REQUEST FOR PROPOSAL 24-55

PROPOSED RENOVATION of FOOBALL/SOCCER FIELDS at HOWARD HIGH SCHOOOL, OOLTEWAH HIGH SCHOOL and SODDY-DAISY HIGH SCHOOL

Prepared For: HAMILTON COUNTY DEPARTMENT of EDUCATION
Chattanooga, Tennessee

Prepared By: BARGE DESIGN SOLUTIONS, INC.
1110 Market Street, Suite 200
Chattanooga, TN 37402

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ADVERTISEMENT DATE: **March 13, 2024**

HAMILTON COUNTY DEPARTMENT OF EDUCATION
3074 Hickory Valley Road
Chattanooga, Tennessee 37421
(423) 498-7030

REQUEST FOR PROPOSAL

RFP 24-55, PROPOSED RENOVATION OF FOOTBALL/SOCCER FIELDS AT HOWARD HIGH SCHOOL, OOLTEWAH HIGH SCHOOL and SODDY-DAISY HIGH SCHOOL

Sealed envelopes containing proposals must be sent to the Purchasing Department and addressed to the Hamilton County Department of Education, 3074 Hickory Valley Road, Chattanooga, Tennessee 37421. In the lower left corner of the envelope, print your company name, RFP Bid File Number and the time and date of opening. Proposers must submit and mark an "original" bid, one "copy", and one "USB Flash Drive" in one (1) sealed envelope. Proposal documents may be secured from the Purchasing Department at the above address and on our website at www.hcde.org via vendor registry. Proposals received shall be opened by the Purchasing Department at the time and place designated in the Request for Proposal and/or associated addenda. The opening for the RFP shall not be open to the public.

Proposals must be received in the Purchasing Department prior to the designated time for opening. Proposals received after the designated time of opening will be considered late and shall be considered Non-Responsive.

SOLICITATION NUMBER & TITLE	RFP 24-55, PROPOSED RENOVATION OF FOOTBALL/SOCCER FIELDS AT HOWARD HIGH SCHOOL, OOLTEWAH HIGH SCHOOL and SODDY-DAISY HIGH SCHOOL
OPENING/DUE DATE & TIME	APRIL 2, 2024 @ 2:00 PM
LOCATION	3074 Hickory Valley Road, Chattanooga, Tennessee 37421
PROCUREMENT CONTACT	Steve Hodgen
PHONE	423-498-7030
EMAIL	DOE_Purchasing@HCDE.Org
PRE-SOLICITATION MEETING	YES
TYPE	MANDATORY
DATE & TIME	MARCH 18, 2024 @ 10:00 AM
LOCATION	OOLTEWAH HS FOOTBALL FIELD 6123 Mountain View Road Ooltewah, TN 37363

BIDDER NAME: _____

HAMILTON COUNTY DEPARTMENT OF EDUCATION
3074 Hickory Valley Road
Chattanooga, Tennessee 37421
(423) 498-7030

REQUEST FOR PROPOSAL

RFP 24-55, PROPOSED RENOVATION OF FOOTBALL/SOCCER FIELDS AT HOWARD HIGH SCHOOL, OOLTEWAH HIGH SCHOOL and SODDY-DAISY HIGH SCHOOL

Sealed bids/proposals will be received addressed to the **Attention of: Purchasing Department, Hamilton County Department of Education**, 3074 Hickory Valley Road, Chattanooga, Tennessee 37421, **until 2:00 PM on April 2, 2024.** Any bid/proposal received after the scheduled closing time for receipt of such bid will be considered late and shall be considered Non-Responsive.

TERMS AND CONDITIONS

These terms and conditions shall be part of the Contract. HCS reserves the right to negotiate other terms and conditions it deems appropriate and necessary under the circumstances to protect the public's trust.

Note: Throughout this document the terms Proposer, Contractor, Company, Vendor, Firm or Bidder are used interchangeably and refer to any organization submitting a response to any solicitation. Additionally, the words terms, quote, bid, proposal are used interchangeably and refer to the submission in response to any solicitation. Hamilton County Schools, will be referenced as "HCS".

1. **Quality and Guarantee** - All material on which bids are submitted shall be of the quality and grade specified. Each bid must be accompanied with complete descriptions, catalog cuts, or other illustrations of each item upon which a bid is made. The names of manufacturers and stock numbers shall be clearly indicated. Approximate delivery dates are to be given for each item. Any item bid which does not completely meet stated specifications must be listed as an alternate.

2. **Requirements for Submitting Bids** – Bids made on forms other than the Bid Form will not be considered. No modifications or alterations to the bid documents may be made either by interlineation, supplements or deletions. Documents submitted with modifications of any kind will be ruled non-responsive and the vendor possibly removed or suspended from the bid vendor listing for a period of up to two (2) years. The signature of the person submitting the bid shall be in longhand without erasure.

3. **Bid amendment:** If it becomes evident that an invitation must be amended, a formal written amendment will be issued to all known Bidders. If necessary, a new due date will be established.

4. **Bid delivery:** HCS requires that all bids be submitted and time/date-stamped by the date and before the time specified in the bid documents to be considered, regardless of method of delivery. The time clock in the Procurement Department shall be the official record of the time. HCS is not responsible for any technical difficulties of any vendor in the delivery of its bid. No late bids will be accepted, opened or returned.

5. **Bid forms:** Vendors must complete bid forms contained in the bid package. Failure to fully complete the bid forms may result in rejection of the bid.

    a. All information shall be entered in ink or typed/computer generated. Mistakes may be crossed out and corrections inserted before submission of your bid. Corrections shall be initialed in ink by the person signing the bid. Corrections and/or modifications received after the closing time specified will not be accepted.

6. **Bid preparation:** Prospective bidders are solely responsible for their own expenses in Bid preparation and subsequent negotiations with HCS, if any.

7. **Bid pricing:** Any bid, and its associated pricing, shall remain valid for at least ninety (90) days after the bid due date, unless otherwise indicated in the bid specifications. Unit price must be shown for all products or services. In case of error in extension, unit price will govern.

8. **Bid submission and transmission:** Bid must be submitted in a sealed envelope with the Bid Number/Name, the closing date and time, as well as your company name provided on the envelope. If your response envelope is enclosed in another envelope/package for delivery, the latter should also be clearly labeled with the same identifying information.

    a. All bids are to be F.O.B. Hamilton County, TN. All responses to this invitation become the property of HCS. Bids/Bids submitted via e-mail or facsimile machine are unacceptable.

9. **Rights of Owner** - The Hamilton County Board of Education reserves the right to reject any or all bids or any part thereof, to waive technicalities and informalities, and to award a contract to other than the low bidder. The right is reserved to reduce or increase the quantity of any item; and to award contract by item number, or group of items. Price, quality, and suitability will be considered in awarding bids. Samples to be submitted by the bidder upon request.

10. **Negotiation** – Hamilton County Department of Education may select a successful Proposer on the basis of initial offers received without discussions. Therefore, each Bid shall contain the Proposer's best terms from a cost or price, experience and technical and service standpoint. Hamilton County Department of Education reserves the right to enter into negotiations with Proposers. If Hamilton County Department of Education and the selected Proposer cannot negotiate a successful agreement, Hamilton County Department of Education may terminate said negotiations and begin negotiations with the other Proposers. Hamilton County Department of Education retains the right to negotiate with multiple Proposers simultaneously. This process will continue until a Contract has been executed or all Proposers have been rejected. No Proposer shall have any rights against Hamilton County Department of Education arising from such negotiations.

11. **Clarification of Bid Document** - Should a bidder find discrepancies in or omissions from the bid document or should he be in doubt as to its meaning, he shall at once request clarification of the Owner.

12. **Awarding of Contracts** - Award will be made to the most responsive, responsible bidder(s) meeting specifications, who presents the product of service that is in the best interest of HCS. HCS reserves the right: (1) to award bids received on the basis of individual items, or groups of items, or on the entire list of items; (2) to reject any or all bids, or any part thereof; (3) to waive any informality in the bids; and (4) to accept the bid that is considered lowest and best. Where RFP is utilized, the apparent best-evaluated Proposer(s) shall be prepared to enter into a contract with HCS which the proposer shall draft. Notwithstanding, HCS reserves the right to add terms and conditions, deemed to be in the best interest of HCS, during final contract negotiations. Any such terms and conditions shall be within the scope of the RFP and shall not affect the basis of proposal evaluations.

13. **Proposer Presentations / Interviews / Site Visits / Demonstrations**
    Presentations, interviews, demonstrations, and/or site visits may be required as a part of the evaluation process. Providers will receive adequate notification to prepare. Information provided during these events shall be taken into consideration when evaluating the stated criteria. Vendors may be requested to submit a best and final offer after evaluations, discussions, oral presentations and site visits have been completed.

14. **Tax Exemption** - Hamilton County Board of Education is a tax-exempt entity/organization and will only pay those taxes for which it is obligated. Hamilton County Board of Education can provide a Government Certificate of Exemption for purchases where the entity's tax exemption may apply. All bidders should include in their bids, all sales and use tax which they are obligated to pay when making purchases for

material or sub-contractor services. Sales and Use Tax shall be omitted when requesting pricing related to only equipment, supplies, product or equivalent purchases where the Certificate of Exemption would exempt Hamilton County Board of Education from paying such taxes.

15. **Meeting Specifications** - By my written signature on this bid, I (we) agree and certify that all items included in the bid meet or exceed any and all specifications covering such items. I (we) further agree, if awarded a contract, to deliver merchandise which meets or exceeds the specifications. Failure to comply with this section will result in removal of your firm from our list of bidders for at least six (6) months. This penalty does not preclude action to enforce specific performance.

16. **Declaration/Statement by Bidder** - The respondent hereby states that he, his company, or any of its employees, agents, officers or proposed sub-contractors have not violated or participated in a violation of, been convicted, or pled "nolo contendre" to any act involving an unlawful restraint of trade such as, but not limited to violations of the Sherman Act (15 U.S.C. § 1-2), the Racketeer Influenced and Corrupt Organizations Act (18 U.S.C. 1961-1968), the Hobbs Act (18 U.S.C. §1961), the mail or wire fraud statutes (18 U.S.C. §1341,1343), the false statements statute (18 U.S.C. §1001), the Tennessee Anti-Trust Act (T.C.A. § 47-25-101) or similar state or federal law. Respondent further states that he, his company or any of its officers, agents, or employees have not been debarred by any governmental agency (Federal, state, or local).

    a. In submitting this bid, you are certifying that you are aware of the requirements imposed by T.C.A. §49-5-413(d) to conduct criminal background checks through the Tennessee Bureau of Investigation and the Federal Bureau of Investigation on yourself and any of your employees who may come in direct contact with students or who may come on or about school property anytime students are present. You are further certifying that at no time will you ever permit any individual who has committed a sexual offense or who is a registered sex offender to come in direct contact with children or to come on or about school property while students are present.

