Solid Waste Department

INVITATION FOR BID

Convenience Center & Recycling Facility Construction (Phase 1)
Assembly Court Solid Waste Convenience Center

Date of Issue: 2 October 2024

Questions Due Date: 9 October 2024

Bid Due Date: 16 October 2024

Direct all inquiries concerning this IFB to:

Johnny Scott

Environmental Services Project Manager

Email: jscott@cumberlandcountync.gov

Phone: 910-321-6929

Bids shall be submitted in accordance with the terms and conditions of this IFB and any addenda issued hereto.

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1.0 PURPOSE AND BACKGROUND

Cumberland County Solid Waste Management intends to construct a 3.81-acre solid waste convenience center and recycling facility at 575 Assembly Court, Fayetteville, NC 28306. This facility shall be constructed in two (2) phases.

Phase 1 of construction includes installation of all erosion and sedimentation control measures, entrance and driveway construction and paving, parking area construction and aggregate surfacing, chain link fence installation, vegetative buffer installation, and water and sewer lateral taps and installation.

2.0 BID INSTRUCTIONS & REQUIREMENTS

2.1 INVITATION FOR BID DOCUMENT

The IFB is comprised of the base IFB document, any attachments, and any addenda released before contract award. All attachments and addenda released for this IFB in advance of any contract award are incorporated herein by reference. By submitting a bid, the vendor agrees to meet all stated requirements in this section as well as any other specifications, requirements and terms and conditions stated in this IFB. If a vendor is unclear about a requirement or specification or believes a change to a requirement would allow for the County to receive a better bid, the vendor is urged and cautioned to submit these items in the form of a question during the question and answer period in accordance with Section 2.3.

Vendors shall populate all attachments of this IFB that require the vendor to provide information and include an authorized signature where requested. Failure to include required documents and/or signatures, where requested, will result in rejection of submitted bids.

2.2 BID SUBMITTAL

Bids, subject to the conditions made a part hereof and the receipt requirements described below, shall be received at the address indicated in the table below.

Mailing address for delivery of bid via US Postal Service	**Office address of delivery by any other method (special delivery, overnight, or any other carrier)**
BID TITLE: *Assembly Court Solid Waste Convenience Center & Recycling Facility Construction (Phase 1)* *Cumberland County Solid Waste* *Attn: Johnny Scott* *Email: jscott@cumberlandcountync.gov*	*BID TITLE:* *Assembly Court Solid Waste Convenience Center & Recycling Facility Construction (Phase 1)* *Cumberland County Solid Waste* *Attn: Johnny Scott* *698 Ann Street* *Fayetteville, NC 28301*

IMPORTANT NOTE: All bids shall be physically delivered to the office address listed above or if submitting electronically received by the email address listed above on or before the bid deadline regardless of the method of delivery. All risk of late arrival due to unanticipated delay—whether delivered by email, hand, U.S. Postal Service, courier or other delivery service is entirely on the vendor. It is the sole responsibility of the vendor to have the bid to the County department specified by the specified time and date of opening. Any bid received after the bid submission

deadline will be rejected. Public bid opening will be held at TIME, as per the clock in the Solid Waste Administration Department on **16 October 2024, 2:00 PM.**

All bid addendums and/or corrections will be posted on the Cumberland County Vendor Self Service site https://ccmunis.co.cumberland.nc.us/vss/Vendors/VBids/Default.aspx . Vendors who submit a notice of intent to bid to **jscott@cumberlandcountync.gov** will receive addendums by email.

2.3 BID QUESTIONS

Written questions shall be emailed to jscott@cumberlandcountync.gov by **9 October 2024, 2:00 PM**. Vendors should enter "Bid: Assembly Court Solid Waste Convenience Center & Recycling Facility Construction (Phase 1): Questions" as the subject for the email. Questions will not be answered by phone. Question submittals should include a reference to the applicable IFB section.

Questions received prior to the submission deadline date, the County's response, and any additional terms deemed necessary by the County will be posted in the form of an addendum to the Cumberland County Vendor Self Service Site, **https://ccmunis.co.cumberland.nc.us/vss/Vendors/default.aspx** and shall become an Addendum to this IFB. **Vendors who submit an intent to bid will receive addendums by email**. Vendors shall rely *only* on written material contained in an Addendum to this IFB. **Vendors should not contact any other County employees, besides those listed above, during the bid process. Vendors who contact any other County employees may be disqualified.**

Any questions considered minute in nature or that point to an error in the IFB or that the County determines will produce information required in order for all vendors to submit a responsible bid, may be answered at the County's discretion after the specified date and time. Such questions that are received after the deadline are not guaranteed to be answered and if the questions qualify as "minute in nature" shall be determined at the sole discretion of the County.

2.4 IFB TERMS & CONDITIONS

It shall be the vendor's responsibility to read the instructions, the County's terms and conditions, all relevant exhibits and attachments, and any other components made a part of this IFB, and comply with all requirements and specifications herein. Vendors also are responsible for obtaining and complying with all Addenda and other changes that may be issued in connection with this IFB.

Questions, issues, or exceptions regarding any term, condition, or other component within this IFB, must be submitted as questions in accordance with the instructions in Section 2.3 BID QUESTIONS. Vendor's bid shall constitute a firm offer.

If a vendor desires modification of the terms and conditions of this solicitation, it is urged and cautioned to inquire during the question period, in accordance with the instructions in this IFB, about whether specific language proposed as a modification is acceptable to or will be considered by the County. It is the County's sole discretion to accept or reject requested modifications and/or exceptions.

3.0 NOTICES TO VENDOR

3.1 PROHIBITED COMMUNICATIONS AND CONFIDENTIALITY

PROHIBITED COMMUNICATION: Each vendor submitting a bid, including its representatives, subcontractors, and suppliers, is prohibited from having any communication with any employees or members of the board of commissioners

of the County except those employees of the County's Finance Department as designated in this IFB. A vendor who does not comply with this provision may be disqualified from award of a contract.

!IMPORTANT INFORMATION! CONFIDENTIAL INFORMATION: The bid must not contain any information marked as "confidential" or as a "trade secret" or in any other manner as to indicate that it is information protected by the Trade Secrets Protection Act (the "Act") as set out in Article 24 of Chapter 66 of the North Carolina General Statutes**, unless the vendor has noticed the County Finance Department of its intent to designate any information in the bid as such and received permission from the County Finance Department to do so in writing.** Vendor's notice to the County Finance Department must be in writing and must describe the information for which confidentiality is requested and explain how the information is a "trade secret" as defined in G.S. § 66-152(3). If the County Finance Department determines the information for which confidentiality is requested is a "trade secret" covered by the Act, it will notify the vendor how to mark the information in the bid and will identify the measures that County will take to protect the confidentiality of the information. Vendor's submission of a bid after receipt of this notice from the County Finance Department shall be deemed to be acceptance of the County Finance Department's statement of how it will maintain confidentiality. If the County Finance Department determines the information for which confidentiality is requested is not a "trade secret" covered by the Act, it will notify vendor of that determination. Any bid marked with any information as "confidential" or as a "trade secret" or in any other manner as to indicate that it is information protected by the Act in violation of this section shall be regarded as not responsive to the invitation for bid and shall not be considered.

3.1.1. QUALIFICATIONS OF BIDDERS

Bidders must be licensed contractors in the State of North Carolina at the time proposals are submitted.

General contractors are notified that Chapter 87, Article 1, General Status of North Carolina, will be observed in receiving and awarding general contracts. General contractors submitting bids on this project must have license classification for Unlimited Building License Classifications.

NOTE—SINGLE PRIME CONTRACTS: Under GS 87-1, a contractor that superintends or manages construction of any building, highway, public utility, grading, structure or improvement shall be deemed a "general contractor" and shall be so licensed. Therefore, a single prime project that involves other trades will require the single prime contractor to hold a proper General Contractors license. EXCEPT: On public buildings being bid single prime, where total value of general construction does not exceed 25% of the total construction value, contractors under GS87- Arts 2 and 4 (Plumbing, Mechanical & Electrical) may bid and contract directly with the Owner as a single prime CONTRACTOR and may subcontract to other properly licensed trades. GS87-1.1- Rules .0210.

3.1.2 To demonstrate qualifications to perform the Work, each Bidder must be prepared to submit, following receipt of written request by COUNTY, information including, but not limited to, financial data, previous experience, including additional references and evidence of authority to conduct business in the jurisdiction where the Project is located. This information must be received by COUNTY within 10 days of Bidder receiving the written request. Submittals requested pursuant to this paragraph are in addition to those required elsewhere.

3.2 BID COMPLIANCE

It is in the best interest of vendors to submit bids that are clear, concise, and easily understood. Bids should provide information essential for a straightforward and concise description of vendor capabilities to satisfy the requirements of the IFB specifications.

Vendor may include any optional data not provided for elsewhere and considered to be pertinent to this bid as an addendum.

Vendors are urged and cautioned to read the IFB completely through as noncompliance with requirements may result in bid rejection. Section 4.0 requirements and request for information must be in the same order with the same titles as listed in Section 4.0. Vendor bids should be easy to follow and all sections should be easily identified.

The specifications included in this package describe the services that the County feels are necessary to meet the performance requirements of this IFB, and shall be considered the minimum standards expected of the Bidder. However, the specifications are not intended to exclude potential bidders.

If the vendor is unable to meet any of the specifications as outlined therein, vendors are advised to submit questions and concerns regarding the specifications during the question and answer period described in Section 2.3.

If the vendor does not indicate or submit questions or concerns regarding the specifications, the County shall assume it is able to fully comply with these specifications. The County shall be the sole and final judge of compliance with all specifications.

The County further reserves the right to determine the acceptability or unacceptability of any and all alternatives or deviations.

3.3 BID EVALUATION PROCESS

The County shall review all responses to this IFB to confirm that they meet the specifications and requirements of the IFB. The County shall not be required to hold interviews; however, depending on the number of responses and the information contained in the responses, the County may decide to conduct interviews with firms of its choice. The County reserves the right to request clarification of information submitted. Vendors may be required to provide a demonstration upon request.

The County reserves the right to reject any and all bids.

3.4 METHOD OF AWARD

IFB will be awarded based on lowest, responsive, responsible bidder method of award.

The County reserves the right to make separate awards to different vendors, to not award, or to cancel this IFB in its entirety without awarding a contract, if it is considered to be most advantageous to the County to do so.

4.0 SCOPE OF WORK & VENDOR'S BID CONTENT REQUIREMENTS

4.1 SCOPE OF WORK

Cumberland County Solid Waste Management intends to construct a 3.81-acre solid waste convenience center and recycling facility at 575 Assembly Court, Fayetteville, NC 28306. This facility shall be constructed in two (2) phases.

Phase 1 of construction includes installation of all erosion and sedimentation control measures, entrance and driveway construction and paving, parking area construction and aggregate surfacing, chain link fence installation, vegetative buffer installation, and water and sewer lateral taps and installation.

4.2 VENDOR'S BID REQUIREMENTS

The vendor's bid must include the required information below. Bids shall be tabbed, using the titles identified in this section, to identify the required information. Tabs must be in the same order as listed below. Failure to submit this information may render its bid non-responsive. **Vendors are urged and cautioned to read the notices in Section 3.1. Noncompliance with the confidentiality requirements will result in a bid being considered nonresponsive.**

A. SPECIFICATIONS

See Drawings and Specifications by Smith Gardner, Inc. for the Assembly Court Solid Waste Convenience Center & Recycling Facility Construction (Phase 1).

B. COST

Cost must be submitted using ***Attachment C: Bid Cost***. Cost shall be all inclusive. **Exclude all sales tax from your bid**. If discount is available for prompt payment, identify terms so it may be considered in analyzing bid.

C. REFERENCES

Vendors shall provide at least three (3) references for which your company has provided services of similar size and scope to that proposed herein.

COMPANY NAME	CONTACT NAME	TELEPHONE NUMBER	EMAIL ADDRESS

5.0 CONTRACT TERMS AND CONDITIONS

5.1 IRAN DIVESTMENT ACT

As provided in N.C.G.S. 147-86.55-69, any person identified as engaging in investment activities in Iran, determined by appearing on the Final Divestment List created by the North Carolina State Treasurer pursuant to G.S. 147-86.57(6) c, is ineligible to contract with the County of North Carolina or any political subdivision of the COUNTY.

5.2 E-VERIFY

CONTRACTOR shall comply with the requirements of Article 2 of Chapter 64 of the General Statutes. Further, if Contractor utilizes a subcontractor, CONTRACTOR shall require the subcontractor to comply with the requirements of Article 2 of Chapter 64 of the General Statutes.

5.3 DIVESTMENT FROM COMPANIES THAT BOYCOTT ISRAEL

The CONTRACTOR certifies that it has not been designated by the North Carolina State Treasurer as a company engaged in the boycott of Israel pursuant to N.C.G.S. 147-86.81. It is the responsibility of each CONTRACTOR to monitor compliance with this restriction. Contracts valued at less than $1,000.00 are exempt from this restriction.

5.4 CONTRACT CHANGES

Contract changes, if any, over the life of the contract shall be implemented by contract amendments agreed to in writing by the COUNTY and CONTRACTOR.

5.5 CONTRACT TERM

The Contract shall have an initial term of 120 days, beginning on the date of contract award (the “Effective Date”). The CONTRACTOR shall begin work under the Contract within 10 business days of the Effective Date.

Vendor shall hold pricing for 180 days after bid opening.

5.6 PRICING

Bid price shall constitute the total cost for complete performance in accordance with the requirements and specifications herein, including all applicable charges handling, administrative and other similar fees. CONTRACTOR shall not invoice for any amounts not specifically allowed for in this IFB.

5.7 INVOICES

a) Invoices must be submitted to the following address: Cumberland County Solid Waste Management

Attn: Amanda Cummings

698 Ann Street, Fayetteville, NC 28301

b) Any applicable taxes shall be invoiced as a separate item.

5.8 PAYMENT TERMS AND PERFORMANCE BONDS

The CONTRACTOR will be paid net thirty (30) calendar days after the CONTRACTOR'S invoice is approved by the COUNTY.

The bidder to whom the contract is awarded will be required to execute the Agreement and obtain the performance Bond and Payment Bond, each in the sum of full amount of the Contract Price.

The Bonds must be duly executed and acknowledged by the Bidder as principal and by a corporate surety company qualified to do business under the laws of the State of North Carolina and satisfactory to the Owner as surety, for the faithful performance of the Contract and payment for labor and materials. The premiums for such Bonds shall be paid by the Contractor. Each Bond must be valid for one (1) year beyond the date of final acceptance of the project by the County.

5.9 APPROPRIATION OF FUNDS

The parties intend that contractual performances by either party beyond the first fiscal year after the execution of this agreement be contingent upon the continued funding and appropriation by the County Board of Commissioners. Therefore, the parties agree that services provided and payment due under this agreement will be provided upon a year-to- year basis contingent upon continued funding and appropriation. The fiscal year for Cumberland County begins on July 1 and ends June 30th.

5.10 FINANCIAL STABILITY

CONTRACTOR warrants that it has the financial capacity to perform and to continue perform its obligations under the contract; that CONTRACTOR has no constructive or actual knowledge of an actual or potential legal proceeding being brought against CONTRACTOR that could materially adversely affect performance of this Contract; and that entering into this Contract is not prohibited by any contract, or order by any court of competent jurisdiction.

5.11 INSURANCE:

Providing and maintaining adequate insurance coverage is a material obligation of the CONTRACTOR and is of the essence of this Contract. All such insurance shall meet all laws of the County of North Carolina. Such insurance coverage shall be obtained from companies that are authorized to provide such coverage and that are authorized by the Commissioner of Insurance to do business in North Carolina. The CONTRACTOR shall at all times comply with the terms of such insurance policies, and all requirements of the insurer under any such insurance policies, except as they may conflict with existing North Carolina laws or this Contract. The limits of coverage under each insurance policy

maintained by the CONTRACTOR shall not be interpreted as limiting the CONTRACTOR'S liability and obligations under the Contract. During the term of the Contract, the CONTRACTOR at its sole cost and expense shall provide commercial insurance of such type and with such terms and limits as may be reasonably associated with the Contract.

5.12 GENERAL INDEMNITY

The CONTRACTOR shall hold and save the COUNTY, its officers, agents, and employees, harmless from liability of any kind, including all claims and losses accruing or resulting to any other person, firm, or corporation furnishing or supplying work, services, materials, or supplies in connection with the performance of this Contract, and from any and all claims and losses accruing or resulting to any person, firm, or corporation that may be injured or damaged by the CONTRACTOR in the performance of this Contract and that are attributable to the negligence or intentionally tortious acts of the CONTRACTOR provided that the CONTRACTOR is notified in writing within 30 days that the COUNTY has knowledge of such claims. The CONTRACTOR represents and warrants that it shall make no claim of any kind or nature against the COUNTY's agents who are involved in the delivery or processing of CONTRACTOR goods or services to the COUNTY. The representation and warranty in the preceding sentence shall survive the termination or expiration of this Contract.

5.13 ENTIRE CONTRACT

The contract formally entered into by the parties after the vendor is selected constitutes the entire understanding of the parties. In the event of a conflict between the COUNTY'S contract terms and the CONTRACTOR'S contract terms, the COUNTY'S terms shall be the overriding determining factor.

5.14 CONTRACT CANCELLATION

The COUNTY may terminate this contract at any time by providing 30 days' notice in writing from the COUNTY to the CONTRACTOR. If the contract is terminated by the COUNTY as provided in this section, the COUNTY shall pay for services satisfactorily completed by the CONTRACTOR, less any payment or compensation previously made.

5.15 LAWS AND ORDINANCES

The contract will be governed by North Carolina law.

5.16 COMPLIANCE WITH LAWS

CONTRACTOR shall comply with all laws, ordinances, codes, rules, regulations, and licensing requirements that are applicable to the conduct of its business and its performance in accordance with this contract, including those of federal, state, and local agencies having jurisdiction and/or authority.

5.17 CONTRACTOR REPRESENTATIONS

CONTRACTOR warrants that qualified personnel shall provide services under this Contract in a professional manner. "Professional manner" means that the personnel performing the services will possess the skill and competence consistent with the prevailing business standards in the industry. CONTRACTOR agrees that it will not enter any agreement with a third party that may abridge any rights of the COUNTY under this Contract.

If any services, deliverables, functions, or responsibilities not specifically described in this Contract are required for CONTRACTOR'S proper performance, provision and delivery of the service and deliverables under this Contract, or are an inherent part of or necessary sub-task included within such service, they will be deemed to be implied by and included within the scope of the contract to the same extent and in the same manner as if specifically described in the

contract. Unless otherwise expressly provided herein, CONTRACTOR will furnish all of its own necessary management, supervision, labor, facilities, furniture, computer and telecommunications equipment, software, supplies and materials necessary for the CONTRACTOR to provide and deliver the Services and Deliverables.

CONTRACTOR certifies that it has not previously or currently:

a. Had any criminal felony conviction, or conviction of any crime involving moral turpitude, including, but not limited to fraud, misappropriation or deception, of CONTRACTOR, its officers or directors, or any of its employees or other personnel to provide services on this project, of which CONTRACTOR has knowledge.

b. Had any regulatory sanctions levied against CONTRACTOR or any of its officers, directors or its professional employees expected to provide services on this project by any governmental regulatory agencies within the past three years. As used herein, the term "regulatory sanctions" includes the revocation or suspension of any license or certification, the levying of any monetary penalties or fines, and the issuance of any written warnings.

c. Had any civil judgments against CONTRACTOR during the three (3) years preceding submission of its bid herein.

Any personnel or agent of the CONTRACTOR performing services under any contract arising from this IFB may be required to undergo a background check at the expense of the CONTRACTOR, if so requested by the COUNTY.

The COUNTY may, in its sole discretion, terminate the services of any person providing services under this Contract. Upon such termination, the COUNTY may request acceptable substitute personnel or terminate the contract services provided by such personnel.

Attachments to this IFB begin on the next page.

ATTACHMENT A: INSTRUCTIONS TO VENDORS

1. **READ, REVIEW AND COMPLY:** It shall be the vendor's responsibility to read this entire document, review all enclosures and attachments, and any addenda thereto, and comply with all requirements specified herein, regardless of whether appearing in these Instructions to vendors or elsewhere in this IFB document.

2. **LATE BIDS**: Late bids, regardless of cause, will not be opened or considered, and will automatically be disqualified from further consideration. It shall be the vendor's sole responsibility to ensure delivery at the designated office by the designated time.

3. **ACCEPTANCE AND REJECTION:** The County reserves the right to reject any and all bids, to waive minor informality in bids and to reject bid with non-minor informalities, based on the sole discretion of the County.

4. **EXECUTION:** Failure to sign EXECUTION PAGE in the indicated space will render bid non-responsive, and it shall be rejected.

5. **GIFTS:** Gifts and favors to the County of any kind in any amount are prohibited.

6. **SUSTAINABILITY**: To support the sustainability efforts of the County of Cumberland we solicit your cooperation in this effort. All copies of the bid are printed double-sided.

7. **HISTORICALLY UNDERUTILIZED BUSINESSES:** Pursuant to General Statute 143-48 and Executive Order #150 (1999), the County invites and encourages participation in this procurement process by businesses owned by minorities, women, disabled, disabled business enterprises and non-profit work centers for the blind and severely disabled.

8. **INFORMAL COMMENTS:** The County shall not be bound by informal explanations, instructions or information given at any time by anyone on behalf of the County during the competitive process or after award. The County is bound only by information provided in this IFB and in formal Addenda issued through the State's IPS and the County's Vendor Self Service website.

9. **COST FOR BID PREPARATION:** Any costs incurred by vendor in preparing or submitting offers are the Vendor's sole responsibility; the County of Cumberland will not reimburse any vendor for any costs incurred.

10. **VENDOR'S REPRESENTATIVE:** Each vendor shall submit with its bid the name, address, and telephone number of the person(s) with authority to bind the firm and answer questions or provide clarification concerning the firm's bid.

11. **SUBCONTRACTING:** The Contractor shall not assign or subcontract the work, or any part thereof, without the previous consent of Cumberland County, nor shall it assign, by power of attorney, operation of law, or otherwise, any moneys payable under the Contract without prior written consent of the County.

    If the vendor proposes to subcontract work in this project, the subcontractor and the activity in this project are to be identified in the bid.

    All subcontractors must be approved by the County and must conform to and comply with the same terms, standards and specifications applicable to the contracting firm.

The vendor shall be fully responsible and accountable to the County for the acts and omissions of its subcontractors, and of persons directly or indirectly employed by him.

12. **INSPECTION AT VENDOR'S SITE:** The County reserves the right to inspect, at a reasonable time, the equipment/item, plant or other facilities of a prospective vendor prior to Contract award, and during the Contract term as necessary for the County determination that such equipment/item, plant or other facilities conform with the specifications/requirements and are adequate and suitable for the proper and effective performance of the Contract.

