.
2. Locations for pumps.
3. Sewer plugging method and types of plugs, if required.
4. Method, number, size, material, and location of suction and discharge piping.
5. Pump manufacturers name, bypass pump sizes, number of each size on site, and motor power.
6. Downstream discharge plan and manhole location.
7. Methods for protecting discharge manholes or structures from erosion or damage.
8. Include information on spare pumps available on site as emergency stand-by.
9. Any temporary pipe supports and anchoring, if required.
10. Emergency contact information.

1.3 QUALITY ASSURANCE

A. Provide continuous sewer service to customers upstream of the bypass area while rehabilitation or construction operations are in progress by diverting flow around construction areas.

B. Provide primary and back-up pump systems, plugs, auxiliary power, and other related items to safely receive and convey the sewage past the Work area.

C. Provide data to ensure that the capacity of the pump is sufficient for bypass pumping the wastewater flows through the discharge piping to the receiving manhole downstream.

D. Take precautions to protect sewer lines from damage caused by improper use of pumping equipment. Repair any damage to sewer pipes at no additional cost to the Owner.

E. Protect private property, wetlands, water resources, and other natural resources.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Use centrifugal, fully automatic self-priming pumps that do not require foot-valves or vacuum pumps in priming. Pumps may be electric, gas or diesel powered with necessary start/stop controls. Pumps must be able to allow dry running for long periods of time.

B. Provide and maintain onsite, one stand-by pump of each size.

C. Discharge piping will be assembled in sections with locking joints to prevent accidental spillage. Provide temporary pipe supports and anchoring as required. Provide protection as necessary to safeguard discharge piping.

PART 3 - EXECUTION

3.1 PREPARATION

A. Locate bypass piping to minimize any disturbance to traffic operations, public or private property, and any existing utilities. If bypass piping crosses any street or driveway, the piping should be placed in a trench or covered with a built up ramp. Obtain approval of all discharge piping locations from Engineer.

B. During bypass pumping operations, protect all existing manholes, sewer lines and other system components from damage, including protection against surcharging of downstream sewer lines due to bypass flow volume. Protect public and private property from flooding.

3.2 PUMPING OPERATIONS

A. Provide connections to existing sewer at manholes directly upstream of Work to be performed, as approved by Engineer.

B. Use plugging or blocking of sewer flows only if necessary, as approved by Engineer. When plugging is no longer required, remove plugs and slowly allow sewer flow to return to normal without surcharging.

3.3 FIELD QUALITY CONTROL

A. Perform leakage testing of the discharge piping using clean water prior to actual operation.

B. Ensure that all components of pumping system are working at all times.

C. Ensure the bypass pumping system is properly maintained and a trained operator is on site at all times when pumps are operating.

D. During flow control bypass pumping, do not allow sewage to leak, dump or spill into or onto areas outside of existing sanitary sewage systems.

E. In the event of an accidental spill or overflow, immediately stop discharge and take action to clean up and disinfect spill. Promptly notify Engineer and Owner so required reporting can be made to the South Carolina Department Environmental Services.

F. Maintain inventory of spare parts for pumps and piping onsite at all times.

G. When flow diversion operations are complete, drain sewage within piping into sanitary sewers prior to disassembly.

END OF SECTION