17. **Drug-Free Workplace Program**- Note: Required for construction services, encouraged for others. Law prohibits state or local governments from contracting for construction services with any private entity having five or more employees who has not furnished a written affidavit by its principal officer at the time of the bid or contract stating that the contractor is in compliance with the provisions of this act. Other organizations are encouraged to ensure that their workplace is Drug-Free

18. **Title VI of the Civil Rights Act of 1964** - No person shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance.

19. **Title IX of the Education Amendments of 1972** - Prohibits discrimination based on gender in all programs or activities that receive Federal financial assistance. Title IX also includes same gender harassment as well as student-to-student harassment.

20. **Bid Acceptance**- Bidders shall hold their price and/or discount firm and subject to acceptance by HCS for a period of ninety (90) days from the date of the bid opening, unless otherwise indicated in their bid.

21. **Qualifications of Bidders**- A bidder may be required, before the award, to show to the complete satisfaction of HCS that it has the necessary facilities, ability, insurance, and financial resources to provide the service or goods specified.

22. **Restrictive or Ambiguous Specifications-** It is the responsibility of the prospective bidder to review the entire invitation to bid (ITB) or Invitation to Bid (Bid) packet and to notify the Procurement Department if the specifications are formulated in a manner that would unnecessarily restrict competition. Any such protest or question regarding the specifications of bidding procedures must be received in the Procurement Department *not less than seventy-two hours* prior to the time set for bid opening. These requirements also apply to specifications that are perceived to be ambiguous.

23. **Samples:** Samples of articles, when required, shall be furnished free of cost of any sort to HCS and may be retained for future comparison. Samples which are not destroyed by testing or which are not retained for future comparison will be returned upon request *at bidder expense*.

24. **TN Department Of Revenue Requirements:** Any awarded Vendor must be registered with the Department of Revenue for the collection of Tennessee sales and use tax.

25. **No Contact Policy-** After the date and time established for receipt of bids by the HCS Procurement Department, any contact initiated by any bidder with any HCS representative, other than the Procurement Division representative listed herein, concerning this solicitation is prohibited. Any such unauthorized contact may cause the disqualification of the bidder from this procurement transaction.

26. **Pricing:** Vendors are to quote a firm fixed price or discount for the term of the contract; inclusive of any renewals. Upon notice of request for renewal, or in the event of significant industry wide market changes, the Vendor may request a price increase. Proof of price increase must be supplied to the HCS Procurement Department. HCS reserves the right to accept or reject the requested price increase. If the price increase is rejected, the vendor may:

    - Continue with existing prices;
    - Submit a revised request for price increase;

    Or

    - not accept the renewal offer.

    a. If a price increase is approved by HCS, the approval notification will be done in writing and the vendor will be notified of the new price schedule. This documentation will become part of the bid file. No approvals will be authorized verbally.

27. **Quantities-** HCS does not guarantee any quantities of items to be purchased. We will buy these items on an as-needed basis.

28. **TN Cooperative Purchasing**: also known as piggybacking, HCDE reserves the right to extend the terms, conditions and prices of this contract to other institutions (such as State, Local and/or Public Agencies) who express an interest in participating in any contract that results from bids and/or bids. Each of the piggyback institutions will issue their own purchasing documents for purchasing of the goods. Bidder agrees that HCDE shall bear no responsibility or liability for any agreements between Bidder and the other Institution(s) who desire to exercise this option

29. **Acceptance:** all terms and conditions in this contract are deemed to be accepted by the vendor and incorporated in the bid, except the provision(s) which are expressly excluded by the specifications.

30. **Additional Information:** vendors are cautioned that any statement made by any individual or employee of HCS that materially changes any portion of the bid document, either before or after the issuance of the bid documents, shall not be relied upon unless subsequently ratified by a formal written amendment to the bid document.

31. **Alteration or amendments:** no alterations, amendment, changes, modifications or additions to any contract resulting from this bid shall be binding on HCS without the prior written approval of HCS.

32. **Assignment:** contractors shall not assign or sub-contract this agreement, its obligations or rights hereunder to any party, company, partnership, incorporation or person without the prior written consent of HCS.

33. **Brand names:** brand names and numbers, when used, are for reference to indicate the character or quality desired. Equal items will be considered, provided they are clearly identified by manufacturer, part number, diagrams, brochures and other related material, *unless stated otherwise in the bid specifications*. When brand, number, or level of quality is not stated by the bidder, it is understood the offer is exactly as specified.

34. **Code Of Ethics:** all suppliers are expected to adhere to business ethics and professional behaviors as outlined in these documents.

35. **Compliance With All Laws:** companies submitting bids must agree to observe and comply with all federal, state, and local laws, statutes, ordinances, and regulations, including but not limited to title vi of the federal civil rights act of 1964, the equal employment opportunity act and the regulations issued there under by the federal government, the Americans with disabilities act of 1990 and the regulations issued there under by the federal government, in any manner affecting the provision of goods and/or services, and all instructions, prohibitive orders issued, and shall obtain all necessary permits.

36. **Declarative Statement:** any statement or word (e.g., must, shall, will) are declarative statements and the vendor must comply with the conditions. Failure to comply with any such statement may result in their bid being deemed non-responsive and disqualified.

37. **Default:** in case of default by the vendor, HCS may procure the articles or services from other sources and may deduct from any monies due, or that may thereafter become due to the vendor, the difference between the price named in the contract or purchase order and actual cost thereof to HCS. Prices paid by HCS shall be considered the prevailing market price at the time such purchase is made. Periods of performance may be extended if the facts as to the cause of delay justify such extension in the opinion of the procurement director.

38. **Deliveries:** must be accompanied by delivery tickets or packing slips. These shall contain the following information for each item delivered: purchase order number; item number; name of article; quantity; and supplier.

39. **Delivery Of Goods And Services** - it is understood and agreed that this bid shall constitute an offer which, when accepted in writing by Hamilton County Schools, will constitute a valid and binding contract between the undersigned and the Hamilton County Department of Education. Failure to supply needed material and/or services will result in removal of your firm from our list of bidders for at least six (6) months.

40. **Delivery Requirements:** time of delivery shall be stated as the number of calendar days following receipt of the order by the vendor to receipt of the goods or services by HCS. *Note: time of delivery may be a consideration in the award.*

41. **Contract Approval:** The RFP and the provider selection processes do not obligate HCS and does not create rights, interests, or claims of entitlement in the apparent best-evaluated Proposer or any vendor. No services or goods may be rendered without issuance of a valid HCS Purchase Order.

42. **RFQ, RFP, and Proposal Incorporated into Final Contract:** Any Request for Qualifications and/or Request for Proposal and the provider's response to such, as amended between HCS and the successful provider, will be included as a part of the contract by reference. It should be understood that in the event of a discrepancy or ambiguity regarding the Proposer's duties, responsibilities and performance under this contract, these documents shall govern in the following order of precedence: Request For Qualifications and/or Request for Proposal and associated amendments, the Proposal/Bid Response and any amendments, technical specifications, clarifications and addenda made to the Proposal/Bid response, the Contract and its attachments.

43. **Drug-Free Workplace Program for Construction Services:** law prohibits state or local governments from contracting for construction services with any private entity having five or more employees who has not furnished a written affidavit by its principal officer at the time of the bid or contract stating that the contractor is in compliance with the provisions of this act. Companies, other than construction services, are also encouraged to have and maintain drug-free workplace policies.

44. **Grant Funded Purchases:** for purchases that are grant funded, the grant agreement may contain/require special terms and conditions. If there is a conflict between the terms and conditions of the grant

agreement and the general terms and conditions of the bid or bid, the grant agreement terms and conditions shall prevail.

45. **Indemnifications/Hold Harmless:** contractor shall indemnify, defend, save and hold harmless HCDE, the school board, administration, and their agents and employees from any and all suits, claims, actions or damages of any nature brought because of, arising out of, or related to the contractor's performance under the terms of this contract, including the work of any sub-contractor, and without regard to any allegations of fault.

46. **Invoices**: will be returned for correction unless they contain the following information: purchase order number; item numbers; description of item; quantity; unit price; extensions; and total.

47. **New equipment:** the vendor shall guarantee that the units submitted for this bid shall be new, and the latest and most improved model of current production, and shall be first quality as to workmanship and materials used in said units. All modifications shall be made at the factory. Demonstrators shall not be acceptable. *Note: when the bid is for services, this item does not apply.*

48. **Non-Collusion:** vendors, by submitting a signed bid, certify that the accompanying bid is not the result of, or affected by, any unlawful act of collusion with any other person or company engaged in the same line of business or commerce, or any other fraudulent act punishable under Tennessee or federal law.

49. **Non-Conflict Statement:** vendors, by submitting a signed bid, agree that it has no public or private interest and shall not acquire directly or indirectly any interest that would conflict in any manner with the provision of its goods or performance of its services. Supplier warrants that no part of the total contract amount provided herein shall be paid directly or indirectly to any officer or employee of HCS as wages, compensation, or gifts in exchange for acting as officer, agent, employee, subcontractor or consultant to the contractor in connections with any goods provided or work contemplated or performed relative to the agreement.

50. **Non-Discrimination Statement:** supplier must agree that no person on the grounds of age, color, disability, gender, genetic information, national origin, political affiliation, race, religion, sexual orientation, or veteran's status shall be excluded from participation in, or be denied benefits of, or be otherwise subjected to discrimination in the performance of this agreement, or in the employment practices of vendor. Supplier shall upon request show proof of such non-discrimination, and shall post in conspicuous places available to all employees and applicants notices of non-discrimination. Suppliers covenants that it complies with the fair wage and hour laws, the national labor relations act, and other federal and statement employment laws as applicable. Supplier covenants that it does not engage in any illegal employment practices.