13. **AFFIRMATIVE ACTION**: The vendor will take affirmative action in complying with all Federal and County requirements concerning fair employment and employment of people with disabilities, and concerning the treatment of all employees without regard to discrimination by reason of race, color, religion, sex, national origin or disability.

14. **VENDOR REGISTRATION**: Vendors are not required to register as a vendor in our system in order to submit a bid; however, registration is recommended so that vendor information is available for future opportunities. New vendors can register by visiting the following URL: https://ccmunis.co.cumberland.nc.us/vss/Vendors/default.aspx .

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ATTACHMENT B: EXECUTION OF BID

EXECUTION

In compliance with this Invitation for Bid (IFB), and subject to all the conditions herein, the undersigned vendor offers and agrees to furnish and deliver any or all items/services upon which prices are proposed. By executing this bid, the undersigned vendor certifies that this bid is submitted competitively and without collusion, that it and its principals are not presently debarred, suspended, proposed for debarment, declared ineligible from covered transactions by any Federal or State department or agency. Furthermore, the undersigned vendor certifies that it and its principals are not presently listed on the Department of State Treasurer's Final Divestment List as per N.C.G.S 147-86.55-69.

The potential Contractor certifies and/or understands the following by placing an "X" in all blank spaces:

_____ The County has the right to reject any and all bids or reject specific bids with deviated/omitted information, based on the County's discretion if the omitted information is considered a minor deviation or omission. The County will not contact vendors to request required information/documentation that is missing from a bid packet. Additionally, if the County determines it is in its best interest to do so, the County reserves the right to award to one or more vendors and/or to award only a part of the items/services specified in the IFB.

_____ This bid was signed by an authorized representative of the Contractor.

_____ The potential Contractor has determined the cost and availability of all materials and supplies associated with performing the services outlined herein.

_____ All labor costs associated with this project have been determined, including all direct and indirect costs.

_____ The potential Contractor agrees to the conditions as set forth in this IFB with no exceptions.

_____ Selection of a contract represents a preliminary determination as to the qualifications of the vendor. Vendor understands and agrees that no legally binding acceptance offer occurs until the Cumberland County Board of Commissioners, or its designee, executes a formal contract and/or purchase order.

Therefore, in compliance with the foregoing IFB, and subject to all terms and conditions thereof, the undersigned offers and agrees to furnish the services for the prices quoted within the timeframe required. Vendor agrees to hold firm offer through contract execution.

Failure to complete, execute/sign (E-signature or handwritten) bid prior to submittal shall render the bid invalid and it WILL BE REJECTED.

VENDOR:		
STREET ADDRESS:	P.O. BOX:	ZIP:
CITY & COUNTY & ZIP:	TELEPHONE NUMBER:	TOLL FREE TEL. NO:
PRINCIPAL PLACE OF BUSINESS ADDRESS IF DIFFERENT FROM ABOVE (SEE INSTRUCTIONS TO VENDORS ITEM #10):		

PRINT NAME & TITLE OF PERSON SIGNING ON BEHALF OF VENDOR:		FAX NUMBER:
VENDOR'S AUTHORIZED SIGNATURE:	**DATE:**	EMAIL:

ATTACHMENT C: BID COST

Assembly Court Solid Waste Convenience Center and Recycling Facility Construction (Phase 1)

Bidder agrees to perform all the work described in the Specifications and shown on the Contract Drawings for the lump sum and unit prices listed in the Bid Schedule(s) below.

Measurement and Basis for Payment:

Some of the line items in the Bid Schedule(s) may include approximate quantities as estimated by the Engineer. The Contractor shall not rely on the quantities given, but shall instead estimate all quantities independently as required to complete the Proposal. The Bid Schedule(s) outlines each item and the corresponding lump sum or unit price listed by the Contractor. The price associated with each lump sum item shall be the full compensation paid for the work described, regardless of the Engineer's or Contractor's estimated quantity. For Lump Sum items, no claim shall be made by the Contractor for deviations between the Contractor's estimated and the actual quantity required to complete the work described, wherein no measurement will be made.

A description of measurement and payment for each Lump Sum and Unit Price Bid item can be found in Section 01025, Measurement and Payment, of these Specifications.

Unit Price Deviations:

The Bidder is responsible for providing unit prices consistent with typical industry norms for the work described. Unit prices which appear inconsistent with typical prices for similar work shall be justified by the Bidder at the request of the Engineer. Providing unit prices which do not reasonably reflect the work described, either high or low, which are not justified satisfactorily to the Engineer, may deem the Bidder non-responsive and invalidate the Bidder's Proposal.

A. Base Bid Schedule:

Item	Description	Estimated Quantity[1]	Units	Unit Cost	Extended Cost
1	Site Preparation	1	LS	Lump Sum	
2	Excavation	200	SY		
3	Over-Excavation & Backfill	1	LS	Lump Sum	
4	Aggregate Surfacing	7,000	SY		
5	Asphalt Paving	1,500	SY		
6	Drainage Channel: DC-1	245	LF		
7	Drainage Channel: DC-2	200	LF		
8	Drainage Channel: DC-3	250	LF		
9	Infiltration Trench	1	LS	Lump Sum	
10	Silt Fence	1,700	LF		
11	Stone Filter Fence	2	EA		
12	Rip Rap Aprons	1	LS	Lump Sum	
13	12" Diam. RCP (Class III) (Culvert C-1)	1	EA		
14	Water Line Connection & Installation (Pending NCDOT & Fayetteville PWC Approval)	1	LS	Lump Sum	
15	Sewer Line Connection & Installation (Pending NCDOT & Fayetteville PWC Approval)	1	LS	Lump Sum	
16	Revegetation	1	AC		
17	Vegetative Buffer	1	LS	Lump Sum	
18	Chain Link Fence	1	LS	Lump Sum	
19	Permit Fees & Coordination	1	LS	Lump Sum	
20	Surveying Control	1	LS	Lump Sum	
21	Bonds, Mobilization & Insurance	1	LS	Lump Sum	

The TOTAL BASE BID PRICE for the pay items listed above is as follows:
(In Words) _____ Dollars and _____ _____Cents.
(In Numbers) ($_____._____)

Notes:
Engineer's estimated quantities are based on in-place quantities. Areas and lengths are based on horizontally projected areas and lengths. No adjustments have been made for slopes, uneven contours, etc.

B. Measurement and Payment

This section includes the units and methods of measurement and the basis of payment for work done under this Contract. The work required for each item shall be as required and/or reasonably implied by the Contract Documents to complete the work. Note that all measurement work shall be subject to verification (surveyed or otherwise) by the Owner.

1. Site Preparation:

All work required for Site Preparation shall be included for payment in the Contractor's Lump Sum Price for this work, wherein no measurement will be made.

2. Excavation:

All work required for Excavation shall be considered incidental to the other pay items in this contract and no separate measurement or payment will be made.

3. Embankment:

All work required for Embankment shall be considered incidental to the other pay items in this contract and no separate measurement or payment will be made.

4. Roadway Work:

All work required for Roadway Work shall be included for payment in the following item:

a) Aggregate Surfacing, which includes related earthwork and materials shall be paid on the basis of the Contractor's Lump Sum Price for this work, wherein no measurement will be made.

b) Asphalt Paving, which includes related earthwork and materials shall be paid on the basis of the Contractor's Lump Sum Price for this work, wherein no measurement will be made.

5. Erosion and Sedimentation Control:

All work required for Erosion and Sedimentation Control shall be included for payment in for the following item:

a) Drainage Channels (DC-1, DC-2, and DC-3), which includes related earthwork and materials, shall be paid on the basis of the Contractor's Unit Price for this work, wherein no measurement will be made.

b) Infiltration Trench, shall be included for payment in the Contractor's Lump Sum Price for this work, wherein no measurement will be made.

c) Silt Fence, which includes related earthwork and materials, shall be paid on the basis of the Contractor's Unit Price for this work, wherein no measurement will be made.

d) Stone Filter Fence, which includes related earthwork and materials, shall be paid on the basis of the Contractor's Unit Price for this work, wherein no measurement will be made.

e) Reinforced Concrete Pipe (RCP), shall be included for payment in the Contractor's Lump Sum Price for this work, wherein no measurement will be made.

6. Rip Rap Aprons:

All work required for Rip Rap Aprons shall be included for payment in the Contractor's Lump Sum Price for this work, wherein no measurement will be made.

7. Revegetation:

All work required for Revegetation shall be included for payment in the Contractor's Lump Sum Price for this work, wherein no measurement will be made.

8. PVC Pipe:

All work required for PVC Pipe will be related to the Water Line Connection & Installation shall be included for payment in the following items:

a) Water Main Tap, which includes materials and all related items and appurtenances required to tap into the existing public water main on Assembly Court, shall be included for payment in the Contractor's Lump Sum Price for this work, wherein no measurement will be made.

b) Water Lateral Installation, shall be included for payment in the Contractor's Lump Sum Price for this work, wherein no measurement will be made.

c) Flow Meter and Backflow Preventer Installation, which includes materials and all related items and appurtenances shall be included for payment in the Contractor's Lump Sum Price for this work, wherein no measurement will be made.

9. Ductile Iron Pipe:

All work required for Ductile Iron Pipe will be related to the Sewer Line Connection & Installation shall be included for payment in the following items:

a) Sewer Manhole Connection, which includes materials and all related items and appurtenances required to connecting to the existing public sewer manhole on Assembly Court, shall be included for payment in the Contractor's Lump Sum Price for this work, wherein no measurement will be made.

b) Sewer Lateral Installation, shall be included for payment in the Contractor's Lump Sum Price for this work, wherein no measurement will be made.

10. Vegetative Buffer:

All work required for Vegetative Buffer shall be included for payment in the Contractor's Lump Sum Price for this work, wherein no measurement will be made.

11. Chain Link Fence:

All work required for Chain Link Fence shall be included for payment in the Contractor's Lump Sum Price for this work, wherein no measurement will be made.

12. Surveying Control:

All work required for Surveying Control shall be included for payment in the Contractor's Lump Sum Price for this work, wherein no measurement will be made.

13. Bonds, Mobilization, and Insurance:

This work shall consist of securing the appropriate bonds and insurance policies for the project, performance of preparatory construction operations, and performance of project closeout activities including the movement of personnel and equipment to and from the project site, safety equipment, and other facilities to begin work on a substantial phase of the Contract. All work required for Bonds, Mobilization, and Insurance shall be included for payment in the Contractor's Lump Sum Price for this work, wherein no measurement will be made. At least twenty (20) percent of this item must be allocated for demobilization at the end of the project.

ATTACHMENT D: CERTIFICATION OF FINANCIAL CONDITION

Name of Vendor: _____

The undersigned hereby certifies that: [check all applicable boxes]

☐ The vendor is in sound financial condition and, if applicable, has received an unqualified audit opinion for the latest audit of its financial statements.

Date of latest audit: _____

☐ The vendor has no outstanding liabilities, including tax and judgment liens, to the Internal Revenue Service or any other government entity.

☐ The vendor is current in all amounts due for payments of federal and County taxes and required employment-related contributions and withholdings.

☐ The vendor is not the subject of any current litigation or findings of noncompliance under federal or County law.

☐ The vendor has no findings in any past litigation, or findings of noncompliance under federal or County law that may impact in any way its ability to fulfill the requirements of this Contract.

☐ He or she is authorized to make the foregoing statements on behalf of the vendor.

Note: This is a continuing certification and vendor shall notify the Contract Lead within 15 days of any material change to any of the representations made herein.

If any one or more of the foregoing boxes is NOT checked, vendor shall explain the reason in the space below:

_____

Signature Date

_____

Printed Name Title

[This Certification must be signed by an individual authorized to speak for the vendor]

ATTACHMENT E: CONTRACT SPECIFICATIONS

A. Summary of Work

a. Scope of Work

1. The work to be done under this Contract and in accordance with these Specifications consists of furnishing all equipment, superintendence, labor, skill, material and all other items necessary for the construction of the Project. The Contractor shall perform all work required for such construction in accordance with the Contract Documents and subject to the terms and conditions of the Contract, complete and ready for use.

   The Contractor shall perform all work required for such construction in accordance with the Contract Documents and subject to the terms and conditions of the Contract, complete and ready for use.

2. The principal features of the work to be performed under this Contract include:

   CONVENIENCE CENTER & RECYCLING FACILITY SITE CONSTRUCTION (PHASE 1): Includes installation of all erosion and sedimentation control measures, entrance and driveway construction and paving, parking area construction and aggregate surfacing, chain link fence installation, vegetative buffer installation, and water and sewer lateral taps and installation.

   The foregoing description(s) shall not be construed as a complete description of all work required.

b. Contract Drawings

The work to be done is shown on the set of Contract Drawings entitled "Assembly Court Solid Waste Convenience Center– Convenience Center & Recycling Facility" dated November 2023.

c. General Arrangement

1. The Contract Drawings indicate the extent and general arrangement of the work. If any departures from the Contract Drawings are deemed necessary by the Contractor to accommodate the materials and equipment they propose to furnish, details of such departures and reasons therefore shall be submitted as soon as practicable to the Engineer for approval. No such departures shall be made without the prior written approval of the Engineer. Approved changes shall be made without additional cost to the Owner for this work.

2. The specific equipment proposed for use by the Contractor on the Project may require changes in or other work to provide a complete satisfactory operating installation. The Contractor shall submit to the Engineer, for approval, all necessary drawings and details

showing such changes to verify conformance with the overall Project requirements and overall Project operating performance. The Bid Price shall include all costs in connection with the preparation of new drawings and details and all changes to construction work to accommodate the proposed materials and equipment.

3. The following materials will be supplied by the Owner:

   i. On-site soil suitable for structural fill (Embankment).

d. Construction Permits, Easements, and Encroachments

1. The Owner shall obtain or cause to be obtained all permanent and temporary construction easements as shown on the Contract Drawings. The Contractor shall verify that these agreements have been obtained and shall comply with the conditions set forth in each agreement.

2. The Contractor shall obtain, keep current, and pay all fees for any necessary construction permits from those authorities, agencies, or municipalities having jurisdiction over land areas, utilities, or structures which are located within the Contract limits and which will be occupied, encountered, used, or temporarily interrupted by the Contractor's operations unless otherwise stated. Record copies of all permits shall be furnished to the Engineer.

3. When construction permits are accompanied by regulations or requirements issued by a particular authority, agency, or municipality, it shall be the Contractor's responsibility to familiarize himself and comply with such regulations or requirements as they apply to their operations on this Project.

4. The Contractor is responsible for all transportation permits required for performance of this Contract.

e. Time of Work

1. The normal time of work for this Contract shall generally be between the hours of 7:00 a.m. and 7:00 p.m., Monday through Saturday. Additionally, no work shall be performed on the following legal holidays should they occur during the Contract Time:

   1. New Year's Day
   2. Martin Luther King, Jr. Day
   3. Good Friday
   4. Memorial Day
   5. Independence Day
   6. Labor Day
   7. Thanksgiving (2 Days)
   8. Christmas (2 Days)

   When a holiday falls on a Sunday, the holiday shall be observed on the following Monday.

   The Contractor may elect to work beyond these times or on Sundays (only as approved in advance by the Owner) provided that all costs incurred by the Owner for additional engineering or landfill site staff required to be present during non-landfill hours shall be

borne solely by the Contractor. Similarly, the Owner shall deduct the cost of additional inspection/monitoring or other required support service costs from monies due the Contractor.

Note that during periods of short daylight, the Contractor is required to provide ample temporary lighting as described in the following paragraph.

2. If it shall become imperative to perform work at night, the Owner and Engineer shall be informed a reasonable time in advance of the beginning of such work. Temporary lighting and all other necessary facilities for performing and inspecting the work shall be provided, maintained, and paid for by the Contractor at no additional cost to the Owner. The Contractor shall take all necessary steps and precautions to ensure a safe workplace for night work including compliance with all applicable statutes, ordinances, rules, and regulations.

3. Unless otherwise specifically permitted, all work that would be subject to damage shall be stopped during inclement, stormy, or freezing weather. Only such work as will not suffer injury to workmanship or materials will be permitted. The Contractor shall carefully protect their work against damage or injury from the weather, and when work is permitted during freezing weather, they shall provide and maintain approved facilities for heating the materials and for protecting the partially completed and finished work.

f. Surveys and Layout

1. All work under this Contract shall be constructed in accordance with the lines and grades shown on the Contract Drawings or as directed by the Engineer. Elevations of existing ground and appurtenances shown on the Contract Drawings are believed to be reasonably correct but are not guaranteed to be absolute and therefore are presented only as an approximation. Any error or apparent discrepancy in the data shown or omissions of data required for accurately accomplishing the stake out survey shall be referred immediately to the Engineer for interpretation or correction.

2. All survey work for construction control purposes shall be made by the Owner at their expense. The Owner shall provide a competently qualified survey party under the supervision of a Registered Land Surveyor, all necessary instruments, stakes, and other material to perform the work.

3. The Owner shall establish all baselines for the location of the principal component parts of the work together with a suitable number of bench marks and batter boards adjacent to the work. Based upon the information provided by the Contract Drawings, the Owner shall develop and make all detail surveys necessary for construction, including slope stakes, batter boards, stakes for all working points, lines, and elevations.

4. The Contractor shall have the responsibility to carefully preserve the bench marks, reference points, and stakes, and in the case of destruction thereof by the Contractor or resulting from their negligence, the Contractor shall be charged with the expense and damage resulting

therefrom and shall be responsible for any mistakes that may be caused by the unnecessary loss or disturbance of such bench marks, reference points, and stakes.

5. Existing or new control points, property markers, and monuments that will be or are destroyed during the normal causes of construction shall be reestablished by the Contractor at no cost to the Owner and all reference ties recorded therefore shall be furnished to the Engineer. All computations necessary to establish the exact position of the work shall be made and preserved by the Contractor.

6. The Engineer may check all or any portion of the work and the Contractor shall afford all necessary assistance and adequate time to the Engineer in carrying out such checks. Any necessary corrections to the work shall be immediately made by the Contractor. Such checking by the Engineer shall not relieve the Contractor of any responsibilities for the accuracy or completeness of their work.

7. GPS-Based Grading Systems:

   If any global positioning system (GPS) based computer equipment is to be used in the grading of the site, the Contractor shall submit the digital data, GPS build file, or model surface in an AutoCAD compatible format to the Engineer for approval prior to construction.

8. Record (As-Built) Drawings:

   For this project, the Owner shall prepare and furnish one (1) reproducible and one (1) digital set of Record (As-Built) Drawings to the Engineer.

   The Record Drawings shall indicate all critical locations/elevations of structures, earthwork, piping, roads, utilities, existing benchmarks, etc. Refer to the individual sections of these Specifications (where applicable) for additional requirements of each drawing.

   The scale, level of detail, and format of the Record Drawings must be to the satisfaction of and approval by the Engineer. The digital drawings shall be readable by AutoCAD Version 2000 or later in the *.DWG or *.DXF format. Topographical maps shall be drawn at full scale in 3-dimensional polylines with X, Y, and Z labeled accurately for each. The layering system shall have descriptive names easily discernible as to the content of the drawing or a layer code sheet shall be provided explaining the layering system. The drawings shall be produced in a fashion that conforms with industry computer aided drafting standards.

9. Tolerances:

   For this project, the maximum allowable deviation from the lines and grades, as shown on the Contract Drawings, are shown in the following table.

Survey Item	Tolerance
Horizontal Location:	± 1.0 Feet

g. Coordination

1. The Contractor shall allow the Owner or their agents, and other Project Contractors or their agents, to enter upon the work for the purpose of constructing, operating, maintaining, removing, repairing, altering, or replacing such pipes, sewers, conduits, manholes, wires, poles, or other structures and appliances which may be required to be installed at or in the work. The Contractor shall cooperate with all aforesaid parties and shall allow reasonable provisions for the prosecution of any other work by the Owner, or others, to be done in connection with their work, or in connection with normal use of the facilities.

2. Each Contractor shall cooperate fully with the Owner, the Engineer, and all other Contractors employed on the work, to effect proper coordination and progress to complete the Project on schedule and in proper sequence. Insofar as possible, decisions of all kinds required from the Engineer shall be anticipated by the Contractor to provide ample time for inspection, or the preparation of instructions.

3. Each Contractor shall assume full responsibility for the coordination of all parts of their work with that of other Contractors. Each Contractor's Superintendent shall coordinate all work with other Contractors in the laying out of work. Each Contractor shall lay out their own work in accordance with the Contract Drawings, Specifications, and instructions of latest issue and with due regard to the work of other Contractors.

4. Periodic coordinating meetings shall be held per Section 01200, Project Meetings, of these Specifications.

5. Active Landfill Operations:

   The Contractor shall coordinate their work with that of the Owner and Owner’s personnel so as to not create any disruption to the access or operation of the active LCID landfill areas or the active borrow and stockpile areas. The Owner and Contractor will agree on the use of borrow and stockpile areas prior to construction.

h. Additional Engineering Services

1. In the event that the Engineer is required to provide additional engineering services as a result of substitution of materials or equipment which are not “or equal” by the Contractor, or changes by the Contractor in dimension, weight, power requirements, etc., of the equipment and accessories furnished, or if the Engineer is required to examine and evaluate any changes proposed by the Contractor for the convenience of the Contractor, then the Engineer's charges in connection with such additional services shall be charged to the Contractor by the Owner.

2. In the event that the Engineer is required to provide additional engineering services as a result of Contractor's errors, omissions, or failure to conform to the requirements of the Contract Documents, or if the Engineer is required to examine and evaluate any changes proposed by the Contractor solely for the convenience of the Contractor, then the Engineer's charges in connection with such additional services shall be charged to the Contractor by the Owner.

i. Additional Owner's Expenses

1. In the event the work of this Contract is not completed within the time set forth in the Contract or within the time to which such completion may have been extended in accordance with the Contract Documents, the additional engineering or inspection charges incurred by the Owner may be charged to the Contractor and deducted from the monies due them. Extra work or supplemental Contract work added to the original Contract, as well as extenuating circumstances beyond the control of the Contractor, will be given due consideration by the Owner before assessing engineering and inspection charges against the Contractor.

2. Charges assessed to the Contractor for additional engineering and inspection costs will be determined based on actual hours charged to the job by the Engineer. Daily rates will depend on the number and classifications of employees involved, but in no case shall such charges exceed $1,200 per day for engineering personnel, travel time and expenses, and any other direct reimbursable items, based on an eight-hour workday.

3. Charges for additional Owner's expenses shall be in addition to any liquidated damages assessed in accordance with the Contract.

j. Protection of Property

1. The Contractor shall be responsible for the preservation and protection of property adjacent to and within the work site against damage or injury as a result of their operations under this Contract. Any damage or injury occurring on account of any act, omission, or neglect on the part of the Contractor shall be restored in a proper and satisfactory manner or replaced by and at the sole expense of the Contractor to an equal or superior condition than previously existed.