51. **Payment Method-** HCS utilizes two (2) methods of placing orders for products. The first is the use of Purchase Orders. These Purchase Orders will be issued from HCS Procurement Division via the method selected by the vendor during registration. The Purchase Order will detail the quantity, specific items(s) and the contracted price for each item.

    a. The second method is the use of the HCS Credit Card (MASTERCARD). Orders placed with the credit card will list the same information as the Purchase Order. Vendors will be given the card information and approval to process the transactions by the requesting department. Vendors must indicate in their bid response if the vendor will accept the HCS Credit Card (MASTERCARD) as a form of payment. Bidders are prohibited to charge HCS any type of merchant fee from their financial institution to accept this type of payment.

52. **Payment Terms:** HCS payment terms are Net 30 after receipt/inspection of merchandise and receipt of invoice unless otherwise stated in the contract documents.

53. **Public Access to Procurement Information:** Subject to the requirements of the TN Open Records Act, **i**nformation relating to the award of a particular contract shall be open to the public only after evaluation

of that bid or bid has been completed. All public records pertaining to procurement shall be open for inspection during normal business hours as scheduled in advance with the Procurement Department.

54. **Protest of Award:** Any vendor who has submitted a timely bid or bid in response to a solicitation may protest the recommendation of award for a contract by submitting such protest to HCS's Director of Procurement. Any protest must be submitted in writing and be in the possession of the Procurement Department before noon (ET) of the 2nd working day following the public recommendation of contract award.

    FAILURE OF A VENDOR TO FOLLOW THE PROTEST REQUIREMENTS WITHIN THE TIME FRAMES PRESCRIBED IN THIS SECTION CONSTITUTES A WAIVER OF THE PROTEST AND ANY RESULTING CLAIMS.

55. **Provision of Database at Contract End:** If applicable and if requested by HCS, upon expiration of the Contract resulting from this RFP, the Proposer shall provide the most up-to-date copy of the system's database, including all historical data, the data dictionary, file layouts, code tables, code value, data relationships, keys, and indices, etc., in a format to be determined by the Contract Manager. In addition, the Proposer shall provide read-only licenses for HCS's use for a period of seven (7) years. If any data stored is in a proprietary format, Proposer shall provide a means for translating it to a standard in the public domain.

56. **Right to Audit:** During all phases of the work and services to be provided hereunder the Provider agrees to permit duly authorized agents and employees of HCS to enter the Provider's offices for the purpose of inspections, reviews and audits during normal working hours. Reviews may also be accomplished at meetings that are arranged at mutually agreeable times and places. The Provider will maintain all books, documents, papers, accounting records, and other evidence pertaining to the fee paid/charged under this Contract and make such materials available at their offices at all reasonable times during the period of this Contract and for seven (7) years from the date of payment under this Contract for inspection by HCS or by any other governmental entity or agency participating in the funding of this Contract, or any authorized agents thereof; copies of said records to be furnished if requested.

57. **Safety Data Sheets:** After award, the successful bidder(s) will be required to provide HCS with a master set of Safety Data Sheets for any applicable products.

58. **Severability:** If any provisions of these Rules or any application thereof to any person or under any circumstance is held to be invalid, such invalidity shall not affect the provisions or applications of these rules which can be given effect without the invalid provision or application, and to this end the provisions of these Rules are declared to be severable.

59. **Termination for Cause:** In the event of any breach of contract by the successful service provider(s), HCS may serve written notice to the service provider of its default, setting forth with specificity the nature of the default. If the defaulting party fails to cure its default within thirty (30) days after receipt of the notice of default, then HCS shall have the right to terminate the contract upon thirty (30) days written notice and pursue all other remedies available to HCS, either at law or in equity.

60. **Termination for Convenience:** Contract may be terminated for convenience by either party by giving written notice to the other, at least sixty (60) days before the effective date of termination unless otherwise specified in the solicitation and/or contract documents. Said termination shall not be deemed a Breach of Contract.

61. **Termination Due To Non-Appropriation:** HCS shall not be obligated for the Contractor's performance hereunder or by any provision of this Contract during any of HCS's future fiscal years unless and until HCS appropriates funds for this Contract in HCS's Budget for each such future fiscal year.

62. **Terms and Conditions:** In the event of a conflict between the specifications and these terms and conditions, the specifications will govern.

63. **Warranties:** Vendor warrants to HCS that all items delivered and all services rendered shall conform to the specifications, drawings, bid and/or other descriptions furnished and/or incorporated by reference, and will be fit for the particular purpose purchased, of merchantable quality, good workmanship, and free from defects. Vendor extends to HCS all warranties allowed under the U.C.C. Vendor shall provide copies of warranties to the HCS. Return of merchandise not meeting warranties shall be at Vendors expense.

64. **Insurance Requirements**: The Vendor shall maintain the following minimum insurance requirements throughout the duration of the Agreement unless otherwise stated herein. HCS reserves the right to request additional documentation or additional policies be provided at its sole discretion and where deemed in its best interest. HCS in no way represents that the insurance required is sufficient or adequate to protect the Vendor's interest or liabilities.

    Vendor shall provide Worker's Compensation Insurance as required by applicable laws of the State of Tennessee and shall provide liability insurances as required. All insurance must be occurrence based. Vendor shall add Hamilton County Department of Education as additional named insured by policy endorsement and provide a certificate of insurance evidencing such coverage and endorsement number (#) for each additional named insured. Complete copies of insurance policies must be provided, if requested. A failure to provide said documentation will be considered a contract breach and grounds for termination of contract or pending award recommendation.

Insurance Required	
Coverage	**Amount**
Workers Compensation	Statutory Limits of Tennessee
Employers Liability	$1,000,000 per occurrence
Commercial General Liability	$1,000,000 each occurrence; $2,000,000 aggregate
Errors & Omissions (Professional Services)	$1,000,000 each occurrence
Auto (Truck) Liability	$1,000,000 each occurrence

65. **Waiving of Informalities:** HCS reserves the right to waive minor informalities or technicalities when it is in the best interest of HCS.

66. **Provisions Required by Law Deemed Inserted:** Each and every provision of law and clause required by law to be inserted in this contract will be deemed to be inserted herein and the contract will be read and enforced as though it were included herein, and if through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon the application of either party the contract will forthwith be physically amended to make such assertion or correction.

67. **Governing Law/Jurisdiction: The Agreement shall be governed by the laws of the State of Tennessee. Any action brought in law or in equity to enforce any provision of the entire Agreement shall be filed in the appropriate state court in Hamilton County, Tennessee. In any action to enforce this Agreement, the prevailing party shall be entitled to recover its costs and expenses, including reasonable attorney's fees. By submission of a proposal and acceptance of a Purchase Order or Contract, Vendor hereby agrees to adhere to Governing Law/Jurisdiction requirements as described herein.**

HCS DOES NOT DISCRIMINATE ON THE BASIS OF AGE, COLOR, DISABILITY, GENDER, GENETIC INFORMATION, NATIONAL ORIGIN, POLITICAL AFFILIATION, RACE, RELIGION, SEXUAL ORIENTATION, OR VETERAN'S STATUS IN THE EVALUATION AND AWARD OF BIDS.

SPECIAL CONDITIONS

1.0 CONTRACT PERIOD

1.1 The Vendor shall be responsible for furnishing and delivery to Project under the following terms: From the Notice to Proceed or the Purchase Order date, whichever applies: 101 calendar days to substantial completion, 10 calendar days from substantial completion to final completion (total contract days 111).

1.2 The Contract Period is expected to begin May 1, 2024, or soon thereafter.

1.3 HCS reserves the right as part of Vendor negotiations under this solicitation to negotiate the Contract Period with the successful Proposer.

2.0 BOND

2.1 Each proposal must be accompanied by a Bid Bond in the amount of 5% of the proposed dollar amount/Project Total (excluding alternates) must be submitted with the bid. Failure to provide a valid Bid Bond at the time of bid submission shall deem Vendor Non-Responsive and therefore ineligible for evaluation and award.

2.2 Vendor shall provide a Performance & Payment Bond meeting the HCS requirements for 100% of the Project Total from a surety company authorized to do business in the state of Tennessee or other form satisfactory to HCS. Fees/costs associated with procuring any bonding shall be at the sole expense of the Vendor and such shall be covered by the Project Total provided by Vendor for the associated Project.

3.0 ALL WORK NOTICE

3.1 Vendor must provide pricing for each location and associated work as specified herein. Failure to provide a proposal and related pricing that encompasses each location may deem Vendor Non-Responsive at the sole discretion of Hamilton County Schools. All work shown for each location must be included in the proposal submitted.

4.0 DOCUMENTATION ACCESS

4.1 Detailed plans and specifications are available through the HCS Vendor Registry, and the Project designated Architect. Request for such from the Project Architect shall be made as follows:

Barge Design Solutions
ATTN: Graham Hartness
1110 Market Street, Suite 200
Chattanooga, TN 37402
graham.hartness@bargedesign.com

All information will be available in digital format.

4.2 All other project documentation including addenda will be posted to the project webpage at the HCS Vendor Registry platform. It shall be the sole responsibility of the Vendor to check Vendor Registry for project related postings for additional information and project status details.

5.0 AWARD

5.1 Hamilton County Schools intends to award the construction contract to the most responsible and responsive Vendor/Contractor whose proposal is determined to be the most advantageous to the District, taking into consideration the evaluation factors and process listed herein in the SUBMITTAL AND EVALAUTION SECTION.

6.0 MANDATORY PRE-BID:

6.1 A mandatory pre-bid has been scheduled for this solicitation as indicated herein. Failure to attend the mandatory pre-bid will deem Vendor as Non-Responsive and therefore ineligible for award.

SCOPE OF SERVICES

RFP 24-55, PROPOSED RENOVATION OF FOOTBALL/SOCCER FIELDS AT HOWARD HIGH SCHOOL, OOLTEWAH HIGH SCHOOL and SODDY-DAISY HIGH SCHOOL

1.0 SUMMARY OF SCOPE

1.1 Hamilton County Schools (HCS) seeks to contract with a qualified Tennessee registered General Contractor experienced in the installation of synthetic turf sports fields to furnish all materials and labor to complete the renovation from natural grass to synthetic turf for the football/soccer fields at Howard High School, Ooltewah High School and Soddy-Daisy High School.