2. The Contractor shall comply promptly with such safety regulations as may be prescribed by the Owner or the local authorities having jurisdiction and shall, when so directed, properly correct any unsafe conditions created by, or unsafe practices on the part of, their employees. In the event of the Contractor's failure to comply, the Owner may take the necessary measures to correct the conditions or practices complained of, and all costs thereof will be deducted from any monies due the Contractor. Failure of the Engineer to direct the correction of unsafe conditions or practices shall not relieve the Contractor of their responsibility hereunder.

3. In the event of any claims for damage or alleged damage to property as a result of work under this Contract, the Contractor shall be responsible for all costs in connection with the settlement of or defense against such claims. Prior to commencement of work in the vicinity of property adjacent to the work site, the Contractor, at their own expense, shall take such surveys as may be necessary to establish the existing condition of the property. Before final payment can be made, the Contractor shall furnish satisfactory evidence that all claims for damage have been legally settled or sufficient funds to cover such claims have been placed in escrow, or that an adequate bond to cover such claims has been obtained.

k. Fire Protection

1. The Contractor shall take all necessary precautions to prevent fires at or adjacent to the work, buildings, etc., and shall provide adequate facilities for extinguishing fires which do occur.

2. When fire or explosion hazards are created in the vicinity of the work as a result of the locations of fuel tanks, or similar hazardous utilities or devices, the Contractor shall immediately alert the local Fire Marshal, the Engineer, and the Owner of such tank or device. The Contractor shall exercise all safety precautions and shall comply with all instructions issued by the Fire Marshal and shall cooperate with the Owner of the tank or device to prevent the occurrence of fire or explosion.

l. Fire Protection

All chemicals used during Project construction or furnished for Project operation, whether herbicide, pesticide, disinfectant, polymer, or reactant of other classification, must show approval of either the EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with all applicable Federal, State, and/or local rules and regulations. Material safety data sheets (MSDS) shall be submitted as requested by the Owner.

m. Existing Utilities and Structures

1. The term existing utilities shall be deemed to refer to both publicly and privately-owned utilities such as electric power and lighting, telephone, water, gas, storm drains, process lines, sanitary sewers, leachate piping, landfill gas (LFG) piping and wells, and all appurtenant structures.

2. Where existing utilities and structures are indicated on the Contract Drawings, it shall be understood that all of the existing utilities and structures affecting the work may not be shown and that the locations of those shown are approximate only. It shall be the responsibility of the Contractor to ascertain the actual extent and exact location of existing utilities and structures. In every instance, the Contractor shall notify the proper authority having jurisdiction and obtain all necessary directions and approvals before performing any work within the Contract limits.

3. Prior to beginning any excavation work, the Contractor shall, through field investigations, determine any conflicts or interferences between existing utilities and new utilities to be constructed under this Project. This determination shall be based on the actual locations, elevations, slopes, etc. of existing utilities as determined in the field investigations, and locations, elevation, slope, etc. of new utilities as shown on the Contract Drawings. If an interference exists, shown or not shown in the Contract Drawings, the Contractor shall immediately cease work in the area of the interference and shall report to the Engineer for further direction.

4. If the Engineer agrees that an interference exists, they shall modify the design as required. Additional costs to the Contractor for this change shall be processed through a Change Order as detailed elsewhere in these Contract Documents. In the event the Contractor fails to bring a potential conflict or interference to the attention of the Engineer prior to beginning excavation work, any actual conflict or interference which does arise during the Project shall be corrected by the Contractor, as directed by the Engineer, at no additional expense to the Owner.

5. The work shall be carried out in a manner to prevent disruption of existing services and to avoid damage to the existing utilities. Temporary connections shall be provided, as required, to insure no interruption of existing services. Any damage resulting from the work of this Contract shall be promptly repaired by the Contractor at their own expense in a manner approved by the Engineer and further subject to the requirements of any authority having jurisdiction. Where it is required by the authority having jurisdiction that they perform their own repairs or have them done by others, the Contractor shall be responsible for all costs thereof.

6. Where excavations by the Contractor require any utility lines or appurtenant structures to be temporarily supported and otherwise protected during the construction work, such support and protection shall be provided by the Contractor. All such work shall be performed in a manner satisfactory to the Engineer and the respective authority having jurisdiction over such work. In the event the Contractor fails to provide proper support or protection to any existing utility, the Engineer may, at their discretion, have the respective authority to provide such support or protection as may be necessary to insure the safety of such utility, and the costs of such measures shall be paid by the Contractor.

n. <u>Ultimate Disposition of Claims by One Contractor Arising from Alleged Damage by Another Contractor</u>

1. During the progress of the work, other Contractors may be engaged in performing other work or may be awarded other Contracts for additional work on this Project. In that event, the Contractor shall coordinate the work to be done hereunder with the work of such other Contractors and the Contractor shall fully cooperate with such other Contractors and carefully fit its own work to that provided under other Contracts as may be directed by the Engineer. The Contractor shall not commit or permit any act which will interfere with the performance of work by any other Contractor.

2. If at the Engineer's discretion, they determine that the Contractor is not coordinating their work with the work of the other Contractors as the Engineer directed, then the Owner shall have the right to withhold any payments otherwise due hereunder until the Contractor completely complies with the Engineer's directions.

3. If the Contractor notifies the Engineer in writing that another Contractor on this Project is failing to coordinate their work with the work of this Contract as directed, the Engineer must investigate the charge within 2 business days. If the Engineer finds it to be true, they must issue such directions to the other Contractor with respect thereto as the situation may require. However, neither the Owner, the Engineer, nor any of their agents shall be liable for any damages suffered by the Contractor by reason of the other Contractor's failure to promptly comply with the directions so issued by the Engineer, or by reason of another Contractor's default in performance, it being understood that the Owner does not guarantee the responsibility or continued efficiency of any Contractor.

4. The Contractor shall indemnify and hold the Owner and the Engineer harmless from any and all claims or judgments for damages and from costs and expenses to which the Owner may be subjected or which it may suffer or incur by reason of the Contractor's failure to comply with the Engineer's directions.

5. Should the Contractor sustain any damage through any act or omission of any other Contractor having a Contract with the Owner for the performance of work upon the site or of work which may be necessary to be performed for the proper execution of the work to be performed hereunder, or through any act or omission of a Subcontractor of such Contract, the Contractor shall have no claim against the Owner or the Engineer for such damage, but shall have a right to recover as allowed by law such damage from the other Contractor under the provision similar to the following provisions which have been or will be inserted in the Contracts with such other Contractors.

6. Should any other Contractor having or who shall hereafter have a Contract with the Owner for the performance of work upon the site sustain any damage through any act or omission of the Contractor hereunder or through any act or omission of any Subcontractor of the Contractor, the Contractor agrees to reimburse such other Contractor for all such damages and to defend at their own expense any suit based upon such claim and if any judgment or claims against the Owner shall be allowed, the Contractor shall pay or satisfy such judgment or claim and pay all costs and expenses in connection therewith and shall indemnify and hold the Owner harmless from all such claims and judgments.

7. The Owner's right to indemnification hereunder shall in no way be diminished, waived or discharged, by its recourse to assessment of liquidated damages as provided in the Contract, or by the exercise of any other remedy provided for by Contract Documents or by law.

o. <u>Applicable Standards and Codes</u>

1. Wherever reference is made to any published standards, codes, or standard specifications, it shall mean the latest standard code, specification or tentative specification of the technical society, organization or body referred to, which is in effect at the date of invitation for Bids.

2. All materials, products, and procedures used or incorporated in the work shall be in strict conformance with applicable codes, regulations, specifications, and standards.

3. A partial listing of codes includes the following:

    a. National Fire Codes.
    b. Underwriters Laboratories, Inc.
    c. National Electrical Manufacturer's Association
    d. American National Standards Association
    e. Regulations and Standards of the Occupational Safety and Health Act (OSHA)
    f. Uniform Building Code (UBC)
    g. American Society for Testing and Materials (ASTM).

    The following is a partial list of typical abbreviations which may be used in the Specifications, and the organizations to which they refer:

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AGA	American Gas Association
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
API	American Petroleum Institute
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
DIPRA	Ductile Iron Pipe Research Association
COE	U.S. Army Corps of Engineers
CRSI	Concrete Reinforcing Steel Institute
Fed Spec	Federal Specifications
GRI	Geosynthetic Research Institute
IEEE	Institute of Electrical and Electronic Engineers
IPCEA	Insulated Power Cable Engineers Association
ISO	Insurance Services Offices
NBS	National Bureau of Standards
NCDOT	North Carolina Department of Transportation
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
OSHA	Occupational Safety and Health Act

PCI	Precast Concrete Institute
UL	Underwriters Laboratories, Inc.
USGS	United States Geological Survey

4. The Contractor shall, when required, furnish evidence satisfactory to the Engineer that materials and methods are in accordance with such standards where so specified.

5. In the event any questions arise as to the application of these standards or codes, copies shall be supplied on-site by the Contractor.

p. Limits of Work Area

1. The Contractor shall confine their construction operations within the Contract limits shown on the Contract Drawings and/or property lines and/or fence lines. Storage of equipment and materials, or erection and use of sheds outside of the Contract limits, if such areas are the property of the Owner, shall be used only with the Owner's approval. Such storage or temporary structures, even within the Contract's limits, shall be confined to the Owner's property and shall not be placed on properties designated as easements or rights-of-way unless specifically permitted elsewhere in the Contract Documents.

2. Damage or impact by the Contractor to areas within or outside the Contract limits shall be the sole responsibility of the Contractor to remedy (including fines) the impact/damage to at least prior condition/function. This shall include sensitive areas including, but not limited to, wetlands and archeological sites.

q. Weather Conditions

The Contractor shall take necessary precautions (in the event of impending storms) to protect all work, materials, or equipment from damage or deterioration due to, but not limited to, floods, driving rain, wind, and snow/ice storms. The Owner reserves the right, through the opinion of the Engineer, to order that additional protection measures over and beyond those proposed by the Contractor, be taken to safeguard all components of the Project. The Contractor shall not claim any compensation for such precautionary measures so ordered, nor claim any compensation from the Owner for damage to the work from weather elements.

r. Periodic Cleanup: Basic Site Restoration

1. During construction, the Contractor shall regularly remove from the site of the work all accumulated debris and surplus materials of any kind which result from their operations. Unused equipment and tools shall be stored at the Contractor's yard or base of operations for the Project.

2. When the work involves installation of sewers, drains, water mains, manholes, underground structures, or other disturbance of existing features in or across streets, rights-of-way, easements, or private property, the Contractor shall (as the work progresses) promptly backfill, compact, grade, and otherwise restore the disturbed area to

the basic condition which will permit resumption of pedestrian or vehicular traffic and any other critical activity or functions consistent with the original use of the land. Unsightly mounds of earth, large stones, boulders and debris shall be removed so that the site presents a neat appearance.

3. The Contractor shall perform the cleanup work on a regular basis and as frequently as ordered by the Engineer. Basic site restoration in a particular area shall be accomplished immediately following the installation or completion of the required facilities in that area. Furthermore, such work shall also be accomplished, when ordered by the Engineer, if partially completed facilities must remain incomplete for some time period due to unforeseen circumstances.

4. Upon failure of the Contractor to perform periodic cleanup and basic restoration of the site to the Engineer's satisfaction, the Owner may, upon five (5) days prior written notice to the Contractor, without prejudice to any other rights or remedies of the Owner, cause such work for which the Contractor is responsible to be accomplished to the extent deemed necessary by the Engineer, and all costs resulting therefrom shall be charged to the Contractor and deducted from the amounts of money that may be due them.

s. Use of Facilities Before Completion

1. The Owner reserves the right to enter and use any portion of the constructed facilities before final completion of the whole work to be done under this Contract. However, only those portions of the facilities which have been completed to the Engineer's satisfaction, as evidenced by their issuing a Certificate of Substantial Completion covering that part of the work, shall be placed in service.

2. It shall be the Owner's responsibility to prevent premature connections to or use of any portion of the installed facilities by private or public parties, persons or groups of persons, before the Engineer issues their Certificate of Substantial Completion covering that portion of the work to be placed in service.

3. Consistent with the approved progress schedule, the Contractor shall cooperate with the Owner, their agents, and the Engineer to accelerate completion of those facilities, or portions thereof, which have been designated for early use by the Owner.

t. Asbestos Containing Materials

It is not anticipated that asbestos containing materials will be encountered during construction. However, if asbestos containing material is encountered, the Contractor shall comply with all Federal, State, and local regulations including applicable NESHAP and OSHA regulations. The attached asbestos work plan is intended to provide direction for the Contractor involved in waste disturbing activities in areas with known or suspected asbestos-contaminated waste, or where asbestos-contaminated waste is discovered. Note that the Accredited Asbestos Inspector (AAI) will be provided through the Engineer.

u. Submittals: Before completion of the first pay application, the Contractor shall prepare and submit copies of their proposed pay application to the Engineer for review.

B. Project Meetings

a. Pre-Bid Meeting

1. A Pre-Bid Meeting will be held at the time and place to be designated in the Advertisement for Bids.

2. The Engineer will be available to discuss the Project and answer pertinent questions. No oral interpretation will be made as to the meaning of the Contract Documents. Interpretation, if deemed necessary by the Engineer, will be in the form of an Addendum to the Contract Documents following the meeting.

b. Pre-Construction Meeting

1. A preconstruction meeting will be held after Award of Contract, but prior to the start of work at the site.

2. Attendance:

a. Owner
b. Engineer
c. Contractor
d. Major Subcontractors (As Appropriate for Initial Stages of Work)
e. Safety Representative (As Appropriate)
f. Representatives of Governmental or other Regulatory Agencies (As Appropriate).

3. Tentative Agenda:

a. Tentative construction schedule/milestones
b. Work sequencing
c. Designation of responsible personnel
d. Processing of Field Decisions and Change Orders
e. Adequacy of distribution of Contract Documents
f. Submittal of Shop Drawings and samples
g. Procedures for maintaining record documents
h. Use of site and Owner's requirements
i. Major equipment deliveries and priorities
j. Safety and first aid procedures
k. Security procedures
l. Housekeeping procedures
m. Processing of Partial Payment Requests
n. General regard for community relations.

c. Progress Meetings

1. Progress meetings will be held monthly (or as otherwise directed by the Owner) at the project site during the performance of the work of this Contract. Additional meetings may be called as progress of work dictates.

2. The Engineer or their representative will preside at meetings and record minutes of proceedings and decisions. The Engineer will subsequently distribute copies of minutes to participants.

3. Attendance:

   a. Owner
   b. Engineer
   c. Contractor
   d. Subcontractors as pertinent to the agenda.

4. Tentative Agenda:

   a. Review and approve minutes of previous meetings.
   b. Review progress of work since last meeting.
   c. Review proposed 30-60 day construction schedule.
   d. Note and identify problems which impede planned progress.
   e. Develop corrective measures and procedures to regain planned schedule.
   f. Revise construction schedule as indicated and plan progress during next work period.
   g. Maintaining of quality and work standards.
   h. Complete other current business.
   i. Report on community and governmental relations.
   j. Schedule next progress meeting.

C. Submittals

a. General

This section describes the submittal process and the various submittal items which are required for this work. Submittal items include:

1. Progress Schedule
2. Proposed Products List
3. Product Data
4. Samples
5. Working Drawings
6. Operation and Maintenance Manuals
7. Other Submittals
8. Certified Shop Test Reports
9. Construction Photographs.

A summary list of required submittals for this project is shown on Table 1 of this section. Note that this summary list does not relieve the Contractor of providing additional submittal information, not listed in Table 1, which may be required by the Contract Documents.

b. Procedure for Submittal and Contractor Responsibilities

1. Submittals shall be transmitted in sufficient time to allow the Engineer at least ten (10) working days (or greater if specified elsewhere) for review and processing.

2. Unless otherwise stated or agreed to, the Contractor shall transmit an electronic copy of all submittals to the Engineer in a format acceptable to the Engineer and Owner. If hard copies of submittals are necessary (or required by the Contract Documents), the Contractor shall transmit five (5) copies of all hard copy submittals to the Engineer. Transportation charges on all submittals shall be the Contractor's responsibility.

3. All submittals from subcontractors, manufacturers, or suppliers shall be sent directly to the Contractor for checking. The Contractor shall thoroughly check all submittals for accuracy and conformance to the intent of the Contract Documents before submitting them to the Engineer. ALL SUBMITTALS SHALL BEAR THE CONTRACTOR'S STAMP OF APPROVAL CERTIFYING THAT THEY HAVE BEEN SO CHECKED. SUBMITTALS WITHOUT THE CONTRACTOR'S STAMP OF APPROVAL WILL NOT BE REVIEWED BY THE ENGINEER AND WILL BE RETURNED TO THE CONTRACTOR.

4. All submittals shall be bound, dated, properly labeled, and consecutively numbered. Information on the label shall indicate submittal number (corresponding to Table 1 of this section), specification section, Contract Drawing number, subcontractors, manufacturer's or supplier's name, and the name or type of item the submittal covers. Each part of a submittal shall be marked and tabulated. Submittals shall be accompanied by a letter of transmittal, containing date, Project title, Contractor's name, number and titles of submittals, and any other pertinent data to facilitate review.

5. If the submittals contain any departures from the Contract Documents, specific mention thereof shall be made in the Contractor's letter of transmittal. Otherwise, the review of such submittals shall not constitute approval of the departure.

c. Procedure for Review

1. Submittals will be reviewed and annotated by the Engineer in one of the following ways:

"Furnish as Submitted" - no exceptions are taken.

"Furnish as Noted" - minor corrections are noted and shall be made.

"Revise and Resubmit" - major corrections are noted and a resubmittal is required.

"Rejected" - Based on the information submitted, the submission is not in conformance with the Contract Documents. The deviations from the Contract Documents are too numerous to list and a completely revised submission of the proposed equipment or a submission of other equipment is required.

2. If a submittal is satisfactory to the Engineer, the Engineer will annotate the submittal "Furnish as Submitted" or "Furnish as Noted" and transmit electronically to the Contractor. For hard copy submittals, the Engineer will transmit two (2) copies to the Contractor.

3. If a resubmittal is required, the Engineer will annotate the submittal "Revise and Resubmit" or "Rejected" and transmit electronically to the Contractor for appropriate action. For hard copy submittals, the Engineer will transmit four (4) copies to the Contractor for appropriate action.

4. The Contractor shall revise and resubmit submittals as required by the Engineer until submittals are acceptable to the Engineer.

5. No materials or equipment shall be ordered, fabricated, shipped, or any work performed until the Engineer returns to the Contractor the submittals, herein required, annotated either "Furnish as Submitted" or "Furnish as Noted".

6. The Engineer's review of the Contractor's submittals shall in no way relieve the Contractor of any of their responsibilities under the Contract. An acceptance of a submittal shall be interpreted to mean that the Engineer has no specific objections to the submitted material, subject to conformance with the Contract Drawings and Specifications.

7. The Engineer's review will be confined to general arrangement and compliance with the Contract Drawings and Specifications only, and will not be for the purpose of checking dimensions, weights, clearances, fittings, tolerances, interferences, coordination of trades, etc.

8. Acceptance of a Working Drawing by the Engineer will constitute acceptance of the subject matter for which the Drawing was submitted and not for any other structure, material, equipment, or appurtenances indicated or shown.

9. Where errors, deviations, and/or omissions are discovered at a later date in any of the submittals, the Engineer's prior review of the submittals does not relieve the Contractor of the responsibility for correcting all errors, deviations, and/or omissions.

10. Additional Engineering Services:

    i. It is understood by the Contractor that the Owner may charge the Contractor the Engineer's charges for review in the event a submittal is not approved (either "Furnish as Submitted" or "Furnish as Noted") by the third submittal. These charges shall be

for all costs associated with engineering review, meetings with the Contractor or manufacturer, etc. commencing with the fourth submittal.

ii. In the event that the Engineer is required to provide additional engineering services as a result of a substitution of materials or equipment by the Contractor, the additional services will be provided in accordance with Section 01010, Summary of Work, of these Specifications, and will be covered in supplementary or revised information which will be issued to the Contractor.

d. Progress Schedule

1. General:

i. Within ten (10) days after the start date defined in the Notice to Proceed, the Contractor shall prepare and submit copies of their proposed progress schedule to the Engineer for review.

ii. If so required, the schedule shall be revised until it is acceptable to the Owner. Acceptance by the Owner does not constitute confirmation that the schedule is accurate and complete only that it appears to meet minimum job requirements; and, thus, shall not relieve the Contractor of any Contract dates, milestones, or deadlines.

iii. The schedule shall be updated monthly, depicting progress to the last day of the month and copies submitted to the Engineer not later than the fifth day of the month. PROGRESS PAYMENTS MAY NOT BE PROCESSED WITHOUT A CURRENT PROGRESS SCHEDULE.

2. Form of Schedule:

i. The schedule shall be prepared in the form of a horizontal bar chart showing in detail the proposed sequence of the work and identifying construction activities for each structure and for each portion of work including the critical path, predecessor relationships, milestones, etc.

ii. The schedule shall be time scaled, identifying the first day of each week, with the estimated date starting and completion of each stage of the work in order to complete the Project within the Contract time.

e. Proposed Products List

1. Within fifteen (15) days after the start date defined in the Notice to Proceed, the Contractor shall prepare and submit copies of their tabulation of principal items of equipment and materials to be purchased to the Engineer for review.

2. The list shall include the manufacturer name, trade name, and model number for each product.

f. Product Data

1. The Contractor shall furnish for review information on proposed products as required by the Contract Documents or requested by the Engineer.

2. Product data shall indicate, at a minimum, the material properties specified in the Contract Documents.

g. Samples

1. The Contractor shall furnish for review all samples as required by the Contract Documents or requested by the Engineer.

2. Samples shall be of sufficient size or quantity to clearly illustrate the quality, type, range of color, finish, or texture and shall be properly labeled to show the nature of the material, trade name of manufacturer, and location of the work where the material represented by the sample will be used.

h. Working Drawings

1. General:

i. Working Drawings include, but are not limited to, Shop Drawings, layout drawings in plan and elevation, etc. The Contractor shall be responsible for securing all of the information, details, dimensions, Drawings, etc., necessary to prepare the Working Drawings required and necessary under this Contract and to fulfill all other requirements of their Contract. The Contractor shall secure such information, details, Drawings, etc. from all possible sources including the Contract Drawings, Working Drawings prepared by subcontractors, Engineers, suppliers, etc.

ii. Working Drawings shall accurately and clearly present the following:

a. All working and installation dimensions.
b. Arrangement and sectional views.
c. Units of equipment in the proposed positions for installation, details of required attachments and connections, and dimensioned locations between units and in relation to the structures.
d. Necessary details and information for making connections between the various trades including, but not limited to, accessories, appurtenances, etc.

iii. Working Drawings specifically prepared for this Project shall be on Mylar or other approved reproducible material sheets of the same size as the Contract Drawings. Drawings shall conform to recognized drafting standards and be neat, legible, and drawn to a large enough scale to show in detail the required information.

iv. Contract Drawings are used for engineering and general arrangement purposes only and are not to be used for Working Drawings.

2. Working Drawing Requirements:

i. Shop Drawings:
   a. The Contractor shall submit for review by the Engineer Shop Drawings for all fabricated work and for all manufactured items required to be furnished by the Contract Documents.
   b. Structural and all other layout Drawings prepared specifically for the Project shall have a plan scale of not less than 1 inch = 4 feet.
   c. Where manufacturer's publications in the form of catalogs, brochures, illustrations, or other data sheets are submitted in lieu of prepared Shop Drawings, such submittals shall specifically indicate the item for which approval is requested. Identification of items shall be made in ink, and submittals showing only general information are not acceptable.

ii. Layout and Installation Drawings:
   a. The Contractor shall prepare and submit for review by the Engineer layout and installation Drawings for all pipes, valves, fittings, etc. under this Contract. The final dimensions, elevation, location, etc., of pipe, valves, fittings, etc., may depend upon the dimensions of equipment and valves to be furnished by the Contractor.
   b. Layout and installation Drawings shall show connections to structures, equipment, sleeves, valves, fittings, etc.

3. Record Working Drawings:

i. Prior to final payment, the Contractor shall furnish the Engineer one complete set of all accepted Working Drawings, including Shop Drawings, for equipment, piping, etc.

ii. Manufacturer's publications, submitted in lieu of prepared Shop Drawings, will not be required in reproducible form. However, five (5) sets of such material shall be furnished by the Contractor to the Engineer.

iii. Working Drawings furnished shall be corrected to include any departures from previously accepted Drawings.

iv. Refer to Section 01010 Paragraph F.9 (Summary of Work - Record (As-Built) Drawings) for additional information regarding required record drawings.

i. <u>Operation and Maintenance Manuals</u>

1. Copies of Operation and Maintenance Manuals, prepared specifically for this Project, shall be furnished for each item of equipment furnished under this Contract at the time it is installed.

2. Manuals shall contain complete information in connection with assembly, operation, lubrication, adjustment, maintenance, and repair, including detailed parts lists with drawings or photographs identifying the parts.
3. All copies of the manuals furnished shall be assembled and bound in separate volumes, by major equipment items or trades, and properly indexed to facilitate locating any required information.
4. The Engineer and the Owner shall be the sole judge of the acceptability and completeness of the manuals and may reject any submittal for insufficient information included, incorrect references, and/or the manner in which the material is assembled.
5. The approved sets of operation and maintenance manuals shall be furnished prior to final acceptance.

j. Other Submittals

Other required submittals include, but are not limited to: proposed handling/installation procedures, information on proposed construction equipment, borrow area information, material certifications, qualifications for manufacturers and installers, manufacturer instructions/recommendations, test reports, and design data.

k. Construction Photographs

1. General:

   i. The Contractor shall engage a competent photographer to take photographs at the locations and at such stages of the construction as necessary document the construction progress as directed by the Engineer.

   ii. Provide the equivalent of 24 different exposures per month (minimum) for the duration of the Contract Time. When directed by the Engineer, frequency of photographs may be increased to weekly sessions provided that the equivalent number of exposures is not exceeded. The Engineer may waive requirements for photographs during inactive construction periods in favor of increased photographs during active construction sequences.

2. Submittal Requirements:

   i. At completion of the work, electronic versions of photographs shall be turned over to the Owner.

Table 1: Summary List of Required Submittals

Specification Section	Submittal Number	Description
01010 (Summary of Work)	01010-1	GPS-Based Grading System Information (If Applicable)
	01010-2	Survey Grid
	01010-3	Record (As-Built) Drawings
01025 (Measurement And Payment)	01025-1	Proposed Pay Application
01300 (Submittals)	01300-1	Progress Schedule
	01300-2	Proposed Products List
	01300-3	Record Working Drawings
01400 (Quality Control & Quality Assurance)	01400-1	Report Documenting all CQC Activities (Pipe)
02500 (Roadway Work)	02500-1	Certification and Summary of Required Test Results on Materials to be Provided
	02500-2	Delivery Tickets or Other Approved Receipts
02270 (Erosion and Sedimentation Control)	02270-1	Certification and Summary of Required Test Results on Materials to be Provided
	02270-2	Delivery Tickets or Other Approved Receipts
02930 (Revegetation)	02930-1	Results of Soil Tests and Proposed Modifications
	02930-2	Seed Certificates
	02930-3	Fertilizer Invoices
03300 (Concrete Work)	03300-1	Product Data
	03300-2	Placing Drawings
	03300-3	Samples
	03300-4	Laboratory Test Reports
	03300-5	Material Certificates

D. Quality Control and Quality Assurance

a. General

1. Definitions:

i. Construction Quality Control (CQC):
Construction Quality Control refers to actions taken by manufacturers, fabricators, installers, and/or the Contractor to ensure that the materials and the workmanship meet the requirements of the Contract Documents. CQC is provided by the Contractor at no additional cost to the Owner. The Contractor shall follow CQC procedures as required by the Contract Documents and the Project CQA Manual.

ii. Construction Quality Assurance (CQA):
Construction Quality Assurance is defined as a planned and systematic program employed by the Owner to assure conformity of the construction with the Contract Documents. CQA is provided by the CQA Engineer as a representative of the Owner and is independent from the Contractor and all manufacturers. The CQA program is designed to provide adequate confidence that items or services meet contractual and regulatory requirements and will perform satisfactorily in service.

2. On this Project, the Owner will provide for the services of a CQA Engineer on-site to selectively test materials and monitor compliance with the requirements of the Contract Documents. This will be in addition to Construction Quality Control (CQC) provided and paid for by the Contractor. The Contractor will afford these representatives access to the job site for the performance of their duties as described in the Contract Documents.

3. At the completion of construction and before final payment is made, the Contractor shall submit a copy of a report to the Engineer documenting all CQC activities performed.

b. Testing Laboratory Services

1. General:

i. Laboratory testing and checking required by the Specifications, including the cost of transporting all samples and test specimens, shall be provided and paid for by the Contractor unless otherwise indicated in the Specifications.

ii. Materials to be tested include, but are not necessarily limited to the following: geosynthetics and pipe.

iii. Tests required by the Owner shall not relieve the Contractor from the responsibility of supplying certificates from manufacturers or suppliers to demonstrate conformance with the Specifications.

2. Procedure:

   i. The Contractor shall plan and conduct his operations to permit taking of field samples and test specimens, as required, and to allow adequate time for laboratory tests.

   ii. The collection, field preparation, and storage of field samples and test specimens shall be as directed by the Engineer with the cooperation of the Contractor.

   iii. Significance of Tests:

   Test results shall be binding on both the Contractor and the Owner, and shall be considered irrefutable evidence of compliance or noncompliance with the Specification requirements, unless:

   a. Supplementary testing shall prove, to the satisfaction of the Owner, that the initial samples were not representative of actual conditions or

   b. Observation(s) of the test sampling or procedures as made by the CQA Engineer or the Engineer render the results invalid.

   iv. Supplementary and Other Testing:

   Nothing shall restrict the Contractor from conducting tests he may require. Should the Contractor at any time request the Owner to consider such test results, the test reports shall be certified by an independent testing laboratory acceptable to the Owner. Testing of this nature shall be conducted at the Contractor's expense.

c. <u>Imperfect Work, Equipment, or Materials</u>

1. Any work, equipment, or materials furnished by the Contractor not in conformance with the Contract Documents which is discovered before the final acceptance of the work, as established by the date of Final Payment, or during the Contractor's guarantee period, shall be removed, replaced, and/or corrected to conform to the Contract Documents immediately even though it may have been overlooked by the Engineer and estimated for payment.

2. Any equipment or materials condemned or rejected by the Engineer shall be tagged as such and shall be immediately removed from the site. Satisfactory work or materials shall be substituted for that rejected.

3. The Engineer may order tests of work, equipment, or materials which appear to be in non-conformance with the Contract Documents to determine the required functional capability for possible acceptance, if there is no other reason for rejection. The cost of such tests shall be borne by the Contractor; and the nature, tester, extent, and supervision of the tests will be as determined by the Engineer. If the results of the tests indicate that the required functional capability of the work, equipment, or material was not impaired, consistent with the final general appearance of same, the work, equipment, or materials may be deemed acceptable.

If the results of such tests reveal that the required functional capability of the questionable work, equipment, or materials has been impaired, then such work, equipment, or materials shall be deemed imperfect and shall be replaced. The Contractor may elect to replace the imperfect work, equipment, or material in lieu of performing the tests.

d. Inspection and Tests

1. The Contractor shall allow the Engineer ample time and opportunity for testing materials and equipment to be used in the work. The Contractor shall at all times furnish the Engineer and their representatives, facilities including labor, and allow proper time for inspecting and testing materials, equipment, and workmanship.

2. The Contractor must anticipate possible delays that may be caused in the execution of their work due to the necessity of materials and equipment being inspected and accepted for use.

3. The Contractor shall furnish, at their own expense, all samples of materials required by the Engineer for testing, and shall make their own arrangements for providing water, electric power, or fuel for the various inspections and tests of structures and equipment.

4. The Contractor shall furnish the services of representatives of the manufacturers of certain equipment, as prescribed in other sections of the Specifications. The Contractor shall also place their orders for such equipment on the basis that, after the equipment has been tested prior to final acceptance of the work, the manufacturer will furnish the Owner with certified statements that the equipment has been installed properly and is ready to be placed in functional operation. Tests and analyses required of equipment shall be paid for by the Contractor, unless specified otherwise in the section which covers a particular piece of equipment.

5. Where other tests or analyses are specifically required in other sections of these Specifications, the cost thereof shall be borne by the party so designated in such sections.

6. The Owner will bear the cost of all tests, inspections, or investigations undertaken by the order of the Engineer for the purpose of determining conformance with the Contract Documents if such tests, inspections, or investigations are not specifically required by the Contract Documents, and if conformance is ascertained thereby. Whenever nonconformance is determined by the Engineer as a result of such tests, inspections, or investigations, the Contractor shall bear the full cost thereof or shall reimburse the Owner for said cost. In this connection, the cost of any additional tests and investigations, which are ordered by the Engineer to ascertain subsequent conformance with the Contract Documents, shall be borne by the Contractor.

E. Temporary Facilities and Controls

a. <u>Temporary Facilities:</u>

1. General:

i. The Contractor shall provide temporary sanitary service, light and power, heating, and water service for their operations at the site unless otherwise provided as agreed to by the Owner. The temporary services shall be provided for use throughout the construction period.

ii. The Contractor shall coordinate and install all temporary services in accordance with the requirements of the utility companies having jurisdiction and as required by applicable codes and regulations.

iii. At the completion of the work, or when the temporary services are no longer required, the temporary facilities shall be restored to their original conditions.

iv. All costs in connection with the temporary services including, but not limited to, installation, utility company service charges, maintenance, relocation, and removal shall be borne by the Contractor at no additional cost to the Owner.

v. Some temporary facilities that may be required may be indicated on the Contract Drawings; however, the Contract Drawings do not necessarily show any or all of the temporary facilities that the Contractor ultimately uses to complete the work.

2. Temporary Sanitary Service:

   Sanitary conveniences, in sufficient numbers, for the use of all persons employed on the work and properly screened from public observation, shall be provided and maintained at suitable locations by the Contractor, all as prescribed by State and local requirements. The contents of same shall be removed and disposed of in a manner consistent with State and local requirements, as the occasion requires. Each Contractor shall rigorously prohibit the committing of nuisances within, on, or about the work. Sanitary facilities shall be removed from the site when no longer required.

3. Temporary Light and Power:

   i. The Contractor shall provide at their sole expense such temporary light and power as required for their operations.

   ii. Upon completion of the work, but prior to acceptance by the Owner, the Contractor shall remove all temporary services, security lighting systems, temporary general lighting systems, and all temporary electrical work from the premises.

4. Temporary Heating:

   i. The Contractor shall provide temporary heating, ventilation coverings, and enclosures necessary to properly protect all work and materials against damage by dampness and cold, to dry out the work and to facilitate work in all structures.

5. Temporary Water:

i. The Contractor shall provide temporary water service for construction purposes, sanitary facilities, fire protection, all field offices, and for cleaning. The Contractor shall pay all charges associated with the connection and all charges for potable water used under this Contract.

ii. Each Contractor shall supply potable water for their employees either by portable containers or drinking fountains.

b. First Aid Facilities and Accidents

1. First Aid Facilities:

The Contractor shall provide at the site such equipment and facilities as are necessary to supply first aid to any of their personnel who may be injured in connection with the work.

2. Accidents:

i. The Contractor shall report immediately by telephone or messenger to both the Owner and the Engineer all accidents whatsoever out of, or in connection with, the performance of the work, whether on or adjacent to the site, which cause death, personal injury, or property damage. The Contractor shall further issue a written report to the Engineer within 24 hours which describes these accidents giving full details and statements of witnesses.

ii. If any claim is made by anyone against the Contractor or a Subcontractor on account of any accidents, the Contractor shall report within 2 business days the facts, in writing, to the Engineer, giving full details of the claim.

c. Protection of Work and Material

1. During the progress of the work and up to the date of final payment, the Contractor shall be solely responsible for the care and protection of all work and materials covered by the Contract as well as other areas of the site that may be impacted by the Contractor or Subcontractors.

2. All work and materials shall be protected against damage, injury, or loss from any cause whatsoever, and the Contractor shall make good any such damage or loss at their own expense. Protection measures shall be subject to the approval of the Engineer.

d. Barricades, Warning Signs, and Lights

1. The Contractor shall provide, erect, and maintain as necessary, strong and suitable barricades, danger signs, and warning lights along all roads accessible to the public, as required by the authority having jurisdiction, to insure safety to the public. All barricades

and obstructions along public roads shall be illuminated at night and all lights for this purpose shall be kept burning from sunset to sunrise.

2. Each Contractor shall provide and maintain such other warning signs and barricades in areas of and around their respective work as may be required for the safety of all those employed in the work, the Owner's operating personnel, or those visiting the site.

e. Access Roads and Parking Areas

1. Access Roads:

i. The Contractor shall construct and maintain such temporary access roads as required to perform the work of this Contract.

ii. The Contractor shall access the site through the existing site entrance shown on the Contract Drawings or as otherwise designated by the Owner. The Contractor shall not disturb areas outside the clearing limits shown on the Contract Drawings unless approved by the Owner.

iii. Access roads shall be located within the property lines of the Owner unless the Contractor independently secures easements for their use and convenience. Contractor shall submit written documentation (consent form, etc.) to the Engineer for any Contractor secured easements across privately held property. The easement agreement shall specify terms and conditions of use and provisions for site restoration. A written release from the property owner certifying that all terms of the easement agreement have been complied with by the Contractor shall be furnished to the Engineer prior to final payment.

iv. The Contractor shall obtain all necessary permits and pay all costs associated with any bonds required by the State transportation department for the use of State maintained roads or similar requirements for local roads and private drives.

2. Parking Areas:

The Contractor shall use existing parking areas and/or construct and maintain suitable parking areas for their construction personnel on the Project site within the clearing limits shown on the Contract Drawings where approved by the Engineer and the Owner.

3. Restoration:

At the completion of the work, the surfaces of land disturbed by the Contractor’s activities, whether in the Contract Limits or not, shall be restored by the Contractor. At a minimum, such restoration shall include establishment of a permanent ground cover (Revegetation or other means acceptable to the Owner) adequate to restrain erosion for all disturbed areas. Revegetation shall be in accordance with Section 02930, Revegetation, of these Specifications. The cost of all restoration work shall be at the Contractor’s sole expense.

f. Dust and Mud Control

1. The Contractor shall take all necessary measures to control dust and mud from their operations, and to prevent spillage of excavated materials on public or site roads.

2. The Contractor shall remove all spillage of excavated materials, debris, dust, or mud from public roads by methods approved by the Engineer.

3. The Contractor shall apply water at locations and in such quantities and at such frequencies as may be required by the Owner or Engineer to control dust and mud and prevent either from becoming a nuisance to the surrounding area. Other measures (dust suppressants, etc.) may be required, as determined by the Owner or Engineer.

4. Dust and mud control and cleaning measures shall be provided at no additional cost to the Owner.

g. Traffic Regulations

The Contractor shall obey all traffic laws and comply with all the requirements, rules, and regulations of the State Department of Transportation and other local authorities having jurisdiction to maintain adequate warning signs, lights, barriers, etc. for the protection of traffic on public roadways.

h. Contractor's Field Office

At their option and upon approval by the Owner, the Contactor may furnish, equip, and maintain a field office at the site of a size required for their operations. The field office shall include in area for use by the Engineer and CQA Engineer

F. Materials and Equipment

a. General:

1. All equipment, materials, instruments, or devices incorporated in this Project shall be new and unused, unless indicated otherwise in the Contract Documents. Equipment and materials to be incorporated into the work shall be delivered sufficiently in advance of their installation and use to prevent delay in the execution of the work, and they shall be delivered as nearly as feasible in the order required for executing the work.

2. The Contractor shall protect all equipment and materials from deterioration and damage. Storage of equipment and materials shall be in locations completely protected from flooding, standing water, excessive dust, falling rock, brush fire, etc. Storage areas shall be located sufficiently distant from all construction activities and the movement of construction vehicles to minimize the potential for accidental damage. Any equipment or materials of whatever kind which may have become damaged or deteriorated from any cause shall be

removed and replaced by good and satisfactory items at the Contractor's expense for both labor and materials.

3. Equipment and materials shall be installed in accordance with the requirements of the General Conditions and the respective Specification Sections.

b. Storage of Materials and Equipment

1. The Contractor shall store their materials and equipment at the job site in accordance with the requirements of the General Conditions and as hereinafter specified. All equipment and materials shall be stored in accordance with manufacturer's recommendations and as directed by the Owner or Engineer, and in conformity to applicable statutes, ordinances, regulations, and rulings of the public authority having jurisdiction.

2. The Contractor shall enforce the instructions of the Owner and Engineer regarding the posting of regulatory signs for loadings on structures, fire safety, and smoking areas.

3. The Contractor shall not store materials or encroach upon private property without the written consent of the owners of such private property.

4. The Contractor shall not store materials in such a manner that they are exposed to weather which, in the Engineer or CQA Engineer’s opinion can alter the material properties.

5. The Contractor shall not store unnecessary materials or equipment on the job site, and shall take care to prevent any structure from being loaded with a weight which will endanger its security or the safety of persons.

6. Materials shall not be placed within ten (10) feet of fire hydrants. Gutters, drainage channels, and inlets shall be kept unobstructed at all times.

c. Connections to Equipment

1. Connections to equipment shall follow manufacturer's recommendations as to size and arrangement of connections and/or as shown in detail on the Contract Drawings or approved Shop Drawings. Piping connections shall be made to permit ready disconnection of equipment with minimum disturbance of adjoining piping and equipment.

d. Substitutions

1. Requests for substitutions of equipment or materials shall conform to the requirements of the General Conditions and as hereinafter specified.

    i. The Contractor shall submit for each proposed substitution sufficient details, complete descriptive literature, and performance data together with samples of the materials, where feasible, to enable the Owner and Engineer to determine if the proposed substitution is equal.

ii. The Contractor shall submit certified tests, where applicable, by an independent laboratory attesting that the proposed substitution is equal.

iii. A list of installations where the proposed substitution is equal.

2. Where the approval of a substitution requires revision or redesign of any part of the work, including that of other Contracts, all such revision and redesign, and all new drawings and details therefore, shall be provided by the Contractor at their own cost and expense, and shall be subject to the approval of the Owner and Engineer.

3. In the event that the Engineer is required to provide additional engineering services, then the Engineer's charges for such additional services shall be charged to the Contractor by the Owner in accordance with the requirements of the General Conditions.

4. In all cases the Owner and Engineer shall be the judge as to whether a proposed substitution is to be approved. The Contractor shall abide by their decision when proposed substitute items are judged to be unacceptable and shall in such instances furnish the item specified or indicated. No substitute items shall be used in the work without written approval of the Owner and Engineer.

5. The Contractor shall have and make no claim for an extension of time or for damages by reason of the time taken by the Engineer in considering a substitution proposed by the Contractor or by reason of the failure of the Engineer to approve a substitution proposed by the Contractor.

6. Acceptance of any proposed substitution shall in no way release the Contractor from any of the provisions of the Contract Documents.

G. Project Closeout

a. Final Cleaning

1. At the completion of the work, the Contractor shall remove all rubbish from and about the site of the work, and all temporary structures, construction signs, tools, scaffolding, materials, supplies, and equipment which they or any of their Subcontractors may have used in the performance of the work.

2. The Contractor shall thoroughly clean all materials, equipment, and structures so as to leave work in a clean and new appearing condition.

3. The Contractor shall maintain cleaning until the Project, or portion thereof, is occupied by the Owner.

b. Spare Parts and Special Tools (Where Applicable)

1. Spare Parts:

i. As soon as practicable after approval of the list of equipment, the Contractor shall furnish spare parts data for each different item of equipment listed. The data shall include a complete list of parts and supplies, with current unit prices, and source or sources of supply.

ii. The Contractor shall also furnish a list of parts and supplies that are either normally furnished at no extra cost with the purchase of the equipment or specified to be furnished as part of the Contract and a list of additional items recommended by the manufacturer to assure efficient operation for a period of one hundred and twenty (120) days for the particular installation.

iii. All parts shall be securely boxed and tagged, and clearly marked on the box and individually for identification as to the name of manufacturer or supplier, applicable equipment, part number, description, and location in the equipment. All parts shall be protected and packaged for a shelf life of at least ten (10) years.

2. Special Tools:

i. The Contractor shall furnish at no additional cost to the Owner with each piece of equipment as a minimum, one (1) complete set, or the number of sets called for in the Specifications, of suitably marked special tools and appliances which may be needed to adjust, operate, maintain, or repair the equipment.

ii. The Contractor shall submit, for approval by the Engineer, a complete list of the special tools and appliances to be furnished. Such tools and appliances shall be furnished in approved painted steel cases properly labeled and equipped with good grade cylinder locks and duplicate keys.

c. Final Cleanup: Site Rehabilitation

1. Before finally leaving the site, the Contractor shall wash and clean all exposed surfaces which have become soiled or marked, and shall remove from the site of work all accumulated debris and surplus materials of any kind which result from their operation, including construction equipment, tools, sheds, sanitary enclosures, etc. The Contractor shall leave all equipment, fixtures, and work, which they have installed, in a clean condition. The completed Project shall be turned over to the Owner in a neat and orderly condition.