1.2 Project Site locations are as follows:

1.2.1 Howard High School: 2500 Market Street Chattanooga, TN 37408
1.2.2 Ooltewah High School: 6123 Mountain View Road Ooltewah, TN 37363
1.2.3 Soddy-Daisy High School: 618 Sequoyah Access Road Soddy-Daisy, TN 37379

2.0 DETAILED SCOPE OF SERVICES

2.1 Hamilton County Schools (HCS) seeks to contract with a qualified Tennessee registered General Contractor experienced in the installation of synthetic turf sports fields to furnish all materials and labor to complete the renovation from natural grass to synthetic turf for the football/soccer fields at Howard High School, Ooltewah High School and Soddy-Daisy High School. Fields are utilized year-round at all locations.

2.2 This project includes the supply and installation of synthetic turf fields at three (3) high schools including, but not limited to: all site grading (excavation and removal of topsoil), existing subdrainage, stone base, storm drainage, concrete curbing, nailer boards, new track and field events both within and outside of the synthetic turf areas, ADA modifications, etc…required for completed installation. The items noted previously may be wholly or partially included at each field location.

2.3 It is the desire of HCS to install the highest quality, longest lasting synthetic turf system at these locations to support year-round, daily use. The system proposed by the Vendor shall include all information necessary to demonstrate why the installation of its product will provide the best available system for the intended use.

2.4 The warranty provided by the manufacturer for this work shall be a minimum of an eight (8) year warranty.

2.5 Vendor shall provide details supporting a minimum quarterly maintenance program for the life of the warranty.

2.6 The detailed scope of work and Contractor responsibilities are further defined within the Project Manual/Specifications and project plans provided as part of the solicitation. Further, the requirements for construction of the Project and duties and responsibilities of the Vendor/Contractor are set forth in the Contract/Project Manual documentation which includes, but is not limited to incorporated General Conditions, any supplementary or other conditions, drawings, specifications and/or addenda issued by HCS and the Project Architect. It is the responsibility of the Vendor to review and fully understand all associated project documents.

2.7 It shall be the sole responsibility of the Vendor to have visited the sites and have fully acquainted and familiarized themselves with the conditions as they exist and related to the work to be carried

out under this Agreement. The Vendor shall make such investigations as they see fit, so that they fully understand the Work necessary to successfully complete this Project.

2.7.1 The failure or omission of the Vendor to receive or examine any instruction or document, or any part of the specifications or to visit the sites and acquaint themselves as to the nature and location of the work, the general and local conditions and all matters which may in any way affect performance, shall not relieve the Vendor of any obligation to perform as specific herein. Vendor understands the intent and purpose therefore and their obligations there under and that the Vendor should not make any claim for or have any right to damages resulting from any misunderstanding or misinterpretation of this Agreement or because of any lack, real or perceived, of information.

SUBMITTAL REQUIREMENTS & EVALUATION CRITERIA

Interested proposers shall include the following information in their submittal responses to this solicitation. The following format and sequence should be followed in order to provide consistency in the proposer's response and to ensure each proposal receives full consideration. It is requested that proposers use 8 ½ x 11 sheet pages only with minimum font size of 10 points and with tabs or section dividers to separate sections as defined below. More than one section is permitted on one page unless otherwise indicated below. Undesignated information shall be inserted at the rear of each package. Place page numbers at the bottom of every page, excluding dividers. Proposal documents should not contain links to other web pages; such links may not be reviewed for evaluation purposes.

Submittal package is requested to not exceed **30 pages** printed single-sided; **page restriction excludes required forms found herein and dividers**. **PLEASE INCLUDE PAGE TABS/SECTION DIVIDERS** so that those evaluating your submittal can easily compare each section with others that are submitted. If any of the information provided by the Proposer is found to be, in the sole opinion of the Evaluation Committee and Procurement Management Director, substantially unreliable their proposal may be rejected.

Proposers shall submit one (1) original hard copy (clearly marked as such), one (1) "copy", and one (1) electronic version on a USB flash drive containing the proposal submittal in an unlocked PDF format. HCS may request specific files be submitted in specialty format (IE: Provide a Project Timeline in Excel format.) Vendor shall accommodate such specialty requests as stated within the submittal requirements describe herein. Should files not be provided in the format or quantity as requested, Vendor may be deemed Non-Responsive and therefore ineligible for award. In case of any discrepancies, the original will be considered HCS in evaluating the Proposal, and the "copy" and electronic version are provided for the agency's administrative convenience only.

Proposals will be evaluated by designated staff members of the Hamilton County Department of Education. Where deemed necessary at the discretion of HCS, outside consultants, experts, or community stakeholders may serve on the evaluation committee.

Select proposals meeting all requirements, and at the request or recommendation of the evaluation committee, may be asked to present an oral presentation in which key areas of the proposal will be discussed. At the presentation meeting, questions and clarifications, if any, will be addressed by the HCS and additional evaluation and/or numerical ranking will be conducted following such presentations. HCS reserves the right to enter into a Best and Final Offer approach amongst proposers deemed qualified by the HCS evaluation committee.

It is the responsibility of the proposer to submit a proposal that best meets the requirements outlined in this Request for Proposal. It is the intent HCS to award a contract for the service described herein as a result of this Request for Proposal. HCS reserves the right to reject any or all such proposals. HCS reserves the right to conduct negotiations with proposing Vendors where it is deemed in its best interest and at HCS's sole discretion.

Scoring criteria and the weight at which specific criteria is to be evaluated as follows:

SCORING CRITERIA & WEIGHT

CRITERIA / TAB	CRITERIA DESCRIPTION	MAX. POINTS AVAILABLE
1	QUALIFICATIONS OF COMPANY – OVERALL	**15**
2	COMPANY SPECIFIC RELEVANT EXPERIENCE & REFERENCES	**20**
3	PLAN OF APPROACH	**30**
4	PERSONNEL	**20**
5	PROPOSED COST	**15**
TOTAL POINTS		**100**
Additional details and documents found within submittal package, although not located within tabs as listed above, may be reviewed and considered by the evaluation committee when scoring Proposers.		

The Request for Proposal document shall include the following:

COVER PAGE: Introduction

- Project RFP Number & Name – RFP 24-55
- Company's Name & Address
- Company's Contact Person & Information (phone, email address)
- How many years has Proposer been in business under present name?
- Under what other former names has your organization operated?

***Cover Page: Introduction does NOT count towards page restriction requested herein. ***

TAB 1: Qualifications of Company – Overall

- Provide a description of your Company, your Company's experience, and underlying philosophy in providing the services as described and requested herein. Description should include details such as: abilities, capacity, skill, strengths, number of years, location of office(s), as well as MBE, WBE, DBE, VBE or similar status, and recent, current, and/or projected workload, etc.

TAB 2: Company Specific Relevant Experience & References

- Provide details of a maximum of five (5) projects/clients similar in scope and size to that being requested through this solicitation that your Company has completed/serviced recently or currently services. School or Educational references are preferred. Southeastern region preferred. Details for each project/client example provided should include:
  - Project Name
  - Project Address
  - Customer Name
  - Customer Contact Information
    - Point of contact Name, Phone, and Email
  - Brief description of work/services provided.

- Type of Turf System
- Initial costs of work/Contract Award Amount
- Final costs of work/Final Contract Award Amount
- Number of change orders
- Details related to any warranty work (how much, damage, repair, etc)
- Total completion time (From Notice to Proceed to Final Invoice payment) / Term of Contract Held

- Provide a statement of understanding that your Company recognizes that HCS reserves the right to evaluate the proposing Company on their past performance and prior dealings with HCS (i.e., failure to meet specifications, poor workmanship, late delivery, etc.) as part of their experience criteria.

TAB 3: Plan of Approach

- Provide a detailed Plan of Approach that explains how your Company intends to comply with and meet the anticipated deliverables and/or requested Scope of Services as detailed within this solicitation.

- Plan of Approach shall include, but not be limited to, specific details related to the following:
  - Construction schedule for each location;
  - Anticipated issues and potential resolutions for each location;
  - Project Manager name(s) and specific duties;
  - Superintendent names(s) and specific duties (if different from the PM);
  - Communication of RFI and/or questions;
  - Recommended Owner/Architect/Contractor meeting frequency;
  - Substantial Completion, Final Completion and Close-out procedures;
  - Proposed Maintenance Plan including hands-on session with location and HCS staff.
  - Warranty details

  - For warranty related details ensure such includes minimum 8-year warranty information along with any information/pricing on available extended warranties. Include a detailed description of the Owner's/HCS's responsibilities or obligations throughout the warranty period.
    - Include history of warranty issues related to proposed turf manufacturer, material and/or recalls along with how such have been addressed.

  - The Maintenance Program proposed shall include a minimum quarterly maintenance program for the life of the warranty. Provide description of the proposed maintenance program and information related to any additional maintenance programs that may be available and the proposed costs related to additional programs should be represented in the value add area of the Bid/Proposal form. Included within this document shall be the specifications and maintenance requirements for the turf groomers (3 required) that are to be included with the proposed price for the project.

  - As it is the desire of HCS to install the highest quality, longest lasting synthetic turf system at these locations to support year-round, daily use. The system proposed by the Vendor shall include all information necessary to demonstrate why the installation of its product will provide the best available system for the intended use.

- HCS intends to request goods or services received under this contract by way of Purchase Order and Standard AIA Contract vehicle as provided herein.

TAB 4: Personnel

- Provide a detailed description of the Company's **specific** project/contract management team, inclusive of sub-Consultants anticipated to be utilized, that will be assigned to the

HCS contract. Identify the roles and responsibilities of the primary team members as they pertain/apply to the Project Approach and include details that demonstrate the individual's knowledge and understanding of the types of services to be performed as well as previous experience in similar or related work.

- Personnel details are requested to specifically include:

  - Installer Qualifications from Manufacturer as well as Professional Associations (Ex: ASBA, Certified Field Builder, Synthetic Turf Council, etc.);
  - Project Team, Company, and Individual Certifications;
  - Copy of Business License;
  - Copy of Contractor Licensing of Prime Contractor;
  - Direct Experience Details related to such/similar projects.

- Provide a statement acknowledging your Company's understanding that the project/contract management team/key team members assigned to the HCS contract, as described above, shall not be substituted without the expressed permission of HCS.

- Provide resumes, licensure, and certifications of proposed **specific** project/contract management team, inclusive of sub-Consultants anticipated to be utilized, to be assigned to the HCS contract.

***Resumes, Licensure, and Certifications are not included within page restrictions. ***
Companies are encouraged to submit valid copies of Licenses, MBE, WBE, DBE, VBE or similar certifications for adequate committee consideration."