2. The site of the work shall be rehabilitated or developed in accordance with other sections of the Specifications and the Drawings. In the absence of any portion of these requirements, the Contractor shall completely rehabilitate the site to a condition and appearance equal or superior to that which existed just prior to construction, except for those items whose permanent removal or relocation was required in the Contract Documents or ordered by the Owner.

d. Final Inspection

1. Final cleaning and repairing shall be so arranged as to be finished upon completion of the construction work. The Contractor will make their final cleaning and repairing, and any portion of the work finally inspected and accepted by the Engineer shall be kept clean by the Contractor, until the final acceptance of the entire work.

2. When the Contractor has finally cleaned and repaired the whole or any portion of the work, they shall notify the Engineer that they are ready for final inspection of the whole or a portion of the work, and the Engineer will thereupon inspect the work. If the work is not found satisfactory, the Engineer will order further cleaning, repairs, or replacement.

3. When such further cleaning or repairing is completed, the Engineer, upon further notice, will again inspect the work. The "Final Payment" will not be processed until the Contractor has complied with the requirements set forth, and the Engineer has made their final inspection of the entire work and is satisfied that the entire work is properly and satisfactorily constructed in accordance with the requirements of the Contract Documents.

e. <u>Project Closeout</u>

1. As construction of the Project enters the final stages of completion, the Contractor shall, in concert with accomplishing the requirements set forth in the Contract Documents, attend to or have already completed the following items as they apply to their contract:

   i. Scheduling equipment manufacturers visits to site.

   ii. Required testing of Project components.

   iii. Scheduling start-up and initial operation.

   iv. Scheduling and furnishing skilled personnel during initial operation.

   v. Correcting or replacing defective work, including completion of items previously overlooked or work which remains incomplete, all as evidenced by the Engineer's "Punch" Lists.

   vi. Attend to any other items listed herein or brought to the Contractor's attention by the Engineer.

2. In addition, and before the Certificate of Substantial Completion is issued, the Contractor shall submit to the Engineer (or to the Owner if indicated) certain records, certifications, etc. which are specified elsewhere in the Contract Documents. A partial list of such items appears below, but it shall be the Contractor's responsibility to submit any other items which are required in the Contract Documents:

   i. Test results of Project components.

   ii. Performance Affidavits for equipment.

iii. Certification of equipment or materials in compliance with Contract Documents.

iv. Operation and maintenance instructions or manuals for equipment.

v. One set of neatly marked-up record drawings showing as-built changes and additions to the work under their Contract.

vi. Any special guarantees or bonds (Submit to Owner).

The Contractor's attention is directed to the fact that required certifications and information under some items above must actually be submitted earlier in accordance with other sections of the Specifications.

H. Site Preparation

a. Description: Site Preparation includes clearing, grubbing, and/or stripping operations.

1. General:
   i. The Contractor shall furnish all labor, material, and equipment to complete Site Preparation in accordance with the Contract Drawings and these Specifications.

   ii. Principal items of work include:

      a. Notifying all authorities owning utility lines running to or on the property. Protect and maintain all utility lines to remain and cap those that are not required in accordance with instructions of the Utility Companies, and all other authorities having jurisdiction.

      b. Clearing the site within the clearing limits, including removal of grass, brush, shrubs, trees, loose debris, and other encumbrances except for trees to remain.

      c. Boxing and protecting all areas to be preserved.

      d. Removing all topsoil from designated areas and stockpiling on site where directed by the Engineer for future use.

      e. Disposing from the site all debris resulting from work under this Section.

b. Materials:

1. Tree Protection Fence:

Tree protection fence shall be constructed as shown on the Contract Drawings and as directed by the Engineer. It is made of a high visibility fabric supported by posts. Tree protection fence shall conform to the following:

i. Posts: Posts shall be 1.3 lbs/linear foot steel ("T" – type) with a minimum length of 5 feet. Posts shall be installed at an 8-foot maximum spacing.

ii. Fabric: Fabric shall consist of orange plastic mesh having a height of 48 inches, maximum porosity of 55%, and containing UV stabilizers to minimize degradation. The selected fabric shall be demonstrated for use in this or similar applications.

iii. Signage: Signs labeled "TREE PROTECTION AREA DO NOT ENTER" shall be attached to the fence every 50 LF with no less than one sign per protected area.

c. Submittals

1. The Contractor shall submit the following to the Engineer prior to performance of the work:

i. Product information for tree protection fence.

ii. Location for disposal of clearing debris and waste.

d. Construction

1. Clearing of the Site:

i. Clearing limits, as shown on the Contract Drawings, shall be established by the Contractor's Surveyor. Once established, the clearing limits shall be inspected and approved by the Engineer prior to clearing the affected areas.

ii. Install tree protection fencing (where applicable) and required erosion and sedimentation control measures prior to performing clearing and grubbing activities.

iii. Before the start of excavation and grading operations, the areas within the clearing limits shown on the Contract Drawings shall be cleared and grubbed.

iv. Clearing shall consist of cutting, removal, and satisfactory disposal of all trees, fallen timber, brush, bushes, rubbish, fencing, and other perishable and objectionable material.

Should it become necessary to remove a tree, bush, brush, or other plants outside the clearing limits, the Contractor shall do so only after permission has been granted by the Engineer.

v. Where necessary, excavation resulting from the removal of trees, roots, and the like shall be filled with suitable material, as approved by the Engineer, and thoroughly compacted per the requirements contained in Section 02223, Embankment, of these Specifications.

vi. In temporary construction easement locations, only those trees and shrubs shall be removed which are in actual interference with excavation or grading work under this Contract, and removal shall be subject to approval by the Engineer. However, the Engineer reserves the right to order additional trees and shrubs removed at no additional cost to the Owner, if such, in their opinion, they are too close to the work to be maintained or have become damaged due to the Contractor's operations.

2. Stripping and Stockpiling Existing Topsoil:

i. Existing topsoil and sod on the site within areas designated on the Contract Drawings shall be stripped to whatever depth it may occur, and stored in locations directed by the Engineer.

ii. The topsoil shall be free of stones, roots, brush, rubbish, or other unsuitable materials before stockpiling.

iii. Care shall be taken not to contaminate the stockpiled topsoil with any unsuitable materials.

3. Grubbing:

i. Grubbing shall consist of the removal and disposal of all stumps, roots, logs, sticks, and other perishable materials to a depth of at least 6 inches below ground surfaces.

ii. Large stumps located in areas to be excavated may be removed during grading operations, subject to the approval of the Engineer.

4. Disposal of Cleared and Grubbed Material:

No open burning of clearing debris will be allowed on this project. All trees, stumps, roots, bushes, etc. shall be removed from the site and disposed of by the Contractor.

I. Excavation

a. Description: Excavation includes excavating, sealing, hauling, scraping, undercutting, removal of accumulated surface water or ground water, stockpiling, and all necessary and incidental items as required for bringing related structures to the specified lines and grades.

1. General: The Contractor shall furnish all labor, material, and equipment required to complete Excavation of the project area in accordance with the Contract Drawings and these Specifications, except as noted below:

i. Clearing and grubbing and removal of topsoil is addressed in Site Preparation, of these Specifications.

2. Definitions:

i. Excavation: shall consist of the removal and satisfactory disposal and/or stockpiling of all materials (borrow and/or unsuitable materials included) located with the limits of construction including widening cuts and shaping of slopes necessary for the preparation of roadbeds, slope areas, cutting of any ditches, channels, waterways, entrances, and other work incidental thereto.

ii. Borrow: shall consist of approved on-site material required for the construction of embankments/fills or for other portions of the work.

iii. Unsuitable Material: is any in-place or excavated material which contains undesirable materials or is in a state which is not appropriate, in the opinion of the Engineer, for the intended use or support of planned structures, embankment, or excavation. This may include but not be limited to organic material, waste/refuse, soft, or wet material not meeting required specifications, etc.

iv. Unsuitable Material Overexcavation: shall consist of the removal and satisfactory disposal of all unsuitable material located within the limits of construction and below subgrade elevations shown or indicated on the Contract Drawings. Where excavation to the subgrade elevations results in a subgrade or slopes of unsuitable material, the Contractor shall overexcavate such material to below the grades shown or indicated on the Contract Drawings or as otherwise directed by the Engineer.

b. Materials

1. Excavation shall include the removal of all soil, weathered rock, boulders, conduits, pipe, unsuitable material, and all other obstacles encountered and shown or indicated on the Contract Drawings and/or specified herein.

c. Submittals

The Contractor shall submit the following to the CQA Engineer:

1. Information on Excavation equipment to be used.

2. For excavations not shown on the Contract Drawings and if requested by the Engineer, submit excavation plans clearly showing the limits and slopes of the proposed excavation.

d. Construction

1. The Contractor shall conduct Excavation activities in such a manner that erosion of disturbed areas and off-site sedimentation is absolutely minimized as outlined in Section 02270, Erosion and Sedimentation Control, of these Specifications.

2. The Contractor shall excavate to the lines and grades shown on the Contract Drawings. As the excavation is made, the materials will be examined and identified to the Engineer.

The Contractor will perform all surveys necessary to establish and verify lines and grades for all Excavation, including pipe excavations, soil overexcavation, and anchor trenches.

3. Stockpiling:

   The Contractor shall stockpile materials as needed in appropriate stockpiles as approved by the Engineer.

   Stockpiles shall be properly sloped and the surfaces sealed by the Contractor at the end of each working day, or during the day in the event of heavy rain, to the satisfaction of the Engineer.

4. The Contractor shall protect all existing facilities and structures including, but not limited to, existing utilities, monitoring wells, signs, grade stakes, etc. during the grading and stockpiling operations.

5. All excavations shall be made in the dry and in such a manner and to such widths as will give ample room for properly constructing and inspecting the structures and/or piping they are to contain and for such sheeting, timbering, pumping, and drainage as may be required.

6. The Contractor shall be responsible for the control of surface and subsurface water when necessary. Except for certain erosion and sedimentation control measures and other areas designated to impound water, all areas shall be graded to drain.

7. Excavation slopes shall be flat enough to avoid sloughs and slides that will cause disturbance of the subgrade or damage of adjacent areas. Slides and overbreaks which occur due to negligence, carelessness, or improper construction techniques on the part of the Contractor shall be removed and disposed of by the Contractor as directed by the Engineer at no additional cost to the Owner.

8. The intersection of slopes with natural ground surfaces, including the beginning and ending of cut slopes, shall be uniformly rounded. All protruding roots and other vegetation shall be removed from slopes.

9. The bottom of all excavations for structures and pipes shall be examined by the Engineer for bearing value and the presence of unsuitable material. If, in the opinion of the Engineer, additional Excavation is required due to the low bearing value of the subgrade material, or if the in-place materials are soft, yielding, pumping and wet, the Contractor shall remove such material to the required width and depth and replace it with thoroughly compacted structural fill, or material directed by the Engineer. No payment will be made for subgrade disturbance caused by inadequate Dewatering or improper construction methods.

10. Any areas excavated below design subgrade elevations by the Contractor, unless directed by the Engineer, shall be brought back to design elevations at no cost to the Owner. The

Contractor shall place and compact such material in accordance with Section 02223, Embankment, of these Specifications.

11. The Contractor shall dispose of excess or unsuitable excavation materials on-site at location(s) approved by the Owner.

12. The Contractor shall properly level-off bottoms of all excavations. Proof-rolling shall be conducted with appropriate equipment.

13. Upon reaching subgrade elevations shown in excavation areas, the Contractor shall scarify subgrade soils to a minimum depth of 6" and obtain the Engineer's approval of quality. If unsuitable materials are encountered at the subgrade elevation, perform additional excavations as approved by the Engineer to remove unsuitable materials.

14. Overexcavation and Backfill:

    i. Where subgrade materials are determined to be unsuitable, such materials shall be removed by the Contractor to the lengths, widths, and depths approved by the Engineer in advance and backfilled with compacted Embankment in accordance with Section 02223, Embankment, of these Specifications.

    ii. No additional payment will be made for such overexcavation and backfill 1 foot or less than the finished subgrade (or pre-existing grades where pre-existing grades are lower than finished subgrade) as this is considered superficial.

    iii. Where overexcavation of unsuitable material is greater than 1 foot beneath the finished subgrade (or pre-existing grades where pre-existing grades are lower than finished subgrade), payment shall be made on a unit price basis for overexcavation and backfill and the measured quantity shall include the entire excavation quantity below the finished subgrade (or pre-existing grades where pre-existing grades are lower than finished subgrade) elevations. The unit price for overexcavation and backfill shall include disposal of unsuitable materials.

15. All cuts shall be brought to the grade and cross section shown or indicated on the Contract Drawings, or established by the Engineer, prior to final inspection.

16. The Contractor shall protect finished lines and grades of completed excavation against excessive erosion, damage from trafficking, or other causes and shall repair any damage at no additional cost to the Owner.

17. Trench Excavation:

    i. All pipe Excavation and trenching shall be done in strict accordance with these Specifications, all applicable parts of the OSHA Regulations, 29 CFR 1926, Subpart P, and other applicable regulations. In the event of any conflicts in this information,

safe working conditions as established by the appropriate OSHA guidelines shall govern.

ii. The minimum trench widths shall be as indicated on the Contract Drawings. Enlargements of the trench shall be made as needed to give ample space for operations at pipe joints. The width of the trench shall be limited to the maximum dimensions shown on the Contract Drawings, except where a wider trench is needed for the installation of and work within sheeting and bracing.

iii. Except where otherwise specified, excavation slopes shall be flat enough to avoid slides which will cause disturbance of the subgrade, damage to adjacent areas, or endanger the lives or safety of persons in the vicinity.

iv. Hand excavation shall be employed wherever, in the opinion of the Engineer, it is necessary for the protection of existing utilities, poles, trees, pavements, obstructions, or structures.

v. No greater length of trench in any location shall be left open, in advance of pipe laying, than shall be authorized or directed by the Engineer and, in general, such length shall be limited to approximately one hundred (100) feet.

vi. Pipe Bedding: All pipe bedding shall be as shown on the Contract Drawings, unless otherwise specified herein, or shall be approved by the Engineer.

18. Sheeting and Bracing:

i. The Contractor shall furnish, place, and maintain such sheeting and bracing which may be required to support sides of Excavation or to protect pipes and structures from possible damage and to provide safe working conditions in accordance with current OSHA requirements. If the Engineer is of the opinion that at any point sufficient or proper supports have not been provided, they may order additional supports put in at the sole expense of the Contractor. The Contractor shall be responsible for the adequacy of all sheeting and bracing used and for all damage resulting from sheeting and bracing failure or from placing, maintaining, and removing it.

ii. The Contractor shall exercise caution in the installation and removal of sheeting to insure that excessive or unusual loadings are not transmitted to any new or existing structure. The Contractor shall promptly repair at their expense any and all damage that can be reasonably attributed to sheeting installation or removal.

iii. All sheeting and bracing shall be removed upon completion of the work.

19. If grading operations are suspended for any reason whatsoever, partially completed cut and fill slopes shall be brought to the required slope and the work of seeding and mulching or other required erosion and sedimentation control operations shall be performed at the Contractor's sole expense.

J. Embankment

a. Description: Embankment is the on-site compacted fill that provides the foundation and the berms, the subgrade for some access roadways and structures, and backfill around structures and piping.

1. General: The Contractor shall furnish all labor, material, and equipment to complete Embankment including borrowing, hauling, screening, discing, drying, compaction, control of surface and subsurface water, final grading, sealing, and all necessary and incidental items as detailed or required to complete the Embankment, all in accordance with the Contract Drawings and these Specifications.

2. Reference Standards:

The latest revision of the following standards of the American Society of Testing and Materials (ASTM) are hereby made a part of these Specifications.

ASTM D 698	Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3).
ASTM D 1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
ASTM D 2167	Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
ASTM D 2216	Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
ASTM D 2487	Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
ASTM D 2488	Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).
ASTM D 2937	Standard Test Method for Density of Soil in Place by the Drive Cylinder Method.
ASTM D 4643	Standard Test Method for Determination of Water (Moisture) Content of Soil by the Microwave Oven Method.
ASTM D 4959	Standard Test Method for Determination of Water (Moisture) Content of Soil by Direct Heating Method.
ASTM D 6938	Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

3. Definitions:

i. Embankment: Shall include construction of all site earthwork including roadways, subgrade, perimeter berm embankments, including preparation of the areas upon which materials are to be placed. Embankment may also be referred to as structural and/or controlled fill. All Embankment materials may be either (off-site) Select Borrow or (on-site) Borrow unless otherwise noted on Contract Drawings or specified by the Engineer.

ii. Prepared Subgrade: The ground surface after clearing, grubbing, stripping, excavation, scarification, and/or compaction, and/or proof rolling to the satisfaction of the Engineer.

iii. Well-Graded: A mixture of particle sizes that has no specific concentration or lack thereof of one or more sizes. Well-graded does not define any numerical value that must be placed on the coefficient of uniformity, coefficient of curvature, or other specific grain size distribution parameters. Well-graded is used to define a material type that, when compacted, produces a strong and relatively incompressible soil mass free from detrimental voids.

iv. Unclassified Fill: The nature of materials to be used is not identified or described herein but must be approved by the Engineer prior to use.

b. Materials

1. Embankment materials shall consist of clean well-graded natural soil classified as SP, SW, SM, SC, ML, or CL (ASTM D 2487) containing no topsoil or other deleterious material. Additionally, for the upper 3 feet beneath the final wearing surface of roadways including shoulders, Embankment materials shall have a liquid limit less than 50%, a plasticity index less than 20% (ASTM D 2487) and have a maximum standard Proctor dry density of at least 100 pounds per cubic foot (ASTM D 698).

   Other material classifications may be approved by the Engineer.

2. Stones or rock fragments shall not exceed one half the maximum lift thickness as compacted in any dimension. Isolated rocks shall be a maximum of 24-inches in any dimension.

c. Submittals

The Contractor shall submit the following to the Engineer:

1. Information on equipment to be used for construction of Embankment.

2. Descriptive information on the location and source of any off-site borrow material to be used for Embankment, where applicable. Information shall include Standard Proctor curves (ASTM D698) for each borrow material.

d. Construction

1. The Contractor shall conduct Embankment activities in such a manner that erosion of disturbed areas and off-site sedimentation is absolutely minimized as outlined in Section 02270, Erosion and Sedimentation Control, of these Specifications.

2. All placement and compaction of Embankment shall be performed only when the Engineer is informed by the Contractor of intent to perform such work.

3. Embankment shall be placed and compacted to the lines and grades shown on the Contract Drawings. Placement of Embankment outside the construction limits shall occur only as directed and approved by the Engineer.

   The Contractor will perform all surveys necessary to establish and verify lines and grades for all Embankment.

4. The Contractor shall protect all existing facilities including, but not limited to, utilities and monitoring wells.

5. Subgrade Preparation:

   i. The Engineer shall inspect the exposed subgrade prior to placement of Embankment to assure that all rocks, topsoil, vegetation, roots, debris, or other deleterious materials have been removed.

   ii. Prior to placement of Embankment, the exposed subgrade shall be proofrolled using a static smooth-drum roller, loaded tandem axle dump truck, or other suitable equipment in the presence of the Engineer. Any soft or unsuitable materials revealed before or during the in-place compaction shall be removed as directed by the Engineer and replaced with suitable Embankment.

6. Surfaces on which Embankment is to be placed, shall be scarified or stepped in a manner which will permit bonding of the Embankment with the existing surface.

7. The Contractor shall be responsible for preparing the materials for the Embankment, including but not limited to, in-place drying or wetting of the soil necessary to achieve the compaction criteria of these Specifications.

8. The Contractor shall be responsible for the control of surface and subsurface water, when necessary. Except for certain erosion and sedimentation control measures and other areas designated to impound water, all areas shall be graded to drain.

9. Embankment materials shall be placed in a manner permitting drainage and in continuous, approximately horizontal layers.

10. Compaction Requirements:

i. The Contractor shall compact Embankment in accordance with the requirements shown in Table 1 of this section. If Embankment does not meet the specified requirements, the Contractor shall rework the material, as may be necessary and continue compaction to achieve these requirements, or remove and replace the material to achieve the specified requirements, at Contractor's expense.

ii. Each lift shall be compacted prior to placement of succeeding lifts. In confined areas, mechanical equipment, suitable for small areas and capable of achieving the density requirements, shall be required.

iii. Lift compaction shall be performed with an appropriately heavy, properly ballasted, penetrating-foot or smooth-drum vibratory compactor depending on soil type. Compaction equipment shall be subject to approval by the Engineer.

11. Embankment that becomes excessively eroded, soft, or otherwise unsuitable shall be removed or repaired by the Contractor as directed by the Engineer, at no cost to the Owner.

12. The exposed surface of Embankment shall be rolled with a smooth-drum roller at the end of each work day to protect from adverse weather conditions.

13. Where Embankment is to be placed and compacted on slopes that are steeper than 3H:1V, the subgrade shall be benched to a minimum depth of 6 inches and the Embankment shall be placed in horizontal lifts.

14. <u>Backfilling for Structures and Piping:</u>

i. All structures, including manholes and pipes shall be backfilled with Embankment as shown in the Contract Drawings and as described in these Specifications.

ii. Where sheeting is used, the Contractor shall take all reasonable measures to prevent loss of support beneath and adjacent to pipes and existing structures when sheeting is removed. If significant volumes of soil cannot be prevented from clinging to the extracted sheets, the voids shall be continuously backfilled as rapidly as possible. The Contractor shall thereafter limit the depth below subgrade that sheeting will be driven in similar soil conditions or employ other appropriate means to prevent loss of support.

iii. When backfilling around structures, do not backfill until concrete has sufficiently cured (as determined by the Engineer) and is properly supported. Place backfill in a manner to avoid displacement or damage of structures.

Table 1: Required Embankment Properties

Item	**Required % Standard Proctor (ASTM D698)[2]**	**Required Moisture Content[3]**	**Maximum Lift Thickness (Compacted) (inches)**
Embankment Beneath Structures and Roads[1]	100	+/- 2% of Optimum (std. Proctor)	8
Embankment	95	As Required for Compaction	8
Backfill Around Structures	95		8
Backfill in Pipe Trenches	95		6
Unclassified Fill	N/A	N/A	N/A

Notes:
1. Embankment beneath structures shall be considered to include a zone 10 feet out from the foundation of the structure extending down to the natural ground on a 45° slope. Embankment beneath roads shall be considered to include all embankment placed within 3 vertical feet of the final wearing surface and shall also include shoulders.
2. Determine field density using ASTM D 6938, ASTM D 1556, ASTM D 2167, or ASTM D 2937.
3. Determine field moisture content using ASTM D 6938, ASTM D 2216, ASTM D 4643, or ASTM D 4959.
4. The Engineer may allow exceptions to the above criteria for areas outside of the containment area which are not subject to significant long-term loads.

K. Geotextiles

a. Description: For the proposed construction, a Type GT-S (Separator/Filter) Geotextile is specified. The Type GT-S Geotextile will be placed between soil subgrade and aggregate in access roads, and in some erosion control and drainage applications.

1. General:

The Contractor shall furnish all labor, material, and equipment to complete installation of Geotextiles including all necessary and incidental items as detailed or required for the Contractor to complete the installation in accordance with the Contract Drawings and these Specifications.

2. Reference Standards:

The latest revision of the following standards of the American Society of Testing and Materials (ASTM) and the American Association of State Highway and Transportation Officials (AASHTO) are hereby made a part of these specifications.

ASTM D 4355	Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon-Arc Type Apparatus.
ASTM D 4491	Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
ASTM D 4533	Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
ASTM D 4632	Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
ASTM D 4751	Standard Test Method for Determining Apparent Opening Size of a Geotextile.
ASTM D 5261	Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
ASTM D 6241	Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile Related Products Using a 50 mm Probe.
AASHTO M 288	Standard Specification for Geotextiles.

b. Materials:

1. General:

   The materials supplied under these Specifications shall consist of new, first-quality products designed and manufactured specifically for the purpose of this work, which shall have been satisfactorily demonstrated, by prior use, to be suitable and durable for such purposes.

   Labels on each roll of Geotextile shall identify the length, width, lot and roll numbers, and name of Manufacturer.

2. The Type GT-S Geotextile shall be a nonwoven spunbonded or nonwoven needlepunched synthetic fabric consisting of polyester or polypropylene manufactured in a manner approved by the Engineer. Woven fabrics may be used in certain applications if approved in advance by the Engineer.

3. Needle Detection and Removal Procedures:

   Manufacturers of Geotextiles shall use needle detection and removal devices (e.g. metal detectors and magnets) in the manufacture of needle-punched geotextiles.

4. All Geotextiles shall conform to the properties listed in Table 1 of this section.

c. Submittals

Prior to the installation of Geotextiles, the Contractor shall submit the following to the CQA Engineer:

1. Mill Certificate and Sample: Prior to shipping to the site, the Contractor shall submit a mill certificate or affidavit signed by a legally authorized official of the Manufacturer for each type of Geotextile attesting that the Geotextiles meet the physical and manufacturing requirements stated in these Specifications including needle detection and removal procedures (as applicable). The Contractor shall also submit a sample of each Geotextile to be used. The samples shall be labeled with the product name and be accompanied by the Manufacturer's specifications.

2. Shipping, Handling, and Storage Instructions: The Manufacturer's plan for shipping, handling, and storage shall be submitted for review.

3. Seaming Procedures: Submit proposed seaming procedures including proposed method and equipment.

4. Quality Control Certificates: For Geotextiles delivered to the site, quality control certificates, signed by the Manufacturer's quality assurance manager shall be provided which represent every roll of each type of Geotextile supplied. Each certificate shall have the roll identification number(s), test methods, frequency, and test results. At a minimum, the test results and frequency of testing shall be as shown in Table 2 of this section.

5. Furnish copies of the delivery tickets or other approved receipts as evidence for materials received that will be incorporated into the construction.

d. Construction

1. Shipping, Handling, and Storage:

All Geotextiles shall be shipped, handled, and stored in strict accordance with the Manufacturer's recommendations.

2. Failing CQA Material Control Tests:

Geotextiles that are rejected upon testing shall be removed from the project site and replaced at Contractor's cost. Sampling and CQA testing of Geotextiles supplied as replacement for rejected material shall be performed by the Engineer at Contractor's cost.

3. Installation:

i. The surface receiving the Geotextiles shall be prepared to a relatively smooth condition, free of obstructions, standing water, excessive depressions, debris, and very

soft, excessively wet, and/or loose pockets of soil. This surface shall be approved by the Engineer prior to Geotextile placement.

ii. Geotextiles shall be placed to the lines and grades shown on the Contract Drawings. At the time of installation, Geotextiles shall be rejected by the Engineer if they have defects, rips, holes, flaws, evidence of deterioration, or other damage.

iii. The Geotextiles shall be placed smooth and free of excessive wrinkles.

iv. On slopes, Geotextiles shall be anchored at the top and unrolled down the slope. In the presence of wind, all Geotextiles shall be weighted with sandbags or other material as appropriate. Geotextiles uplifted by wind may be reused upon approval by the Engineer.

4. Seams:

i. All Geotextile seams shall be continuously sewn or heat bonded with methods approved by the Engineer. Overlapping of seams may also be allowed if approved in advance by the Engineer. All seams must be approved by the Engineer.

ii. On slopes of 6H:1V or steeper, all seams shall be oriented parallel to (in the direction of) the slope unless otherwise approved by the Engineer.

iii. Seams to be sewn shall be sewn using a Type 401 stitch. One or two rows of stitching may be used. Each row of stitching shall consist of 4 to 7 stitches per inch. The minimum distance from the geotextile edge to the stitch line nearest to that edge (seam allowance) shall be 1.5 inches if a Type SSa (prayer or flat) seam is used. The minimum seam allowance for all other seam types shall be 1.0 inches.

iv. Seams to be heat bonded shall be bonded using hot plate, hot knife, ultrasonic, or other approved devices.

5. Repair Procedures:

i. Any Geotextile that is torn, punctured, or otherwise damaged shall be repaired or replaced, as directed by the Engineer, by the Contractor at no additional cost to the Owner. The repair shall consist of a patch of the same type of Geotextile placed over the failed areas and shall overlap the existing Geotextile a minimum of 18 inches from any point of the rupture. Patches shall be spot sewn or heat bonded so as not to shift during cover placement.

6. Cover Placement:

i. Except when designed to remain exposed, Geotextiles shall be covered in a timely manner to limit potential UV damage. Unless otherwise approved by the Engineer, covering shall occur within 30 days of installation. Extension of this time may be

considered by the Engineer based on weather conditions (i.e. prolonged cloud cover during 30 day period) or technical information provided by the Manufacturer that would justify an extension.

a. The Engineer may conduct sampling and testing of any Geotextiles exposed for a period longer than allowed to verify the material properties. The cost associated with this testing and the subsequent repair(s) shall be borne solely by the Contractor regardless of the test results. In no case will the maximum length of exposure be greater than 60 days without verification of material properties.

ii. Placement of cover over Geotextiles shall be performed in a manner as to ensure that the Geotextiles or underlying materials are not damaged. Cover material shall be placed such that excess tensile stress is not mobilized in the Geotextile.

Table 1: Required Geotextile Properties

Property	**Test Method**	**Units**	**Value**[1]
			Type GT-S
Geotextile Construction (NW = Nonwoven) (W = Woven)	-----	-----	NW[2] or W[3]
Mass per Unit Area (Unit Weight)	ASTM D 5261	oz/yd^2	N/A
UV Resistance (500 hrs)	ASTM D 4355	%	70
Strength Class[4]	AASHTO M 288	Class	2
Tensile Properties:	ASTM D 4632		
Grab Strength		lbs	160 (NW) 250 (W)
Grab Elongation		%	$\geq$ 50 (NW) < 50 (W)
Puncture Resistance	ASTM D 6241	lbs	410 (NW) 950 (W)
Trapezoidal Tear Strength	ASTM D 4533	lbs	55 (NW) 90 (W)
Apparent Opening Size (AOS)	ASTM D 4751	U.S. Sieve	70+
Permittivity	ASTM D 4491	sec^{-1}	1.0

Notes:
1. Minimum Average Roll Value (MARV).

2. Nonwoven geotextiles that have been heat calendered are not acceptable, unless approved by the Engineer in advance.
3. Woven geotextiles shall be approved in advance by the Engineer. Woven geotextiles formed exclusively with slit film fibers are not acceptable.
4. AASHTO M 288 criteria include the above listed requirements for: Tensile Properties, Puncture Resistance, Trapezoidal Tear Strength, and Burst Strength.

Table 2: Required Manufacturer Quality Control Tests

Property	**Test Method**	**Minimum Test Frequency**
Mass per Unit Area (Unit Weight)	ASTM D 5261	200,000 ft^2
Ultraviolet Resistance (500 hrs)	ASTM D 4355	Periodic
Tensile Properties	ASTM D 4632	200,000 ft^2
Apparent Opening Size (AOS)	ASTM D 4751	Periodic
Permittivity	ASTM D 4491	Periodic
Puncture Resistance	ASTM D 6241	200,000 ft^2
Trapezoidal Tear Strength	ASTM D 4533	200,000 ft^2

L. Erosion & Sedimentation Control

a. Description: Erosion and Sedimentation Control is a system of construction and engineered measures (devices, structures, practices, etc.) which act to minimize surface water induced erosion of disturbed areas and the resulting off-site sedimentation.

1. General:

The Contractor shall furnish all labor, material, and equipment to complete installation of and maintain Erosion and Sedimentation Control measures and related work in accordance with the Contract Drawings and these Specifications.

All Erosion and Sedimentation Control work shall be in accordance with the latest edition of the North Carolina Erosion and Sediment Control Planning and Design Manual as well as applicable regulations.

2. Reference Standards:

The latest revision of the following standards of the American Society of Testing and Materials (ASTM) are hereby made a part of these specifications.

ASTM D 3786	Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics: Diaphragm Bursting Strength Tester Method.
ASTM D 4355	Standard Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus).
ASTM D 4491	Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
ASTM D 4533	Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
ASTM D 4632	Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
ASTM D 4751	Standard Test Method for Determining Apparent Opening Size of a Geotextile.
ASTM D 4833	Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.

b. Materials:

1. Permanent Drainage Channels, Infiltration Trenches, Swales, and Ditches:

   Permanent drainage channels, infiltration trenches, swales, and ditches shall be constructed as shown on the Contract Drawings.

2. Silt Fence:

   Silt fences shall be constructed as shown on the Contract Drawings and as needed, based on the Contractor's discretion and Engineer's approval. The silt fence is a permeable barrier erected within and downgradient of small disturbed areas to capture sediment from sheet flow. It is made of filter fabric buried at the bottom, stretched, and supported by posts and wire mesh backing. Silt fence shall conform to the following properties:

   i. Posts: Posts shall be 1.33 lb/linear foot steel (preferred) or wood with a minimum length of 5 feet. Steel posts shall be "U" or "T"-type. Wood posts shall have a minimum diameter of 4-inches.

   ii. Filter Fabric: Filter fabric shall be a woven geotextile made specifically for sediment control. Filter fabric shall conform to the properties listed in Table 1 of this section.

3. Stone Filter Fence:

   Stone filter fence shall be constructed as shown on the Contract Drawings.

4. Geotextiles:

   Geotextiles shall conform to the requirements of Geotextiles, of these Specifications.

5. Rip Rap:

Rip Rap shall conform to the requirements of Rip Rap, of these Specifications.

6. Rolled Erosion Control Products (RECPs):

   Rolled Erosion Control Products (RECPs) shall conform to the requirements of Rolled Erosion Control Products, of these Specifications.

7. Other Work:

   In addition to the Erosion and Sedimentation Control measures shown on the Contract Drawings, the Contractor shall provide adequate means to prevent any sediment from entering any storm drains, drop inlets, ditches, streams, or bodies of water downstream of any area disturbed by construction. Excavation materials shall be placed upstream of any trench or other excavation to prevent sedimentation of off-site areas. In areas where a natural buffer area exists between the work area and the closest stream or water course, this area shall not be disturbed. All paved areas shall be scraped and swept as necessary to prevent the accumulation of dirt and debris. Work associated with this provision shall be considered incidental to the project and no separate payment will be made.

c. Submittals

The Contractor shall submit the following to the Engineer:

1. Submit a certification and summary of all required test results, prior to installation, that all Erosion and Sedimentation Control materials manufactured for the project have been produced in accordance with these Specifications.

2. Furnish copies of the delivery tickets or other approved receipts as evidence for materials received that will be incorporated into construction.

d. Construction

1. Establishment of Erosion and Sedimentation Control Measures:

   i. All Erosion and Sedimentation Control measures will be constructed according to the Contract Drawings and these Specifications.

   ii. Due to the nature of the work required by this Contract, it is anticipated that the location and nature of the Erosion and Sedimentation Control measures may need to be adjusted to reflect the current phase of construction.

   iii. Erosion and Sedimentation Control measures shall be established prior to the work in a given area. Where such practice is not feasible, the Erosion and Sedimentation

Control measure(s) shall be established immediately following completion of the clearing operation.

iv. The construction schedule adopted by the Contractor will impact the placement and need for specific measures required for the control of erosion. The Contractor shall develop and implement such additional techniques as may be required to minimize erosion and prevent or correct the discharge of sediment outside the limits of construction (unless controlled by other on-site measure(s)).

v. The location and extent of Erosion and Sedimentation Control measures shall be revised at each phase of construction that results in a change in either the quantity or direction of surface runoff from construction areas. All deviations from the control provisions shown on the Contract Drawings shall have the prior approval of the Engineer.

2. Inspection and Maintenance of Erosion and Sedimentation Control Measures:

i. The Contractor shall furnish the labor, material, and equipment required for the inspection and maintenance of all Erosion and Sedimentation Control measures. Maintenance shall be scheduled as required for a particular measure to maintain the removal efficiency and intent of the measure.

ii. All Erosion and Sedimentation Control measures shall be inspected at least once every seven calendar days and within 24 hours after any storm event of greater than 0.5 inches of rain per 24 hour period and appropriate maintenance conducted. A rain gauge shall be maintained on the site and a record of the rainfall amounts and dates shall be kept properly.

iii. Maintenance shall include, but not be limited to:

a. The removal and satisfactory disposal of trapped or deposited sediments from basins, traps, barriers, filters, and/or drainage features/devices;

b. Replacement of filter fabrics used for silt fences upon loss of efficiency; and

c. Replacement of any other components which are damaged or cannot serve the intended use.

iv. The Contractor shall accept and maintain any existing sediments that are included in existing sediment basins and traps that accept or will accept stormwater flow and or sediment accumulation from all areas within the Contractor’s limits of construction.

v. Sediments removed from Erosion and Sedimentation Control measures shall be disposed of in locations that will not result in off-site sedimentation as approved by the Engineer.

vi. All Erosion and Sedimentation Control measures shall be maintained to the satisfaction of the Engineer until the site has been stabilized.

3. Graded Slopes and Fills:

   The angle for graded slopes and fills shall be no greater than the angle that can be retained by vegetated cover or other adequate measures.

4. Finish Grading:

   All disturbed areas shall be uniformly graded to the lines, grades, and elevations shown on the Contract Drawings. Except for certain erosion and sedimentation control measures and other areas designated to impound water, all areas shall be graded to drain. Finished surfaces shall be reasonably smooth, compacted, and free from irregular surface changes. Unless otherwise specified, the degree of finish shall be that ordinarily obtainable from either blade or scraper operations. Areas shall be finished to a smoothness suitable for application of topsoil.

5. Revegetation:

Revegetation shall conform to the requirements of Revegetation, of these Specifications.

6. Cleanup:

   i. The Contractor shall remove from the site all debris from their work including, but not limited to, branches, paper, and rubbish in all landscape areas, and remove temporary barricades as the work proceeds.

   ii. All areas shall be kept in a neat, orderly condition at all times. Prior to final acceptance, the Contractor shall clean up the entire landscaped area to the satisfaction of the Engineer.

Table 1: Required Silt Fence Filter Fabric Properties

Property	Test Method	Units	Value[1]
Grab Tensile Strength[2]	ASTM D 4632	lbs	90 x 90
Grab Elongation	ASTM D 4632	%	20 (Max.)
Ultraviolet Resistance (500 hrs)	ASTM D 4355	%	80
Apparent Opening Size (AOS)	ASTM D 4751	U.S. Sieve	30+
Permittivity	ASTM D 4491	sec^{-1}	0.05

Notes:
1. Minimum Average Roll Value (MARV).
2. Values for machine and cross machine direction (MD x XD), respectively.

M. Rip Rap

a. Description: This section includes all rip rap aprons and channel protection.

i. General:

The Contractor shall furnish all labor, material, and equipment to complete installation of Rip Rap for protection of earthen slopes against erosion as indicated, including all necessary and incidental items, in accordance with the Contract Drawings and these Specifications.

ii. Reference Standards:
The latest revision of the following standards of the North Carolina Department of Transportation (NCDOT) are hereby made a part of these Specifications.

NCDOT Standard Specifications for Roads and Structures.

b. Materials**:**

i. Rip Rap: Rip Rap shall be of the size indicated on the Contract Drawings and shall conform to NCDOT Section 1042, Rip Rap Materials.

ii. Geotextiles: Geotextiles shall conform to the requirements outlined in Section 02240, Geotextiles, of these Specifications.

c. Submittals**:**

i. The Contractor shall submit the following to the Engineer:

ii. Submit a certification and summary of all required test results prior to installation, that all Rip Rap has been produced in accordance with these Specifications.

iii. Furnish copies of the delivery tickets or other approved receipts as evidence for materials received that will be incorporated into construction.

d. Construction**:**

i. Surface Preparation:

1. Trim and dress all areas to conform to the Contract Drawings as indicated with tolerance of 2 inches from theoretical slope lines and grades.

2. Bring areas that are below allowable minimum tolerance limit to grade by filling with compacted Embankment material similar to adjacent material.

3. Geotextiles shall be placed as shown on the Contract Drawings and in accordance with Geotextiles, of these Specifications.

4. Do not place any stone material on the prepared surface prior to inspection and approval to proceed from the Engineer.

ii. Placing Rip Rap:

Rip Rap shall be placed in accordance with NCDOT Section 876, Rip Rap.

N. Rolled Erosion Control Products

a. Description: Rolled Erosion Control Products (RECPs) include erosion control blankets (ECB).

1. General:

The Contractor shall furnish all labor, material, and equipment to complete installation of all RECPs in accordance with the Contract Drawings and these Specifications.

2. Reference Standards:

The latest revision of the following standards of the American Society of Testing and Materials (ASTM) are hereby made a part of these specifications.

ASTM D 4355	Standard Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus).

ASTM D 6475	Standard Test Method for Measuring Mass per Unit Area of Erosion Control Blankets.
ASTM D 6524	Standard Test Method for Measuring the Resiliency of Turf Reinforcement Mats.
ASTM D 6525	Standard Test Method for Measuring Nominal Thickness of Permanent Erosion Control Products.
ASTM D 6566	Standard Test Method for Measuring Mass per Unit Area of Turf Reinforcement Mats.
ASTM D 6818	Standard Test Method for Ultimate Tensile Properties of Turf Reinforcement Mats.

e. Materials

1. General:

   The materials supplied under these Specifications shall consist of new, first-quality products designed and manufactured specifically for the purpose of this work, which shall have been satisfactorily demonstrated, by prior use, to be suitable and durable for such purposes.

   Labels on each RECP shall identify the length, width, product name, and name of Manufacturer.

2. Erosion Control Blanket (ECB)(Single Net):

   ECB (single net) shall consist of a machine-produced mat of straw or wood excelsior fiber covered on the top side with a photodegradable extruded plastic or woven biodegradable netting and sewn together with degradable thread. ECB (single net) shall also conform to the properties listed in Table 1 of this section. ECB (single net) shall be EroNet S75, as manufactured by North American Green, CURLEX I, as manufactured by American Excelsior Company, LANDLOK S1, as manufactured by Propex GeoSolutions, or approved equal.

   Flexterra Flexible Growth Media (FGM), as manufactured by Profile Products, applied at a minimum rate of 3,500 lbs/acre (or equal product/application rate) is an acceptable substitute for ECB to be placed on 2H:1V slopes (a minimum rate of 3,000 lbs/acre shall be used on 3H:1V slopes).

3. Erosion Control Blanket (ECB)(Double Net):

   ECB (double net) shall consist of a machine-produced mat of straw or wood excelsior fiber covered on the top and bottom sides with photodegradable extruded plastic or woven biodegradable nettings and sewn together with degradable thread. ECB (double net) shall also conform to the properties listed in Table 1 of this section. ECB (double net) shall be EroNet S150, as manufactured by North American Green, CURLEX II, as manufactured by American Excelsior Company, LANDLOK S2, as manufactured by Propex GeoSolutions, or approved equal.

Flexterra Flexible Growth Media (FGM), as manufactured by Profile Products, applied at a minimum rate of 3,500 lbs/acre (or equal product/application rate) is an acceptable substitute for ECB to be placed on 2H:1V slopes (a minimum rate of 3,000 lbs/acre shall be used on 3H:1V slopes)

4. Anchors: Anchors for RECPs shall consist of machine-made staples of No. 8 gauge new steel wire formed into a "U" shape. The size when formed shall be not less that 8 inches in length with a throat of not less than 1 inch in width. Longer anchors may be required for loose soils. Other anchors, such as metal pins or plastic pegs, may also be used if approved in advance by the Engineer.

f. **Submittals**

The Contractor shall submit the following to the Engineer:

1. Mill Certificate and Sample: Prior to shipping to the site, the Contractor shall submit a mill certificate or affidavit signed by a legally authorized official of the Manufacturer for each RECP attesting that each RECP meets the physical and manufacturing requirements stated in these Specifications. The Contractor shall also submit a sample of each RECP to be used. The sample shall be labeled with the product name and be accompanied by the Manufacturer's specifications.

2. Installation Guidelines/Instructions: The Manufacturer's guidelines/instructions for installation shall be submitted for review.

3. Furnish copies of delivery tickets or other approved receipts as evidence for materials received that will be incorporated into the construction.

Construction

1. Shipping, Handling, and Storage:

   All RECPs shall be shipped, handled, and stored in strict accordance with the Manufacturer's recommendations.

2. Installation - General:

   a. Placing of RECPs shall be done immediately following seeding. Seeding shall be performed in accordance with Revegetation, of these Specifications.

   b. RECPs shall be placed to the lines and grades shown on the Contract Drawings. The earth surface shall be smooth and free from stones, clods, or debris which will prevent the contact of the RECP with the soil. Care shall be taken to preserve the required line, grade, and cross section of the area.

   c. RECPs shall be unrolled in the direction of the flow of water and shall be applied without stretching so that it will lie smoothly but loosely on the soil surface.

d. At the time of installation, RECPs shall be rejected, if they have defects, rips, holes, flaws, evidence of deterioration, or other damage.

e. The Engineer may require adjustments in the installation requirements to fit individual conditions.

3. Installation - Channels:

RECPs installed in channels shall be unrolled parallel to the direction of water flow. The first roll shall be centered longitudinally in the channel and anchored with staples. Subsequent rolls shall be installed outward to the edges of the channel and be lapped to allow installation of a common row of anchors. RECP ends shall be overlapped with the upstream ends on top ("shingled").

4. Installation - Slopes:

RECPs installed on slopes shall be oriented in vertical strips and anchored. Subsequent rolls shall be installed outward to the edge(s) of the original roll and be lapped to allow installation of a common row of anchors. RECP ends shall be shingled.

5. Maintenance:

Maintenance of RECPs shall be in accordance with Erosion and Sedimentation Control, of these Specifications.