TAB 5: Proposed Cost Scoring:

- Vendor shall provide, on the Bid/Proposal form provided herein, lump sum per field location pricing for the full and complete construction of the Project in conformity to all requirements as stated with in the plans, specifications, contract documents and solicitation.
  - Vendor is encouraged to propose value added options as either add or deductive alternates to their pricing. See spaces for such alternates on Bid/Proposal Form. Such value added options may be taken into considered and/or award as part of this Project at the sole discretion of HCS. The alternates listed are not to be included in the proposed Lump Sum bid.

- Pricing shall be inclusive of all incidentals necessary to provide for the services as defined herein.

- Pricing provided as part of the submission shall be utilized for evaluation purposes and may be utilized for award purposes. HCS does however reserve the right to negotiate pricing with the Vendor(s) as a condition of award.

TAB 6: Required Forms

- Forms 1- 9 to follow herein

HAMILTON COUNTY DEPARTMENT OF EDUCATION
Chattanooga, Tennessee 37421

SOLICITATION RESPONSE & PROPOSAL FORM

RFP 24-55, PROPOSED RENOVATION OF FOOTBALL/SOCCER FIELDS AT HOWARD HIGH SCHOOL, OOLTEWAH HIGH SCHOOL and SODY-DAISY HIGH SCHOOL

1. Vendor Name _____
2. Vendor Address _____
3. City _____ State _____ Zip _____
4. Telephone Number _____ Fax Number _____
5. Contact Person _____
6. Contact Person's email address _____
7. By submission of this bid/proposal, each Vendor and each person signing on behalf of any Vendor certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief that each Vendor is not on the list created pursuant to Tennessee Code Annotated § 12-12-106.
8. Authorizing Signature _____
   (Sign)
9. Authorizing Print Name & Title: _____
10. Vendor's Hamilton County Business License Number _____
    (If Applicable*) Attach A Copy Of The License.*
11. I Acknowledge the Receipt Of: (Please Write "Yes" If You Received One)
    Addendum 1 _____ Addendum 2 _____ Addendum 3 _____ Addendum 4 _____
12. Do you accept the Terms and Conditions of the solicitation/contract? Yes _____ No _____
13. May other Government Agencies in Tennessee purchase these products/services at the same prices as this bid/proposal? Yes _____ No _____
14. Will you accept E-commerce payments? Yes _____ No _____
15. Pricing: Complete following page Bid/Proposal Form

REMINDER:
All questions pertaining to this solicitation must be submitted electronically to doe_purchasing@hcde.org no later than 8 calendar days prior to the Opening/Due date designated herein. Failure to submit a question in the timeframe indicated above may result in the question going unanswered at the discretion of HCS.

An extension to the opening date does not guarantee an extension to the question deadline period. Such will be communicated in associated addendum posting.

It is the sole responsibility of the Vendor to ensure they receive/obtain all solicitation related documentation.

BID/PROPOSAL FORM

COMPANY NAME: _____

SOLICITATION: **RFP 24-55, PROPOSED RENOVATION of FOOTBALL/SOCCER FIELDS at HOWARD HIGH SCHOOL, OOLTEWAH HIGH SCHOOL and SODDY-DAISY HIGH SCHOOL**

Having carefully examined the Solicitation/Contract Documents, Contractor/Vendor proposes to furnish the Scope of Services as described herein and within all applicable proposal submission documents for the fee(s) as presented below.

Pricing shall be inclusive of all labor, equipment, supplies, overhead, profit, material, and any other incidental costs required to perform and complete all work as specified in the Solicitation/Contract Documents. All Unit Prices shall be bid at the nearest whole penny.

In the event there is a discrepancy between a subtotal or total amount and the unit prices and extended amounts, the unit prices shall prevail and the corrected extension(s) and total(s) will be considered the price.

HCS requests bids/proposals be submitted on bid/proposal forms provided by the HCS for this solicitation. Fee(s) submitted on other forms, other than those provided by the HCS, may be deemed Non-Responsive upon review by and at the sole discretion of the HCS Purchasing Office.

TURF FIELDS INSTALLATION & SOFTBALL FIELD IMPROVEMENTS

Item	Description	Unit of Measure	Quantity	Total Amount
1	Howard High School	LS	1	$
2	Ooltewah High School	LS	1	$
3	Soddy-Daisy High School	LS	1	$
4	Owner's Contingency	EA	1	$100,000.00

BID SUMMARY

PROJECT TOTAL	**$**

PROJECT TOTAL: _____

(Use Words to Write Total)

OPTIONAL VALUE ADD/DELETE ALTERNATES

(List any Vale Added/Deductive Options Company Proposes; Including any Additional Maintenance Programs)

Item	Description	Unit of Measure	Quantity	Total Amount
1Add		EA	1	$
2Add		EA	1	$
3Add		EA	1	$
4Add		EA	1	$
5Add		EA	1	$
1Ded		EA	1	$
2Ded		EA	1	$
3Ded		EA	1	$
4Ded		EA	1	$
5Ded		EA	1	$

Use additional separate paper for optional value add/deduct alternates where necessary.

Form 2

CERTIFICATE OF COMPLIANCE

By indication of the authorized signature below, the Proposer/Bidder does hereby make certification and assurance, under penalty of perjury, of the Proposer's/Bidder's compliance with all provisions of this bid/bid and the following items:

1. The laws of the State of Tennessee and Hamilton County;
2. Title VI of the Civil Rights Act of 1964;
3. Title IX of the Education Amendments of 1972;
4. The condition that no amount shall be paid directly or indirectly to an employee or official of Hamilton County Department of Education as wages, compensation, or gifts in exchange for acting as an officer, agent, employee, subcontractor, or consultant to the Proposer/Bidder in connection with the procurement under this Bid/RFP.

Signed _____ Dated _____

Print Name _____ Email _____

Company _____ Telephone No. _____

Address _____ Fax No. _____

City _____ State _____ Zip _____

Form 3

AUTHORIZATION TO BIND

By signing this proposal, I certify and acknowledge that the information contained in this document is true and correct, containing **NO** misrepresentations. The information is **NOT** tainted by any collusion. I certify and acknowledge that I have reviewed and approved the release of this proposal/bid for HCS's consideration. Further, I am authorized to bind my company to the responses and pricing in these proposal/bid documents, and any subsequent negotiations, as well as execute the actual Contract documents, if selected.

_____
Authorized Signature (Officer of the Company)

_____
Name of Authorized Signer (Printed or Typed)

_____
Title of Authorized Signer

_____
Firm Name

_____
Taxpayer Identification Number

_____
Firm Address, City and Zip Code

_____
Telephone Number

_____
Fax Number

_____
Email Address

_____
Date

Form 4

Drug-Free Workplace Requirements & Affidavit
TENNESSEE CODE ANNOTATED, § 50-9-113

(1) Each Contractor or Subcontractor with no less than five (5) employees receiving pay shall submit an affidavit stating that such employer has a drug-free workplace program in effect at the time of submission of bids. Said program shall comply with Title 50, Chapter 9, TCA.

(2) If it is determined that an employer subject to the provisions of this section has entered into a contract for this Project and does not have a drug-free workplace pursuant to the referenced requirements, such employer shall be prohibited from entering into another contract with any local government or state agency until such employer can prove compliance.

(3) The written affidavit shall be submitted with the Construction Contractor's Bid Form, and the Bid shall not be considered complete if said affidavit is not included, and the Bid shall be rejected as Non-Responsive. For all other product or service contracts submission of the affidavit is encouraged only.

(4) For purposes of compliance with this section, any private employer shall obtain a certificate of compliance with the applicable portions of the Drug-Free Workplace Act from the Department of Labor and Workforce Development.

(To be submitted with bid by construction contractor with 5 or more employees and encouraged for all others)

AFFIDAVIT

I _____, president or other principal

Officer of _____, swear or affirm that the
(Name of Company)

Company has a drug-free workplace program that complies with Title 50, Chapter 9, Tennessee Code Annotated, in effect at the time of this bid submission at least to the extent required of governmental entities. I further swear or affirm that the company is in compliance with the Tennessee Code Annotated, § 50-9-113.

_____
President of Principal Officer

For: _____

STATE OF TENNESSEE}
COUNTY OF _____}

Subscribed and sworn before me by _____, President

or principal officer of _____,

On this _____ day of _____, 20_____.

_____ NOTARY PUBLIC

My Commission Expires: _____

Instructions for Non-Collusion Affidavit

(1) This non-collusion affidavit is material to any contract awarded pursuant to this bid.

(2) This non-collusion affidavit must be executed by the member, officer, or employee of the bidder who makes the final decision on prices and the amount quoted in the bid.

(3) Bid rigging and other efforts to restrain competition, and the making of false sworn statements in connection with the submission of bids are unlawful and may be subject to criminal prosecution. The person who signs the Affidavit should examine it carefully before signing and assure himself or herself that such statement is true and accurate, making diligent inquiry, as necessary, of all other persons employed by or associated with the bidder with responsibilities for the preparation, approval or submission of the bid.

(4) In the case of a bid submitted by a joint venture, each party to the venture must be identified in the bid documents, and an affidavit must be submitted separately on behalf of each party.

(5) The term "complementary bid" as used in the Affidavit has the meaning commonly associated with that term in the bidding process and includes the knowing submission of bids higher than the bid of another firm, and intentionally high or noncompetitive bid, and any other form of bid submitted for the purpose of giving a false appearance of competition.

Non-Collusion Affidavit
(Attachment A)

State of_____

County of _____

I state that I am_____of _____
(Title) (Name of Firm)

and that I am authorized to make this affidavit on behalf of my firm, and its owners, directors, and officers. I am the person responsible in my firm for the price(s) and the amount of this bid.

I state that:

(1) The price(s) and amount of this bid have been arrived at independently and without consultation, communication or agreement with any other contractor, bidder, or potential bidder.

(2) Neither the price(s) nor the amount of this bid, and neither the approximate price(s) nor approximate amount of this bid, have been disclosed to any other firm or person who is a bidder or potential bidder, and they will not be disclosed before bid opening.

(3) No attempt has been made or will be made to induce any firm or person to refrain from bidding on this contract, or to submit a bid higher than this bid, or to submit any intentionally high or noncompetitive bid or other form of complementary bid.

(4) The bid of my firm is made in good faith and not pursuant to any agreement or discussion with, or inducement from, any firm or person to submit a complementary or other noncompetitive bid.

(5) _____, its affiliates, subsidiaries, officers, directors and
(Name of my Firm)
employees are not currently under investigation by any governmental agency and have not in the last three years been convicted or found liable for any act prohibited by State or Federal law in any jurisdiction, involving conspiracy or collusion with respect to bidding on any public contract, except as follows:

I state that_____understands and acknowledges that the
(Name of my Firm)
above representation are material and important and will be relied on by Hamilton County Department of Education in awarding the contract(s) for which this bid is submitted. I understand and my firm understands that any misstatement in this affidavit is and shall be treated as fraudulent concealment from Hamilton County Department of Education of the true facts relating to submission of bids for this contract.

_____
(Signature and Company Position)

SWORN TO AND SUBSCRIBED
BEFORE ME THIS_____DAY OF

_____, 20 _____

NOTARY PUBLIC:

My Commission Expires: _____

Form 6

CERTIFICATION OF COMPLIANCE WITH THE IRAN DIVESTMENT ACT

Effective July 1, 2016, this form must be submitted for any contract that is subject to the Iran Divestment Act, Tenn. Code Ann. § 12-12-101, et seq., ("Act"). This form must be submitted with any bid or bid regardless of where the principal place of business is located.

Pursuant to the Act, this certification must be completed by any corporation, general partnership, limited partnership, limited liability partnership, joint venture, nonprofit organization, or other business organization that is contracting with a political subdivision of the State of Tennessee.

Certification Requirements.

No state agency or local government shall enter into any contract subject to the Act, or amend or renew any such contract with any bidder/contractor who is found ineligible under the Act.

Complete all sections of this certification and sign and date it, under oath, in the presence of a Notary Public or a person authorized to take an oath in another state.

CERTIFICATION:

I, the undersigned, certify that by submission of this bid, each bidder and each person signing on behalf of any Respondent certifies, and in the case of a joint bid or contract each party thereto certifies, as to its own organization, under penalty of perjury, that to the best of its knowledge and belief that each bidder is not on the list created pursuant to Tenn. Code Ann. § 12-12-106.

Respondent represents it has the full power, knowledge, and authority to make this Certification and that the signatory signing this Certification on behalf of bidder/contractor has been duly authorized to do so on behalf of the bidder/contractor.

Sworn as true to the best of my knowledge and belief, subject to the penalties of false statement.

_____
Company Name

_____
Signature of Authorized Official

State of _____

County of _____

The foregoing instrument was signed and acknowledged before me, by means of ☐ physical presence or ☐ personally known, this _____day of _____, 20___, by

_____ who has produced _____ as identification.
(Print or Type Name) (Type of Identification and Number)

_____
Notary Public Signature

_____
Printed Name of Notary Public

_____
Notary Commission Number/Expiration

The signee of these Affidavit guarantees, as evidenced by the sworn affidavit required herein, the truth and accuracy of this affidavit to interrogatories hereinafter made.

Form 7

Hamilton County Board of Education
Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion

The prospective participant / vendor certifies, by submission of this bid, that neither it nor its Principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal Department or agency.

Where the prospective participant / vendor is unable to certify to any of the statements in this Certification, such prospective participant / vendor shall attach an explanation to this bid.

_____

Organization Name

_____

Name(s) and Title(s) of Authorized Representative(s)

_____ _____

Signature

Form 8

Certification of Compliance with Tennessee Public Chapter # 587

The General Assembly of the State of Tennessee requires any person, corporation or other entity who enters into or renews a contract with a local board of education comply with Tennessee Public Chapter #587 (TPC587).

TPC587 requires persons, employees of the person or corporation that have direct contact with school children or access to school grounds when children are present to have supplied to the corporation a fingerprint sample and have conducted a criminal history records check by the Tennessee Bureau of Investigation and the Federal Bureau of Investigation prior to permitting the person to have contact with such children or enter school grounds. (The Public Chapter 1080, (D) was amended to: "A person whose contract is for the performance of a service at a school-sponsored activity, assembly or even at which school officials or employees are present when the service is performed and where the activity, assembly, or event is *conducted under the supervision of school officials or employees."*

TPC587 provides guidance for employees who have been convicted of an offense that is classified as a sexual offense or a violent sexual offense.

I have read the attached TENNESSEE PUBLIC CHAPTER # 587 and certify compliance with the regulations.

_____

Name/Address of Organization

_____

Name/Title of Submitting Official

_____ _____

Signature Date

Form 9

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned,

_____

as Principal, and _____

as Surety, are hereby held and firmly bound unto Hamilton County Department of Education, Tennessee

as Owner in the penal sum of _____ for the payment of which, well and truly to be

made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

Signed, this _____day of _____, 20___.

The condition of the above obligated is such that whereas the Principal has submitted to Hamilton County Department of Education, Tennessee, a certain Bid, attached hereto and hereby made a part hereof to enter into a contract in writing for the Project known as: RFP 24-55 Proposed Renovation of Football/Soccer Fields at Howard High School, Ooltewah High School and Soddy-Daisy High School.

NOW, THEREFORE,

(a) If said Bid shall be rejected, or in the alternate.

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

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

_____ _____ (L.S.)

Surety Principal

By:_____ _____

Title

_____

Title

SEAL

Note: Bond may be declared invalid if not accompanied by Power of Attorney.

Sealed Label - **Affix this page to your sealed solicitation envelope to identify it as a "Sealed Submission/Proposal".**

BID/PROPOSAL DOCUMENTS • DO NOT OPEN

SOLICITATION NO.:	**RFP 24-55**
SOLICITATION TITLE:	**PROPOSED RENOVATION of FOOTBALL/SOCCER FIELDS at HOWARD HIGH SCHOOL, OOLTEWAH HIGH SCHOOL and SODDY-DAISY HIGH SCHOOL**
OPENING/DUE DATE:	**April 2, 2024**
TIME DUE:	**Prior to: 2:00 PM**
SUBMITTED BY:	

(Name of Company)

e-mail address Telephone

DELIVER TO: **Hamilton County Board of Education**
Attn: Purchasing Department
3074 Hickory Valley Road
Chattanooga, TN 37421

CONTRACTOR LICENSING DETAILS

Per TCA 62-6-119, it is necessary for Bidder to be properly licensed at the time of the bid and provide evidence of compliance with the applicable provisions of TCA 62-6-119 before such bid may be considered. As such the following licensure table shall be completed and affixed to the exterior of the Bidder's submission.

Provide TN state contractor license number, expiration date, and classification for Bidder and listed subcontractors as applicable. Provide name as listed on license.

Prime Contractor

	Name	License Number	Expires	Classification	Address
Prime Contractor					

Subcontractor(s)

- If any trade work meets the monetary value listed below, list subcontractor(s) that will perform that work. If Prime Bidder will perform work in that category with Prime Bidder's own forces, fill in Prime Bidder's name as subcontractor.
- If no work is required in a subcontractor category, write "None Required".
- If the monetary amount of a subcontractor's work is such that no license is require, write "N/A" in the license number column, but still write name.
- Failure to provide licensure information may deem bid submission Void and ineligible for receipt and up to award.

	Name	License Number	Expires	Classification	License Required If Greater Than
Electrical	N/A				≥ $25,000
Geothermal	N/A				≥ $25,000
HVAC	N/A				≥ $25,000
Masonry	N/A				≥ $100,000
Plumbing	N/A				≥ $25,000
Roofing	N/A				≥ $25,000

***Notices:**

- **The Date Due/Submission Deadline Date/Opening Date as stated on this label and other forms contained herein may have been updated via issuance of Addenda against this project. It is the sole responsibility of the Contractor/Vendor to monitor the HCS solicitation for any updates to the Date Due/Submission Deadline Date/Opening Date via Addenda. This label or other original forms may not be updated. Contractor/Vendor may strike through and update Date Due/Submission Deadline Date/Opening Date at their discretion to match any updates to this date that have been published via Addenda.**
- **Submissions received after the time and date of the Date Due/Submission Deadline Date/Opening Date will not be accepted at the sole discretion of HCS.**
- **Some submissions may require the Vendor to provide the company name, Tennessee Contractor's license number, expiration date, license classification and company address on the outside of the sealed bid envelope in accordance with TCA 62-6-119. Where this is requested within the project documents the Vendor is solely responsible for compliance with this request.**
- **Please print clearly.**

DRAFT

AIA® Document A104™ – 2017

Standard Abbreviated Form of Agreement Between Owner and Contractor

AGREEMENT made as of the « » day of «» in the year «Two Thousand Twenty-Four»
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

«**Hamilton County Department of Education**»«»
«3074 Hickory Valley Road
Chattanooga, TN 37421»
«Telephone Number: (423) 498-7030»
«»

and the Contractor:
(Name, legal status, address and other information)

«»

for the following Project:
(Name, location and detailed description)

«**Proposed Renovation of Football/Soccer Fields at**
Howard High School, 2500 Market Street, Chattanooga, TN 37408
Ooltewah High School, 6123 Mountain View Road, Ooltewah, TN 37363
Soddy-Daisy High School, 618 Sequoyah Access Road, Soddy-Daisy, TN 37379

The Engineer:
(Name, legal status, address and other information)

«**Barge Design Solutions, Inc..**»« »
«1110 Market Street, Suite 200
Chattanooga, TN 37402»
«423-756-3025»
«Email: joe.sawyer@bargedesign.com

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

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TABLE OF ARTICLES

ARTICLE 1 THE WORK OF THIS CONTRACT

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

ARTICLE 2 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 2.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[« »] The date of this Agreement.

[« X »] A date set forth in a notice to proceed issued by the Owner.

[« »] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

«May 1, 2024 »

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 2.2 The Contract Time shall be measured from the date of commencement.

§ 2.3 Substantial Completion

§ 2.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:
(Check the appropriate box and complete the necessary information.)

[« X »] Not later than «**one hundred and one days**» (« **101** ») calendar days from the date of commencement of the Work.

[« »] By the following date: « »

§ 2.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date

§ 2.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 2.3, liquidated damages, if any, shall be assessed as set forth in Section 3.5.

ARTICLE 3 CONTRACT SUM

§ 3.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be one of the following:
(Check the appropriate box.)