Table 1: Required Rolled Erosion Control Product Properties

Property	Test Method	Units	Value[1]
Erosion Control Blanket (ECB) (Single Net)			
Mass per Unit Area	ASTM D 6475	lbs/yd^2	0.5 ± 10% (Straw) 0.7 ± 10% (Excelsior)
Tensile Strength[2]	ASTM D 6818	lbs/ft	50 x 65
Tensile Elongation	ASTM D 6818	%	20
Maximum Permissible Shear Stress (Un-Vegetated)	-----	lbs/ft^2	1.55
Functional Longevity	-----	months	12
Erosion Control Blanket (ECB) (Double Net)			

Property	Test Method	Units	Value[1]
Mass per Unit Area	ASTM D 6475	lbs/yd^2	0.5 ± 10% (Straw) 0.7 ± 10% (Excelsior)
Tensile Strength[2]	ASTM D 6818	lbs/ft	75 x 75
Tensile Elongation	ASTM D 6818	%	25
Maximum Permissible Shear Stress (Un-Vegetated)	-----	lbs/ft^2	1.75
Functional Longevity	-----	months	12

Notes:
1. Typical for ECB.
2. Values for machine and cross machine direction (MD x XD), respectively.

O. Geogrid

a. Description: Geogrid serves as a reinforcing layer.

1. General:

The Contractor shall furnish all labor, material, and equipment to complete installation of Geogrid including all necessary and incidental items as detailed or required to complete the installation in accordance with the Contract Drawings and these Specifications.

2. Reference Standards:

The latest revision of the following standards of the American Society of Testing and Materials (ASTM) and the Geosynthetic Research Institute (GRI) are hereby made a part of these Specifications.

ASTM D 4355	Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon-Arc Type Apparatus.

ASTM D 4595	Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
ASTM D 5262	Standard Test Method for Evaluating the Unconfined Tension Creep and Creep Rupture Behavior of Geosynthetics.
ASTM D 6637	Standard Test Method for Determining Tensile Properties of Geogrids by the Single or Multi-Rib Tensile Method.
GRI GG4a	Determination of the Long-Term Design Strength of Stiff Geogrids.
GRI GG4b	Determination of the Long-Term Design Strength of Flexible Geogrids.
GRI GG7	Carboxyl End Group Content of PET Yarns.
GRI GG8	Determination of the Number Average Molecular Weight of PET Yarns Based on Relative Viscosity Value.

3. Manufacturers Qualifications:

   The Manufacturer shall have previously demonstrated their ability to produce the required Geogrid by having successfully manufactured a minimum of 10,000,000 ft2 of Geogrid for reinforcement purposes.

4. Materials

   i. General:

   The materials supplied under these Specifications shall consist of new, first-quality products designed and manufactured specifically for the purpose of this work, which shall have been satisfactorily demonstrated, by prior use, to be suitable and durable for such purposes. The Geogrid and Geogrid Manufacturer shall be approved by the Engineer prior to the Contract award.

   Labels on each roll of Geogrid shall identify the material type, lot and roll numbers, and name of Manufacturer.

ii. The Geogrid shall be a geosynthetic manufactured for reinforcement applications having a regular network of integrally connected polymer tensile elements with aperture geometry sufficient to permit significant mechanical interlock with the surrounding soil, aggregate, or other fill materials. The Geogrid structure shall be dimensionally stable and able to retain its geometry under manufacture, transport, and installation. The Geogrid shall be manufactured with 100 percent virgin resin consisting of polyethylene, polypropylene, polyester, or other approved material and with a maximum of 5 percent in-plant regrind material. Polyester resin shall have a molecular weight of 25,000 g/m (per GRI GG8) and a carboxyl end group number less than 30 (per GRI GG7). Polyethylene and polypropylene shall be stabilized with long-term antioxidants.

iii. Physical properties of Geogrid shall be as shown in Table 1 of this section.

5. Submittals

The Contractor shall submit the following to the Engineer:

i. Pre-Installation Requirements:

Prior to Geogrid installation the Contractor shall submit the following:

a. Mill Certificate and Sample: Prior to shipping to the site, the Contractor shall submit a mill certificate or affidavit signed by a legally authorized official of the Manufacturer for the Geogrid attesting that the Geogrid meets the physical and manufacturing requirements stated in these Specifications. The Contractor shall also submit a sample of the Geogrid to be used. The sample shall be labeled with the product name and be accompanied by the Manufacturer's specifications.

b. Allowable Strength Calculations: Submit allowable strength calculations (including identification of the ultimate tensile strength) of each geogrid supplied. Calculations shall be in accordance with GRI GG4a or GRI GG4b. The calculations shall itemize each reduction factor. Allowable strength shall be based on reduction factors for installation damage, durability, and creep which are applicable to site-specific conditions. Determine reduction factors in accordance with the test procedures documented in GRI GG4a or GRI GG4b. The minimum reduction factor for durability shall be 1.1 for polyethylene and polypropylene Geogrid and 1.15 for coated polyester Geogrid. The minimum reduction factor for installation damage shall be 1.1 for all polymers. The reduction factor for creep shall be based on testing performed in accordance with ASTM D 5262 at the strain specified Table 1.

c. Qualifications:

Submit list of equipment and personnel proposed for the Project. Include equipment type and quantities. Include personnel experience on similar projects.

Submit resume and references of Installation Supervisor to be assigned to the Project, including data and duration of employment and pertinent experience information.

d. Shipping, Handling, and Storage Instructions: The Manufacturer's plan for shipping, handling, and storage shall be submitted for review.

e. Delivery Date: Submit notification of the scheduled delivery dates for the materials.

f. Installation Procedures and Drawings:

Submit installation procedures and (shop) drawings for carrying out the work.

i. Installation procedures to be addressed shall include but not be limited to material installation and repair.

ii. Installation drawings shall have Geogrid sheet layout with proposed size, number, position, and sequence of placing of all rolls, and indicating the location of all field seams. Shop drawings shall also show complete details and/or methods for anchoring the Geogrid and making field seams.

Following review, these procedures and drawings will be used for installation of the Geogrid. Any deviations from these procedures and drawings must be approved by the Engineer.

g. Quality Control Certificates: For Geogrid delivered to the site, quality control certificates, signed by the Manufacturer's quality assurance manager shall be provided which represent every roll of Geogrid. Each certificate shall have the roll identification number(s), test methods, frequency, and test results.

h. Furnish copies of the delivery tickets or other approved receipts as evidence for materials received that will be incorporated into the construction.

ii. Post-Installation Requirements:

Upon completion of the Geogrid installation, the Contractor shall submit the following:

a. Certificate stating that the Geogrid has been installed in accordance with the Drawings, Specifications, and the Manufacturer's recommendations.

Finalization of payment for Geogrid installation shall not be made until the above submittals have been reviewed by the Engineer.

6. Construction

i. Shipping, Handling, and Storage:

The Geogrid shall be shipped, handled, and stored in strict accordance with the Manufacturer's recommendations.

ii. Subgrade Preparation:

a. The surface of the subgrade shall be prepared according to Excavation, and Embankment, of these Specifications.

b. Before an individual roll of Geogrid is installed; the Contractor and Installer shall verify in writing and submit to the Engineer:

i. Lines and grades are in conformance with the Contract Drawings and Specifications.

ii. The surface area to be covered has been rolled and compacted, free of irregularities and abrupt changes in grade.

iii. Geogrid Placement:

a. Each roll of Geogrid shall be installed in accordance with the approved installation drawings prepared by the Contractor.

b. Geogrid rolls shall be oriented perpendicular to the line of the slope crest (i.e., down and not across slope).

c. Geogrid may be temporarily secured in-place with staples, pins, sand bags, or backfill as approved by the Engineer.

iv. Seams and Overlaps:

a. Roll ends of uniaxial Geogrid shall be spliced together using flat polymer “Bodkin” slats in a method consistent with the Manufacturer's recommendations.

b. Adjacent rolls of Geogrid shall be butted together side-by-side without overlap unless an overlap is required to ensure coverage around curving slope faces.

v. Penetrations:

For small penetrations through Geogrid, only transverse members of the Geogrid shall be cut. The load-carrying longitudinal (machine direction) members shall be spread around the penetration. For larger penetrations, additional Geogrid shall be placed on each side of the penetration and spliced to the adjacent Geogrid to compensate for any longitudinal tensile members that must be cut.

vi. Cover Placement:

a. No cover material shall be placed over the Geogrid until approved by the Engineer.

b. Cover shall consist of structural fill as described in Section 02223, Embankment, of these Specifications.

c. Cover shall be placed, spread, and compacted in such a manner that minimizes the development of wrinkles in and/or movement of Geogrid. The Geogrid shall be kept smooth and taut during placement of cover material.

d. Care shall be taken to ensure that when compacting cover material, compaction equipment does not come in direct contact with Geogrid.

e. Tracked construction equipment shall not be operated directly on the Geogrid. A minimum fill thickness of 6 inches is required prior to operation of tracked vehicles over the Geogrid. Turning of tracked vehicles shall be minimized to prevent tracks from displacing the fill and damaging the Geogrid.

vii. Repair Procedures:

Any portion of the Geogrid exhibiting signs of defect shall be repaired by the Geogrid Installer. Several procedures exist for the repair of these areas. The final decision as to the appropriate repair procedure shall be made by the Engineer.

Table 1: Required Geogrid Properties

Property	Test Method	Units	Value
Reinforcement Orientation	-----	-----	Uniaxial or Biaxial
Ultimate Tensile Strength (T_{ult}) (@ 5% Strain)	ASTM D 6637	lbs/ft	(See Note 1)
Allowable Strength (T_{all}) (@ 5% Strain) (Gravel)	GRI GG4a or GRI GG4b	lbs/ft	1,700
UV Resistance (500 hours)	ASTM D 4355	%	70

Notes:

1. As calculated based on allowable strength and reduction factors.

P. Roadway Work

a. Description: Roadway Work refers to the construction of paved and gravel road surfaces, the repair and reconstruction of existing roads, and the construction of concrete curb and gutter.

1. General:

The Contractor shall furnish all labor, material, and equipment required to complete construction of all Roadway Work including gravel roads, asphalt concrete pavement, asphalt concrete overlay, concrete pavement, concrete curb and gutter, repair and reconstruction of existing asphalt pavement, repair of existing gravel roads, and pavement markings in accordance with the Contract Drawings and these Specifications.

2. Reference Standards:

The latest revision of the following standards of the North Carolina Department of Transportation (NCDOT) are hereby made a part of these Specifications:

NCDOT Standard Specifications for Roads and Structures.

3. Quality Control:

The Contractor will perform and document Quality Control tests for asphalt and concrete pavements as described in this section.

b. Materials

1. Geotextiles:

   Geotextiles shall conform to the requirements outlined in Section 02240, Geotextiles, of these Specifications.

2. Aggregate Base Course (ABC):

3. All materials and placement associated with ABC shall be in accordance with NCDOT Section 520, Aggregate Base Course, and Section 1010, Aggregate for Non-Asphalt Flexible Type Bases.

4. Asphalt Concrete Base Course:

5. All materials and placement associated with asphalt concrete base course shall be in accordance with NCDOT Section 610, Asphalt Concrete Plant Mix Pavements. A job mix formula shall be developed by the Contractor for the particular materials the Contractor proposes to use, in accordance with Article 610-3. The job mix formula shall be delivered to the Engineer at least two (2) weeks prior to beginning paving operations. Type B-25.0C base course is required for this project.

6. Asphalt Concrete Intermediate Course:

   All materials and placement associated with asphalt concrete intermediate course shall be in accordance with NCDOT Section 610, Asphalt Concrete Plant Mix Pavements. A job mix formula shall be developed by the Contractor for the particular materials the Contractor proposes to use, in accordance with Article 610-3. The job mix formula shall be delivered to the Engineer at least two (2) weeks prior to beginning paving operations. Type I-19.0C intermediate course is required for this project.

7. Asphalt Concrete Surface Course:

   All materials and placement associated with asphalt concrete surface course shall be in accordance with NCDOT Section 610, Asphalt Concrete Plant Mix Pavements. A job mix formula shall be developed by the Contractor for the particular materials the Contractor proposes to use, in accordance with Article 610-3. The job mix formula shall be delivered to the Engineer at least two (2) weeks prior to beginning paving operations. Type S-12.5C surface course is required for this project.

8. Concrete Curb and Gutter:

   All materials associated with concrete curb and gutter shall be in accordance with Concrete Work, of these Specifications. Class A concrete shall be used. Placement shall be in accordance with Concrete Work and NCDOT Section 846, Concrete Curb, Curb and Gutter, Concrete Gutter, Shoulder Berm Gutter, Concrete Expressway Gutter, and Concrete Valley Gutter.

9. Concrete Pavement:

   All materials associated with Concrete Pavement shall be in accordance with Section 03300, Concrete Work, of these Specifications. Class A concrete shall be used. Placement shall be in accordance with Section 03300, Concrete Work, NCDOT Section 700, General Requirements For Portland Cement Concrete Paving, and NCDOT Section 710, Concrete Pavement, except that Articles 700-14 (Contractor=s Responsibility for Process Control), 700-15 (Acceptance Tests For Concrete), 710-3 (Composition of Concrete), 710-4 (Acceptance of Concrete), 710-7 (Final Surface Testing), 710-8 (Pavement Marking), 710-9 (Thickness Tolerances), and 710-10 (Measurement and Payment) shall be deleted.

10. Concrete Pavement Reinforcing:

    Reinforcing of concrete pavement, if required, shall be as shown on the Contract Drawings and as specified under Concrete Work, of these Specifications.

11. Guardrails:

    All materials and placement associated with guardrails shall be in accordance with NCDOT Section 862, Guardrail.

c. Submittals

   The Contractor shall submit the following to the Engineer:

   1. Submit a certification and summary of all required test results, prior to installation, that all materials for Roadway Work have been produced in accordance with these Specifications.

   2. Furnish copies of the delivery tickets or other approved receipts as evidence for materials received that will be incorporated into construction.

   3. Submit copies of all quality control test results demonstrating compliance with project criteria.

d. Construction

   1. General:

      All Roadway Work including the replacement of portions of the existing roads shall be tothe limits, grades, thicknesses, and types as shown on the Contract Drawings. Patches for pipe crossings and areas damaged during the construction work shall be asphalt or gravel, depending upon the material encountered, unless otherwise indicated.

   2. Earthwork:

The earthwork for all Roadway Work shall be completed in accordance with Excavation, and Embankment, of these Specifications and as shown on the Contract Drawings.

3. Geotextiles:

   Geotextiles shall be placed as shown on the Contract Drawings and in accordance with Geotextiles, of these Specifications. If overlapped seams are used, overlaps shall be a minimum of 12 inches.

4. Aggregate Base Course:

   ABC shall be constructed in accordance with NCDOT Section 520.

5. Asphalt Concrete Base Course:

   Prior to placement of the asphalt concrete base course, the ABC (or soil subgrade) shall be inspected for damage or defects and repaired to the satisfaction of the Engineer. The surface of the ABC (or soil subgrade) shall be approved by the Engineer. The asphalt concrete base course shall be placed and compacted on the ABC in accordance with NCDOT Section 610 in 3.0 to 5.5 inch layers.

6. Asphalt Concrete Intermediate Course:

   Prior to placement of the asphalt concrete intermediate course, the underlying course shall be inspected for damage or defects and repaired to the satisfaction of the Engineer. The surface of the underlying course shall be approved by the Engineer. The asphalt concrete intermediate course shall be placed and compacted on the underlying course in accordance with NCDOT Section 610 in 2.5 to 4.0 inch layers.

7. Asphalt Concrete Surface Course:

   Prior to placement of the asphalt concrete surface course, the underlying course shall be inspected for damage or defects and repaired to the satisfaction of the Engineer. The surface of the underlying course shall be approved by the Engineer. The asphalt concrete surface course shall be placed and compacted on the underlying course in accordance with NCDOT Section 610 in layers not to exceed 2 inches.

8. Concrete Curb and Gutter:

   The expansion joint filler for concrete curb and gutters shall be cut to conform with the cross section of the curb. Expansion joints shall be spaced at intervals of not more than 25 feet. Formed or sawed control joints shall be installed at intervals not exceeding 10 feet. Depth of joint shall be ⅓ the thickness. Curved forms shall be used where radii are indicated; straight segments shall not be permitted. Upon removal of the forms, exposed curb faces shall be immediately rubbed down to a smooth and uniform surface. No plastering shall be permitted.

9. Concrete Pavement:

   The subgrade and base course beneath concrete pavement shall be prepared in accordance with the applicable Sections of these Specifications and referenced Standard Specifications, except that the Contractor shall use an approved automatically controlled fine grading machine to produce final subgrade and base surfaces meeting the lines, grades, and cross sections (thicknesses) shown on the Contract Drawings or established by the Engineer.

   The surface of the base shall be damp at the time the concrete is placed. The Contractor shall sprinkle water on the surface of the base when necessary to provide a damp surface. The Contractor shall satisfactorily correct all soft areas in the subgrade or base prior to placing concrete.

   Hauling over the base course shall not be allowed except where specifically permitted by and in writing by the Engineer. The Engineer may allow equipment dumping concrete to operate on the base to the extent and under the conditions the Engineer deems necessary to facilitate placing and spreading the concrete.

   Installation of the rigid concrete pavement shall be in accordance with the details shown on the Contract Drawings and Concrete Work.

   Contraction joints shall be spaced at intervals as shown on the Contract Drawings. Transverse contraction joints shall be formed by an approved joint insert or by sawing with an approved concrete saw. Expansion joints shall be placed when the pavement abuts a structure using 1 inch expansion joint material (filler) and sealant as specified herein.

10. Underground Utility Lines:

    Where an underground utility line is beneath the Roadway Work, backfilling shall be carried out with special care, and the final consolidation shall be accomplished by a vibratory roller. Construction of Roadway Work over the trench shall be deferred as long as practicable.

11. Junction with Other Paving:

    Where new asphalt pavement abuts existing asphalt pavement, the existing pavement shall be cut back to insure obtaining the specified compaction of the new pavement courses and interlocking adjoining courses. Existing subbase courses shall be cut back from the subgrade level of the new pavement on a one-on-one slope into the existing pavement and the asphalt courses of the existing pavement shall be removed for an additional 6 inches back from the slope. The edge of the existing asphalt courses shall be saw cut straight and true. The faces between new and existing asphalt courses shall receive an application of tack coat.

    Where new rigid concrete pavement abuts existing rigid concrete or asphalt paving, the existing paving shall be saw cut straight and true. An expansion joint or a ½ inch minimum

thickness with a filler material and sealant shall be placed between the new concrete pavement and the existing rigid concrete or asphalt paving.

12. Asphalt Concrete Overlay:

    Where asphalt concrete is proposed to be placed over an existing asphalt or concrete surface, the surfaces shall be thoroughly cleaned by power brooming and a tack coat shall be applied in accordance with NCDOT Section 605 prior to installing the overlay. The overlay shall be applied in accordance with applicable subsections of this section and according to the Contract Drawings.

13. Guardrails:

    Guardrails shall be constructed in accordance with NCDOT Section 862.

14. Quality Control Testing:

    a. Testing of Asphalt Pavement: The Contractor shall perform density testing using either core samples or nuclear methods on all pavement sections 4.0 feet and wider (including widening, travel lanes, etc.) and on uniform width paved shoulders 2.0 feet and wider. A minimum of one density test shall be performed for every 500 LF per lane of pavement.

    b. Concrete Testing: Quality control testing of all concrete installed under this Section shall be in accordance with the requirements of Concrete Work, of these Specifications.

Q. PVC Pipe

a. Description: PVC Pipe is used for a potable water line.

1. General:

    i. The Contractor shall furnish all labor, material, and equipment to complete installation of PVC Pipe in accordance with the Contract Drawings and these Specifications. The Contractor shall also clean and test pipelines where required.

2. Reference Standards:

    The latest revision of the following standards of the American Society of Testing and Materials (ASTM) and the Uni-Bell PVC Pipe Association are hereby made a part of these specifications.

ASTM D 1784	Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.

ASTM D 1785	Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
ASTM D 2464	Standard Specification for Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
ASTM D 2466	Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
ASTM D 2467	Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
ASTM D 2564	Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
ASTM D 3139	Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
ASTM D 3212	Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
ASTM F 1417	Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air.
UNI-PUB-9	Installation Guide for PVC Pressure Pipe.

3. Quality Control:

   The Contractor shall perform pressure testing of PVC Pipe as described in this section.

b. Materials

1. All PVC Pipe shall be manufactured from new materials meeting the physical requirements shown in Table 1 of this section.

2. All PVC Pipe shall have smooth interior walls and the Schedule or DR (dimension ratio) and diameter of the pipe shall be as shown on the Contract Drawings.

3. Visible defects, such as cracks, creases, crazing, non-uniformly pigmented areas, or undispersed raw materials shall not be acceptable and will result in rejection of the pipe by the Engineer.

4. Fittings: Fittings for PVC Pipe shall be in conformance with the following ASTM standards. All fittings shall be watertight.

Pipe Schedule	Fitting Type	ASTM Standard

40	Socket (Solvent-Welded)	ASTM D 2466
80	Socket (Solvent-Welded)	ASTM D 2467
80	Threaded	ASTM D 2464

5. Push-On Joints: Push-on joints for PVC Pipe shall be in conformance with the following ASTM standards. All push-on joints shall be watertight.

Pipe Schedule	**System Type**	**ASTM Standard**
40	Gravity	ASTM D 3212
40	Pressure	ASTM D 3139
80	Gravity	ASTM D 3212
80	Pressure	ASTM D 3139

6. Solvent Cement: PVC solvent cement shall be in compliance with ASTM D 2564 and in accordance with the pipe Manufacturer=s recommendations.

7. Thread Lubricant: Lubricant for Schedule 80 threaded joints shall be Teflon tape only.

8. Pipe Perforations: The perforations of the perforated PVC Pipe shall be as shown on the Contract Drawings.

9. Electrical Heat Tape and Insulation:

   Electrical heat tape and insulation shall be installed where shown on the Contract Drawings. Heat tape shall be Easy Heat Freeze Free Self Regulating Pipe Heating System by Easy Heat of New Carlisle, Indiana, or approved equal. Heat tape shall be installed per the Manufacturer's guidelines based on the pipe diameter and a temperature of -20° F. Insulation shall consist of premolded fiberglass or of closed cell flexible elastomeric material. Insulation thickness shall be as recommended by the Manufacturer for a temperature of -20° F. Insulation of interior service shall be jacketed with suitable moisture resistant fabric type material. Insulation for exterior service shall have aluminum or plastic jacketing.

c. Submittals

The Contractor shall submit the following to the Engineer:

1. Submit a certification and summary of all required test results, prior to installation, that all PVC Pipe and fittings manufactured for the project have been produced in accordance with these Specifications.

2. Submit a copy of the PVC Pipe Manufacturer's recommendations for shipping, handling, and storage of pipe.

3. Furnish copies of the delivery tickets or other approved receipts as evidence for materials received that will be incorporated into construction.

d. **Construction**

1. Shipping, Handling, and Storage:

All PVC Pipe shall be shipped, handled, and stored in strict accordance with the Manufacturer's recommendations.