[« X »] Stipulated Sum, in accordance with Section 3.2 below

[« »] Cost of the Work plus the Contractor's Fee, in accordance with Section 3.3 below

[« »] Cost of the Work plus the Contractor's Fee with a Guaranteed Maximum Price, in accordance with Section 3.4 below

(Based on the selection above, complete Section 3.2, 3.3 or 3.4 below.)

§ 3.2 The Stipulated Sum shall be « » **($ «** »), subject to additions and deductions as provided in the Contract Documents.

§ 3.2.1 The Stipulated Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:
(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

« **None** »

§ 3.2.2 Unit prices, if any:

(Identify the item and state the unit price and the quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)
None		

§ 3.2.3 Allowances, if any, included in the stipulated sum:
(Identify each allowance.)

Item	Price

§ 3.3 Cost of the Work Plus Contractor's Fee
§ 3.3.1 The Cost of the Work is as defined in Exhibit A, Determination of the Cost of the Work.

§ 3.3.2 The Contractor's Fee:
(State a lump sum, percentage of Cost of the Work or other provision for determining the Contractor's Fee and the method of adjustment to the Fee for changes in the Work.)

« »

§ 3.4 Cost of the Work Plus Contractor's Fee With a Guaranteed Maximum Price
§ 3.4.1 The Cost of the Work is as defined in Exhibit A, Determination of the Cost of the Work.

§ 3.4.2 The Contractor's Fee:
(State a lump sum, percentage of Cost of the Work or other provision for determining the Contractor's Fee and the method of adjustment to the Fee for changes in the Work.)

« »

§ 3.4.3 Guaranteed Maximum Price
§ 3.4.3.1 The sum of the Cost of the Work and the Contractor's Fee is guaranteed by the Contractor not to exceed « » ($ « »), subject to additions and deductions by changes in the Work as provided in the Contract Documents. This maximum sum is referred to in the Contract Documents as the Guaranteed Maximum Price. Costs which would cause the Guaranteed Maximum Price to be exceeded shall be paid by the Contractor without reimbursement by the Owner.
(Insert specific provisions if the Contractor is to participate in any savings.)

« »

§ 3.4.3.2 The Guaranteed Maximum Price is based on the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:
(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

« »

§ 3.4.3.3 Unit Prices, if any:
(Identify the item and state the unit price and the quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)

§ 3.4.3.4 Allowances, if any, included in the Guaranteed Maximum Price:
(Identify each allowance.)

Item	Price

§ 3.4.3.5 Assumptions, if any, on which the Guaranteed Maximum Price is based:

« »

§ 3.4.3.6 To the extent that the Contract Documents are anticipated to require further development, the Guaranteed Maximum Price includes the costs attributable to such further development consistent with the Contract Documents and reasonably inferable therefrom. Such further development does not include changes in scope, systems, kinds and quality of materials, finishes or equipment, all of which, if required, shall be incorporated by Change Order.

§ 3.4.3.7 The Owner shall authorize preparation of revisions to the Contract Documents that incorporate the agreed-upon assumptions contained in Section 3.4.3.5. The Owner shall promptly furnish such revised Contract Documents to the Contractor. The Contractor shall notify the Owner and Engineer of any inconsistencies between the agreed-upon assumptions contained in Section 3.4.3.5 and the revised Contract Documents.

§ 3.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any.)

«**None** »

ARTICLE 4 PAYMENT

§ 4.1 Progress Payments

§ 4.1.1 Based upon Applications for Payment submitted to the Engineer by the Contractor and Certificates for Payment issued by the Engineer, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 4.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

« »

§ 4.1.3 Provided that an Application for Payment is received by the Engineer not later than the « 25th » day of a month, the Owner shall make payment of the certified amount to the Contractor not later than the « 10th » day of the « next » month. If an Application for Payment is received by the Engineer after the date fixed above, payment shall be made by the Owner not later than « thirty » (« 30 ») days after the Engineer receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 4.1.4 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold retainage from the payment otherwise due as follows:
(Insert a percentage or amount to be withheld as retainage from each Application for Payment and any terms for reduction of retainage during the course of the Work. The amount of retainage may be limited by governing law.)

« Five percent (5%) retainage will be withheld until Closeout is complete. »

§ 4.1.5 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

« » % « »

§ 4.2 Final Payment

§ 4.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Section 18.2, and to satisfy other requirements, if any, which extend beyond final payment;

.2 the Contractor has submitted a final accounting for the Cost of the Work, where payment is on the basis of the Cost of the Work with or without a Guaranteed Maximum Price; and

.3 a final Certificate for Payment has been issued by the Engineer in accordance with Section 15.7.1.

§ 4.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Engineer's final Certificate for Payment, or as follows:

« »

ARTICLE 5 DISPUTE RESOLUTION

§ 5.1 Binding Dispute Resolution

For any claim subject to, but not resolved by, mediation pursuant to Section 21.5, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

[« X »] Arbitration pursuant to Section 21.6 of this Agreement

[« »] Litigation in a court of competent jurisdiction

[« »] Other *(Specify)*

« »

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, claims will be resolved in a court of competent jurisdiction.

ARTICLE 6 ENUMERATION OF CONTRACT DOCUMENTS

§ 6.1 The Contract Documents are defined in Article 7 and, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 6.1.1 The Agreement is this executed AIA Document A104™–2017, Standard Abbreviated Form of Agreement Between Owner and Contractor.

§ 6.1.2 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203–2013 incorporated into this Agreement.)

« None »

§ 6.1.3 The Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
Section 00800	Supplementary General Conditions		4

§ 6.1.4 The Specifications:
(Either list the Specifications here or refer to an exhibit attached to this Agreement.)

« **Included on Drawings.** »

Section	Title	Date	Pages

§ 6.1.5 The Drawings:
(Either list the Drawings here or refer to an exhibit attached to this Agreement.)

« »

Number	Title	Date

§ 6.1.6 The Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are enumerated in this Article 6.

§ 6.1.7 Additional documents, if any, forming part of the Contract Documents:

.1 Other Exhibits:
(Check all boxes that apply.)

[« »] Exhibit , Determination of the Cost of the Work.

[« »] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

« »

[« »] The Sustainability Plan:

Title	Date	Pages

[« »] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.2 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents.)

« »

ARTICLE 7 GENERAL PROVISIONS

§ 7.1 The Contract Documents

The Contract Documents are enumerated in Article 6 and consist of this Agreement (including, if applicable, Supplementary and other Conditions of the Contract), Drawings, Specifications, Addenda issued prior to the execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Engineer. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by

one shall be as binding as if required by all; performance by the Contractor shall be required to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 7.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind between any persons or entities other than the Owner and the Contractor.

§ 7.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 7.4 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Engineer and the Engineer's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 7.5 Ownership and use of Drawings, Specifications and Other Instruments of Service

§ 7.5.1 The Engineer and the Engineer's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Engineer's or Engineer's consultants' reserved rights.

§ 7.5.2 The Contractor, Subcontractors, Sub-subcontractors and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to the protocols established pursuant to Sections 7.6 and 7.7, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Engineer and the Engineer's consultants.

§ 7.6 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 7.7 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

§ 7.8 Severability

The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 7.9 Notice

§ 7.9.1 Except as otherwise provided in Section 7.9.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with AIA Document E203–2013, insert requirements for delivering Notice in electronic format such as name, title and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

« »

§ 7.9.2 Notice of Claims shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 7.10 Relationship of the Parties

Where the Contract is based on the Cost of the Work plus the Contractor's Fee, with or without a Guaranteed Maximum Price, the Contractor accepts the relationship of trust and confidence established by this Agreement and covenants with the Owner to cooperate with the Engineer and exercise the Contractor's skill and judgment in furthering the interests of the Owner; to furnish efficient business administration and supervision; to furnish at all times an adequate supply of workers and materials; and to perform the Work in an expeditious and economical manner consistent with the Owner's interests. The Owner agrees to furnish and approve, in a timely manner, information required by the Contractor and to make payments to the Contractor in accordance with the requirements of the Contract Documents.

ARTICLE 8 OWNER

§ 8.1 Information and Services Required of the Owner

§ 8.1.1 Prior to commencement of the Work, at the written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 8.1.1, the Contract Time shall be extended appropriately.

§ 8.1.2 The Owner shall furnish all necessary surveys and a legal description of the site.

§ 8.1.3 The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 8.1.4 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 9.6.1, the Owner shall secure and pay for other necessary approvals, easements, assessments, and charges required for the construction, use, or occupancy of permanent structures or for permanent changes in existing facilities.

§ 8.2 Owner's Right to Stop the Work

If the Contractor fails to correct Work which is not in accordance with the requirements of the Contract Documents, or repeatedly fails to carry out the Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order is eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity.

§ 8.3 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents, and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to any other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Engineer and the Engineer may, pursuant to Section 15.4.3, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the

reasonable cost of correcting such deficiencies, including the Owner's expenses and compensation for the Engineer's additional services made necessary by such default, neglect, or failure. If the Contractor disagrees with the actions of the Owner or the Engineer, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 21.

ARTICLE 9 CONTRACTOR

§ 9.1 Review of Contract Documents and Field Conditions by Contractor

§ 9.1.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 9.1.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 8.1.2, shall take field measurements of any existing conditions related to that portion of the Work and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Engineer any errors, inconsistencies, or omissions discovered by or made known to the Contractor as a request for information in such form as the Engineer may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional unless otherwise specifically provided in the Contract Documents.

§ 9.1.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Engineer any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Engineer may require.

§ 9.2 Supervision and Construction Procedures

§ 9.2.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters.

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

§ 9.3 Labor and Materials

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

§ 9.3.2 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.

§ 9.3.3 The Contractor may make a substitution only with the consent of the Owner, after evaluation by the Engineer and in accordance with a Modification.

§ 9.4 Warranty

The Contractor warrants to the Owner and Engineer that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation or normal wear and tear under normal usage. All other warranties

required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 15.6.3.

§ 9.5 Taxes

The Contractor shall pay sales, consumer, use, and other similar taxes that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 9.6 Permits, Fees, Notices, and Compliance with Laws

§ 9.6.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 9.6.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work. If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 9.7 Allowances

The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. The Owner shall select materials and equipment under allowances with reasonable promptness. Allowance amounts shall include the costs to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts. Contractor's costs for unloading and handling at the site, labor, installation, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowance.

§ 9.8 Contractor's Construction Schedules

§ 9.8.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Engineer's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 9.8.2 The Contractor shall perform the Work in general accordance with the most recent schedule submitted to the Owner and Engineer.