2. PVC Pipe Installation:

i. The Contractor shall install PVC Pipe to the lines and grades shown on the Contract Drawings. Line and grade of piping shall be maintained with laser or approved equivalent. The Contractor shall give the Engineer sufficient notice so that the they may observe field location and installation activities.

ii. Excavation for PVC Pipe shall be backfilled as directed by the Engineer as shown on the Contract Drawings. Sand backfill or approved soil backfill compacted to at least 95 percent of the Standard Proctor dry density (ASTM D 698) shall be used.

Sharp stones or other potentially damaging material shall be removed from the base of the trench prior to placement of the piping. A leveling course, as required, shall consist of sand or other approved material.

iii. Pipe Connections: Joining of PVC Pipe shall be as follows:

a. General pipe sections shall be joined according to the Manufacturer's recommendations.

b. Specified bolted pipe connections shall be made as specified on the Contract Drawings using stainless steel hardware and neoprene gaskets.

c. PVC unions are required adjacent to valves and equipment.

iv. Perforated PVC Pipe shall be placed during construction as shown on the Contract Drawings.

3. Cleaning:

i. All PVC Pipe shall be cleaned of any accumulation of silt, debris, or foreign matter of any kind and shall be kept clear of such accumulation until final acceptance of the work.

4. Pressure Testing:

   i. All solid piping where factory or field joints have been performed require pressure testing except as noted below.

      a. Any unjointed section of pipe showing visual signs of damage or that is of questionable quality may be required to be pressure tested as directed by the Engineer.

      b. Cleanout risers within the containment areas do not require pressure testing.

   ii. Pressure testing shall be conducted by the Contractor in a manner approved by the Engineer. Such testing shall be observed by the Engineer.

   iii. Leachate Transmission Lines: Pressure testing of leachate transmission lines shall be as follows:

      a. All gravity piping shall be tested using low-pressure air in accordance with ASTM F 1417.

      b. All force main piping shall be tested using hydrostatic pressure in accordance with UNI-PUB-9.

   iv. LFG Piping: Pressure testing of landfill gas piping shall be as follows:

      a. All gravity and vacuum piping shall be tested using low-pressure air in accordance with ASTM F 1417.

      b. All force main piping shall be tested using hydrostatic pressure in accordance with UNI-PUB-9.

   v. The pressures used in testing must not exceed the working pressure of the lowest rated component in the system (i.e. valves, meters, flanges, unions, etc.). The Manufacturer's recommendation for pressure testing may also be acceptable as an alternative if approved in advance by the Engineer.

   vi. Pressure testing of short sections of piping to be placed in confined or inaccessible areas may be pressure tested by the Contractor prior to installation when approved by the Engineer. Temporary fittings, etc. required to plug section ends shall be provided by the Contractor at no expense to the Owner.

   vii. Any piping that does not meet the pressure test criteria shall be repaired and retested at the Contractor's expense. No piping shall be approved until successful pressure testing is completed.

Table 1: Required PVC Pipe Properties

Property	Test Method	Value
Material	-----	Rigid, Unplasticized Polyvinyl Chloride (PVC)
Cell Classification	ASTM D 1784	12454 B or C

R. Ductile Iron Pipe

a. Description: Ductile Iron Pipe is used for the sewer line.

1. General:

The Contractor shall furnish all labor, material, and equipment to complete installation of Ductile Iron Pipe in accordance with the Contract Drawings and these Specifications. The Contractor shall also clean and test pipelines where required.

2. Reference Standards:

The latest revision of the following standards of the American National Standards Institute (ANSI) and the American Water Works Association (AWWA) are hereby made a part of these specifications.

ANSI/AWWA C104/A21.4	Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
ANSI/AWWA C110/A21.10	Ductile-Iron and Gray-Iron Fittings, 3-in through 48-in for Water and Other Liquids.
ANSI/AWWA C111/A21.11	Rubber Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
ANSI/AWWA C115/A21.15	Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
ANSI/AWWA C150/A21.50	Thickness Design of Ductile-Iron Pipe.
ANSI/AWWA C151/A21.51	Ductile-Iron Pipe, Centrifugally Cast for Water.
ANSI/AWWA C153/A21.53	Ductile-Iron Compact Fittings, 3-in through 24-in and 54-in through 64-in for Water Service.

ANSI/AWWA C600	Installation of Ductile-Iron Water Mains and their Appurtenances.

3. Quality Control:

The Contractor shall perform pressure testing of Ductile Iron Pipe as described in this section.

b. Materials

1. All Ductile Iron Pipe shall be designed in accordance with the requirements of ANSI/AWWA C150/A21.50 for a minimum of 150 psi (or project requirements, whichever is greater) rated working pressure plus a 100 psi surge allowance with a 2:1 factor of safety on the sum of working pressure plus surge pressure.

2. All Ductile Iron Pipe shall be manufactured in accordance with the requirements of ANSI/AWWA C151/A21.51. Each pipe shall be subjected to a hydrostatic pressure test of at least 500 psi at the point of manufacture.

3. All Ductile Iron Pipe shall have a standard asphaltic coating on the exterior in accordance with ANSI/AWWA C104/A21.4. For piping exposed to leachate, the interior of the pipe shall be coated with a fusion-bonded epoxy/fusion-bonded polyethylene lining such as Polybond Plus as manufactured by the American Cast Iron Pipe Company of Birmingham, Alabama, or approved equal. The diameter of the pipe shall be as shown on the Contract Drawings.

4. All Ductile Iron Pipe shall be furnished with either push-on type joints or mechanical type joints, as applicable, in accordance with ANSI/AWWA C111/A21.11.

5. Fittings: Fittings for Ductile Iron Pipe shall be in conformance with either ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53. Fittings and accessories shall be furnished with either push-on or mechanical type joints in accordance with ANSI/AWWA C111/A21.11.

6. Electrical Heat Tape and Insulation:

Electrical heat tape and insulation shall be installed where indicated on the Contract Drawings. Heat tape shall be Easy Heat Freeze Free Self Regulating Pipe Heating System by Easy Heat of New Carlisle, Indiana, or approved equal. Heat tape shall be installed per the Manufacturer's guidelines based on the pipe diameter and a temperature of -20E F. Insulation shall consist of 1" mineral or glass fiber and as recommended by the Manufacturer for a temperature of -20E F. Insulation jacketing shall be aluminum or stainless steel.

c. Submittals

The Contractor shall submit the following to the Engineer:

1. Submit a certification and summary of all required test results, prior to installation, that all Ductile Iron Pipe and fittings manufactured for the project have been produced in accordance with these Specifications.

2. Submit a copy of the Ductile Iron Pipe Manufacturer's recommendations for shipping, handling, and storage of pipe.

3. Furnish copies of the delivery tickets or other approved receipts as evidence for materials received that will be incorporated into construction.

d. Construction

1. Shipping, Handling, and Storage:

   All Ductile Iron Pipe shall be shipped, handled, and stored in strict accordance with the Manufacturer's recommendations.

2. Ductile Iron Pipe Installation:

   i. The Contractor shall install Ductile Iron Pipe to the lines and grades shown on the Contract Drawings and in accordance with ANSI/AWWA C600. Line and grade of piping shall be maintained with laser or approved equivalent. The Contractor shall give the Engineer sufficient notice so that the they may observe field location and installation activities.

   ii. Excavation for Ductile Iron Pipe shall be backfilled as directed by the Engineer as shown on the Contract Drawings. Sand backfill or approved soil backfill compacted to at least 95 percent of the Standard Proctor dry density (ASTM D 698) shall be used.

3. Cleaning:

   All Ductile Iron Pipe shall be cleaned of any accumulation of silt, debris, or foreign matter of any kind and shall be kept clear of such accumulation until final acceptance of the work.

4. Hydrostatic Pressure Testing:

   i. All piping shall be hydrostatically pressure tested by the Contractor in the presence of the Engineer. Test procedures shall be in accordance with ANSI/AWWA C600. The Manufacturer's recommendation for pressure testing may also be acceptable as an alternative to the above procedure if approved in advance by the Engineer.

ii. Any line that does not meet the pressure test criteria shall be repaired and retested at the Contractor's expense. No line shall be approved until successful pressure testing is completed.

iii. Pressure testing of short sections of Ductile Iron Pipe to be placed in confined or inaccessible areas may be pressure tested by the Contractor prior to installation when approved by the Engineer. Temporary fittings, etc. required to plug section ends shall be provided by the Contractor at no expense to the Owner.

S. Chain Link Fence

a. Description: Chain Link Fence and Gates are installed around various portions of the site which require restricted access.

1. General:

The Contractor shall furnish all labor, material, and equipment to complete installation of Chain Link Fence and Gates in accordance with the Contract Drawings and these Specifications.

2. Reference Standards:

The latest revision of the following standards of the American Society of Testing and Materials (ASTM) and Underwriters Laboratories (UL) are hereby made a part of these specifications.

ASTM A 392	Standard Specification for Zinc-Coated Steel Chain Link Fabric.
ASTM A 491	Standard Specification for Aluminum-Coated Steel Chain Link Fence Fabric.
ASTM F 626	Standard Specification for Fence Fittings.
ASTM F 900	Standard Specification for Industrial and Commercial Swing Gates.
ASTM F 1043	Standard Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework.
ASTM F 1083	Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.
ASTM F 1184	Standard Specification for Industrial and Commercial Horizontal Slide Gates.
ASTM F 2200	Standard Specification for Automated Vehicular Gate Construction.

b. Materials

1. Fabric:

   The fencing fabric shall be 9 gauge, 2-inch mesh galvanized (zinc) coated steel chain link fabric per ASTM A 392. Fabric shall have a minimum zinc coating of 2.0 oz/ft2 (Class 2). Top and bottom selvages of fabric shall be twisted and barbed.

   OR

   The fencing fabric shall be 9 gauge, 2-inch mesh aluminum coated steel chain link fabric per ASTM A 491. Fabric shall have a minimum aluminum coating of 0.40 oz/ft2. Top and bottom selvages of fabric shall be twisted and barbed.

2. Framework:

   a. Round Steel Pipe and Rail:

      Posts and rails shall be ASTM F 1043 Group IA Table 3 Heavy Industrial Fence Framework, schedule 40 hot-dip galvanized steel pipe per ASTM F1083. Exterior and interior zinc coatings shall be Type A. Pipe shall be regular grade with a minimum steel yield strength of 30,000 psi and shall have the following minimum diameters:

Line Posts:	1.900 inch O.D.
End, Corner, Pull Posts:	2.375 inch O.D.
Top, Bottom, Intermediate, and Brace Rails:	1.660 inch O.D.

   b. All posts not otherwise covered, shall be provided with weather-tight end caps.

   c. Rail couplings shall be of the outside type and shall be so constructed as to prevent creeping. They shall be manufactured from galvanized steel and shall be suitable for coupling the rails. Couplings shall be a minimum of 6 inches long and self-centering.

      Rail ends and brace ends for receiving top, bottom, and brace rails shall be galvanized steel.

3. Barbed Wire:

Barbed wire shall be zinc coated double-strand twisted wire with 14 gauge zinc coated 4 point barbs spaced on approximately 5 inch centers. Minimum weight of zinc coating shall be 0.8 oz/ft2.

OR

Barbed wire shall be aluminum coated double-strand twisted wire with 14 gauge zinc aluminum coated 4 point barbs spaced on approximately 5 inch centers. Minimum weight of aluminum coating shall be 0.3 oz/ft2.

4. Extension Arms:

For barbed wire, line, end, and corner posts shall be fitted with extension arms of galvanized steel. Each arm shall carry three barbed wires securely fastened. The topmost barbed wire shall be 12 inches above the fabric of the fence and 12 inches out from the fence line.

5. Fittings and Accessories:

Unless otherwise specified, all miscellaneous fencing fittings and accessories shall be of galvanized steel. Wire ties, hog rings, brace and tension (stretcher) bars and bands, truss rod assembly, barbed wire supporting arms, etc. shall be in accordance with ASTM F 626.

Truss bands and turnbuckles for rods shall be provided. Stretcher, truss rod, and brace bands shall be fastened by means of carriage bolts and nuts, which shall not be removable form the outside of the fence. Hog rings shall be provided to attach the bottom tension wire to the bottom of the fabric.

6. Swing Gates:

a. Swing gates shall be fabricated in accordance with ASTM F 900 and shall be single or double leaf as shown or indicated on the Contract Drawings. Gate frames shall be non-sag, welded galvanized steel construction utilizing a minimum 1.900 inch O.D. pipe (exterior members)/1.660-inch O.D. pipe (internal members) (maximum 8.0-foot horizontal or vertical spacing for framing) and fitted with fencing fabric to match the fence. Frame members shall be ASTM F 1043 Group IA Table 3 Heavy Industrial Fence Framework, schedule 40 hot-dip galvanized steel pipe per ASTM F1083. The vertical members of the gate frame shall be extended one foot above the top horizontal member to which 3 strands of barbed wire, uniformly spaced at the same height as the fence barbed wire, shall be attached.

b. Hardware for each gate shall include a forked type latch capable of retaining gate in a closed position and shall have a provision for a padlock (to be provided by Owner). The latch shall permit operation from either side of the gate.

c. Fittings shall be supplied to hold the gates in an open position. Hinges shall be furnished which will permit the gates to swing 180 degrees parallel to the fence line. Hinges shall be installed with rods, nuts, and bolts.

d. Gate posts shall be of the same type and grade as used for framework and shall be of the following diameters:

Gate Fabric Height ≤ 6 Feet:

Gate Leaf Width:	
≤ 4 Feet	2.375 inch O.D.
Over 4 Feet to 10 Feet	2.875 inch O.D.
Over 10 Feet to 18 Feet	4.000 inch O.D.

Gate Fabric Height > 6 Feet to 12 Feet:

Gate Leaf Width:	
≤ 6 Feet	2.875 inch O.D.
Over 6 Feet to 12 Feet	4.000 inch O.D.
Over 12 Feet to 18 Feet	6.625 ch O.D.

c. Submittals

The Contractor shall submit the following to the Engineer:

1. The Contractor shall submit shop drawings for the Chain Link Fence and Gates for approval at least 2 weeks prior to construction.

2. The Contractor shall furnish copies of the delivery tickets or other approved receipts to the Engineer as evidence for materials received that will be incorporated into construction.

d. Construction

1. Site Conditions:

Prior to installation of Chain Link Fence and Gates, the Contractor shall verify that the work of other trades is completed to the point where this installation may properly commence. The areas to receive fences shall be smoothly graded and free of rocks, debris, obstructions, mounds, and depressions.

2. Fabric:

Fence fabric shall be installed two inches above finished grade level and shall be securely fastened to posts, gate frames, top, bottom, and brace rails, and elsewhere, as specified

hereinbefore. The fabric shall be tightened to provide a smooth, uniform appearance. Where rolls of fabric are joined, they shall be properly tensioned, ends of fabric matched and mounted by a spiral connecting link.

3. Top Rails:

   All top rails shall pass through loops of cap posts and shall form a continuous brace from end to end of each stretch of fence. Top rail lengths shall be joined with couplings. Top rails shall be securely fastened to terminal posts by means of rail ends and brace bands.

4. Bottom Rails:

   Bottom rails shall be provided between all posts, except at gate openings. Bottom rails shall be securely fastened to end, corner, pull, and gate posts by means of rail ends and brace bands, and to line posts by means of rail ends and post connectors.

5. Brace Rails:

   Horizontal brace rails shall be provided at all terminal posts midway between top rails and the ground, and shall extend from the terminal post to the first adjacent line post. Braces shall be securely fastened to line posts by brace ends and brace bands, and to terminal posts by rail ends and brace bands.

6. Truss Rods:

   Diagonal truss rods shall be trussed from the brace and on the line post back to the terminal post and fastened to it by a brace band.

7. Posts:

   Line posts shall be spaced equidistant in the fence line at no more than 10 feet on centers. Posts shall be plumb and tops of posts properly aligned. Line, terminal, and gate post holes shall be 36 inches deep and have a diameter of 4 times greater than the outside dimension of the post. Posts shall be set 30 inches in the hole, which shall be filled with 3,000 psi concrete. The top exposed surface of the footing shall be sloped to shed water and shall be smoothly finished to present a neat appearance. Extension arms and end caps shall be firmly seated on the top of posts.

8. Gates:

   Gates shall be erected plumb and true with all required hardware properly installed. The top rail of the gate shall be the same height as the top rail of the fence. Gates shall be fitted with vertical galvanized steel arms and shall carry three strands of barbed wire. The top strand of the barbed wire shall be at the same height as the barbed wire on the line fence.

9. Damaged and Un-Coated Areas:

All damaged and un-coated areas shall be repaired in accordance with the manufacturer's instructions.

T. Revegetation

a. Description: Revegetation includes permanent Revegetation of all site areas disturbed by the Contractor whether inside the Contract Limits or not.

1. General:

The Contractor shall furnish all labor, material, and equipment to complete Revegetation in accordance with the Contract Drawings and these Specifications.

2. Correction Period:

The Contractor shall be responsible for the satisfactory establishment and growth of a permanent stand of vegetation as judged by the Engineer. During this period, the Contractor shall be responsible for the maintenance items described in Maintenance of this Specification.

b. Materials

1. Limestone: Unless otherwise defined by specific soil tests, supply agricultural grade ground limestone conforming to the current "Rules, Regulations, and Standards of the Fertilizer Board of Control."

2. Fertilizer: Unless otherwise defined by specific soil tests, supply commercial fertilizer meeting applicable requirements of State and Federal law. Do not use cyanamic compounds of hydrated lime. Deliver fertilizer in original containers labeled with content analysis.

3. Grass Seed: Supply fresh, clean, new-crop seed. Do not use seed which is wet, moldy, or otherwise damaged. Deliver seed in standard sealed containers labeled with producer's name and seed analysis, and in accord with US Department of Agriculture Rules and Regulations under Federal Seed Act.

4. Mulch: Supply clean, seed-free, threshed straw of oats, wheat, barley, rye, beans, or other locally available mulch material.

i. Do not use mulch containing a quantity of matured, noxious weed seeds or other species that will be detrimental to seeding, or provide a menace to surrounding land.

ii. Do not use mulch material which is fresh or excessively brittle, or which is decomposed and will smother or retard growth of grass.

5. Binder: Supply emulsified asphalt or synthetic binder.

6. Water: Supply potable, free of substances harmful to growth.

7. Application rates, seed types, and other requirements shall be in accordance with Table 1 of this section.

c. Submittals

The Contractor shall submit the following to the Engineer:

1. Results of soil tests performed and proposed modifications, if any, to the specified requirements.

2. Certificates for each grass seed mixture, stating botanical and common name, percentage by weight, and percentages of purity, germination, and weed seed. Certify that each container of seed delivered is fully labeled in accordance with Federal Seed Act and equals or exceeds specification requirements.

3. Copies of invoices for fertilizer, showing grade furnished and total quantity applied.

d. Construction

1. The Contractor shall establish a smooth, healthy, uniform, close stand of grass from the specified seed. Prior to Revegetation, the Contractor shall adequately test the soils to be revegetated to ensure the adequacy of the specified requirements. Any modifications to these requirements deemed necessary after the review of soil test results, shall be at the Contractor's sole expense. The Engineer will perform the observations to determine when successful Revegetation is achieved.

2. Soil Preparation:

i. Limit preparation to areas which will be planted soon after preparation.

ii. Loosen surface to minimum depth of four (4) inches.

iii. Remove stones, sticks, roots, rubbish and other extraneous matter over three (3) inches in any dimension.

iv. Spread lime uniformly over designated areas at the rate specified in Table 1 of this section.

v. After application of lime, prior to applying fertilizer, loosen areas to be seeded with double disc or other suitable device if soil has become hard or compacted. Correct any surface irregularities in order to prevent pocket or low areas which will allow water to stand.

vi. Distribute fertilizer uniformly over areas to be seeded at the rate specified in Table 1 of this section.

a. Use suitable distributor.

b. Incorporate fertilizer into soil to depth of at least two (2) inches.

c. Remove stones or other substances which will interfere with turf development or subsequent mowing.

vii. Grade seeded areas to smooth, even surface with loose, uniformly fine texture.

a. Roll and rake, remove ridges and fill depressions, as required to meet finish grades.

b. Fine grade just prior to planting.

3. Seeding:

i. Use approved mechanical power-driven drills or seeders, mechanical hand seeders, or other approved equipment.

ii. Distribute seed evenly over entire area at the rate specified in Table 1 of this section.

iii. Stop work when work extends beyond most favorable planting season for species designated, or when satisfactory results cannot be obtained because of drought, high winds, excessive moisture, or other factors.

iv. Resume work only when favorable condition develops, or as directed by the Engineer.

v. Lightly rake seed into soil followed by light rolling or cultipacking.

vi. Immediately protect seeded areas against erosion by mulching or placing Rolled Erosion Control Products in accordance with these Specifications, where applicable.

a. Spread mulch in a continuous blanket at the rate specified in Table 1 of this section.

b. Immediately following spreading mulch, secure with evenly distributed binder at the rate specified in Table 1 of this section.

c. For slopes not steeper than 3H:1V and as an option to using binder to secure mulch, use a mulch anchoring tool operated along the contour of the slope.

4. Maintenance:

The Contractor shall be responsible for maintaining all seeded areas through the end of their warranty period. The Contractor shall provide, at their expense, protection of all seeded areas against damage at all times until acceptance of the work. Maintenance shall include, but not be limited to, the following items:

i. Regrade and revegetate all eroded areas until adequately stabilized by grass.

ii. Remulch with new mulch in areas where mulch has been disturbed by wind or maintenance operations sufficiently to nullify its purpose. Anchor as required to prevent displacement.

iii. Replant bare areas using same materials specified.

Table 1: Seeding Schedule

Material	Seed Type	Application Rate (See Note 1)
Lime	-----	4,000 lbs/acre
Fertilizer (10-10-10)	-----	1,000 lbs/acre
Seed:		
Permanent:	Kentucky 31 Tall Fescue Pensacola Bahiagrass Sericea Lespedeza[3] Kobe Lespedeza Seasonal Nurse Crop[2]	250 lbs/acre 50 lbs/acre 30 lbs/acre 10 lbs/acre See Note 2
Temporary:	Seasonal Nurse Crop[2]	See Note 2
Mulch	-----	4,000 - 5,000 lbs/acre
Binder	-----	400 gallons/acre

Notes:
Application rates and/or chemical analysis shall be confirmed or established by a soil test(s).
Use seasonal nurse crop in accordance with seeding dates as stated below:

April 15 - August 15	10 lbs/acre German Millet or 15 lbs/acre Sudangrass
August 16 - April 14	25 lbs/acre Rye (grain).

From September 1 - March 1, use unscarified Sericea seed.

ATTACHMENT F: CONTRACT DRAWINGS