§ 9.9 Submittals

§ 9.9.1 The Contractor shall review for compliance with the Contract Documents and submit to the Engineer Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents in coordination with the Contractor's construction schedule and in such sequence as to allow the Engineer reasonable time for review. By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Engineer that the Contractor has (1) reviewed and approved them; (2) determined and verified materials, field measurements, and field construction criteria related thereto, or will do so; and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents. The Work shall be in accordance with approved submittals.

§ 9.9.2 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents.

§ 9.9.3 The Contractor shall not be required to provide professional services that constitute the practice of Architecture or Engineering unless such services are specifically required by the Contract Documents or unless the Contractor needs to provide such services in order to carry out the Contractor's own responsibilities. If professional design services or certifications by a design professional are specifically required, the Owner and the Engineer will specify the performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional. If no criteria are specified, the design shall comply with applicable codes and ordinances. Each Party shall be entitled to rely upon the information provided by the other Party. The Engineer will review and approve or take other appropriate action on submittals for the limited purpose of checking for conformance with information provided and the design concept expressed in the Contract Documents. The Engineer's review of Shop Drawings, Product Data, Samples, and similar submittals shall

be for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. In performing such review, the Engineer will approve, or take other appropriate action upon, the Contractor's Shop Drawings, Product Data, Samples, and similar submittals.

§ 9.10 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 9.11 Cutting and Patching

The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly.

§ 9.12 Cleaning Up

The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus material from and about the Project.

§ 9.13 Access to Work

The Contractor shall provide the Owner and Engineer with access to the Work in preparation and progress wherever located.

§ 9.14 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Engineer harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Engineer. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Engineer.

§ 9.15 Indemnification

§ 9.15.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Engineer, Engineer's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section 9.15.1.

§ 9.15.2 In claims against any person or entity indemnified under this Section 9.15 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 9.15.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

ARTICLE 10 ENGINEER

§ 10.1 The Engineer will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction, until the date the Engineer issues the final Certificate for Payment. The Engineer will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents, unless otherwise modified in writing in accordance with other provisions of the Contract.

§ 10.2 Duties, responsibilities, and limitations of authority of the Engineer as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Engineer. Consent shall not be unreasonably withheld.

§ 10.3 The Engineer will visit the site at intervals appropriate to the stage of the construction to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general, if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Engineer will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Engineer will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences, or procedures, or for safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 10.4 On the basis of the site visits, the Engineer will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Engineer will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Engineer will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 10.5 Based on the Engineer's evaluations of the Work and of the Contractor's Applications for Payment, the Engineer will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 10.6 The Engineer has authority to reject Work that does not conform to the Contract Documents and to require inspection or testing of the Work.

§ 10.7 The Engineer will review and approve or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 10.8 The Engineer will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Engineer will make initial decisions on all claims, disputes, and other matters in question between the Owner and Contractor but will not be liable for results of any interpretations or decisions rendered in good faith.

§ 10.9 The Engineer's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

ARTICLE 11 SUBCONTRACTORS

§ 11.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site.

§ 11.2 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Engineer of the Subcontractors or suppliers proposed for each of the principal portions of the Work. The Contractor shall not contract with any Subcontractor or supplier to whom the Owner or Engineer has made reasonable written objection within ten days after receipt of the Contractor's list of Subcontractors and suppliers. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 11.3 Contracts between the Contractor and Subcontractors shall (1) require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by the terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by the Contract Documents, assumes toward the Owner and Engineer, and (2) allow the Subcontractor the benefit of all rights, remedies and redress against the Contractor that the Contractor, by these Contract Documents, has against the Owner.

ARTICLE 12 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 12.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 12.2 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's activities with theirs as required by the Contract Documents.

§ 12.3 The Owner shall be reimbursed by the Contractor for costs incurred by the Owner which are payable to a Separate Contractor because of delays, improperly timed activities, or defective construction of the Contractor. The Owner shall be responsible to the Contractor for costs incurred by the Contractor because of delays, improperly timed activities, damage to the Work, or defective construction of a Separate Contractor.

ARTICLE 13 CHANGES IN THE WORK

§ 13.1 By appropriate Modification, changes in the Work may be accomplished after execution of the Contract. The Owner, without invalidating the Contract, may order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, with the Contract Sum and Contract Time being adjusted accordingly. Such changes in the Work shall be authorized by written Change Order signed by the Owner, Contractor, and Engineer, or by written Construction Change Directive signed by the Owner and Engineer. Upon issuance of the Change Order or Construction Change Directive, the Contractor shall proceed promptly with such changes in the Work, unless otherwise provided in the Change Order or Construction Change Directive.

§ 13.2 Adjustments in the Contract Sum and Contract Time resulting from a change in the Work shall be determined by mutual agreement of the parties or, in the case of a Construction Change Directive signed only by the Owner and Engineer, by the Contractor's cost of labor, material, equipment, and reasonable overhead and profit, unless the parties agree on another method for determining the cost or credit. Pending final determination of the total cost of a Construction Change Directive, the Contractor may request payment for Work completed pursuant to the Construction Change Directive. The Engineer will make an interim determination of the amount of payment due for purposes of certifying the Contractor's monthly Application for Payment. When the Owner and Contractor agree on adjustments to the Contract Sum and Contract Time arising from a Construction Change Directive, the Engineer will prepare a Change Order.

§ 13.3 The Engineer will have authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes shall be effected by written order and shall be binding on the Owner and Contractor. The Contractor shall carry out such written orders promptly. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Engineer and shall not proceed to implement the change in the Work.

§ 13.4 If concealed or unknown physical conditions are encountered at the site that differ materially from those indicated in the Contract Documents or from those conditions ordinarily found to exist, the Contract Sum and Contract Time shall be equitably adjusted as mutually agreed between the Owner and Contractor; provided that the Contractor provides notice to the Owner and Engineer promptly and before conditions are disturbed.

ARTICLE 14 TIME

§ 14.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing this Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 14.2 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 14.3 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 14.4 The date of Substantial Completion is the date certified by the Engineer in accordance with Section 15.6.3.

§ 14.5 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) changes ordered in the Work; (2) by labor disputes, fire, unusual delay in deliveries, abnormal adverse weather conditions not reasonably anticipatable, unavoidable casualties, or any causes beyond the Contractor's control; or (3) by other causes that the Contractor asserts, and the Engineer determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Engineer may determine, subject to the provisions of Article 21.

ARTICLE 15 PAYMENTS AND COMPLETION

§ 15.1 Schedule of Values

§ 15.1.1 Where the Contract is based on a Stipulated Sum or the Cost of the Work with a Guaranteed Maximum Price pursuant to Section 3.2 or 3.4, the Contractor shall submit a schedule of values to the Engineer before the first Application for Payment, allocating the entire Stipulated Sum or Guaranteed Maximum Price to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy required by the Engineer. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 15.1.2 The allocation of the Stipulated Sum or Guaranteed Maximum Price under this Section 15.1 shall not constitute a separate stipulated sum or guaranteed maximum price for each individual line item in the schedule of values.

§ 15.2 Control Estimate

§ 15.2.1 Where the Contract Sum is the Cost of the Work, plus the Contractor's Fee without a Guaranteed Maximum Price pursuant to Section 3.3, the Contractor shall prepare and submit to the Owner a Control Estimate within 14 days of executing this Agreement. The Control Estimate shall include the estimated Cost of the Work plus the Contractor's Fee.

§ 15.2.2 The Control Estimate shall include:

- **.1** the documents enumerated in Article 6, including all Modifications thereto;
- **.2** a list of the assumptions made by the Contractor in the preparation of the Control Estimate to supplement the information provided by the Owner and contained in the Contract Documents;
- **.3** a statement of the estimated Cost of the Work organized by trade categories or systems and the Contractor's Fee;
- **.4** a project schedule upon which the Control Estimate is based, indicating proposed Subcontractors, activity sequences and durations, milestone dates for receipt and approval of pertinent information, schedule of shop drawings and samples, procurement and delivery of materials or equipment the Owner's occupancy requirements, and the date of Substantial Completion; and
- **.5** a list of any contingency amounts included in the Control Estimate for further development of design and construction.

§ 15.2.3 When the Control Estimate is acceptable to the Owner and Engineer, the Owner shall acknowledge it in writing. The Owner's acceptance of the Control Estimate does not imply that the Control Estimate constitutes a Guaranteed Maximum Price.

§ 15.2.4 The Contractor shall develop and implement a detailed system of cost control that will provide the Owner and Engineer with timely information as to the anticipated total Cost of the Work. The cost control system shall compare the Control Estimate with the actual cost for activities in progress and estimates for uncompleted tasks and proposed changes. This information shall be reported to the Owner, in writing, no later than the Contractor's first Application for Payment and shall be revised and submitted with each Application for Payment.

§ 15.2.5 The Owner shall authorize preparation of revisions to the Contract Documents that incorporate the agreed-upon assumptions contained in the Control Estimate. The Owner shall promptly furnish such revised Contract Documents to the Contractor. The Contractor shall notify the Owner and Engineer of any inconsistencies between the Control Estimate and the revised Contract Documents.

§ 15.3 Applications for Payment

§ 15.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Engineer an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 15.1, for completed portions of the Work. The application shall be notarized, if required; be supported by all

data substantiating the Contractor's right to payment that the Owner or Engineer require; shall reflect retainage if provided for in the Contract Documents; and include any revised cost control information required by Section 15.2.4. Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 15.3.2 With each Application for Payment where the Contract Sum is based upon the Cost of the Work, or the Cost of the Work with a Guaranteed Maximum Price, the Contractor shall submit payrolls, petty cash accounts, receipted invoices or invoices with check vouchers attached, and any other evidence required by the Owner to demonstrate that cash disbursements already made by the Contractor on account of the Cost of the Work equal or exceed progress payments already received by the Contractor plus payrolls for the period covered by the present Application for Payment, less that portion of the progress payments attributable to the Contractor's Fee.

§ 15.3.3 Payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment stored, and protected from damage, off the site at a location agreed upon in writing.

§ 15.3.4 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or other encumbrances adverse to the Owner's interests.

§ 15.4 Certificates for Payment

§ 15.4.1 The Engineer will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Engineer determines is properly due, or notify the Contractor and Owner of the Engineer's reasons for withholding certification in whole or in part as provided in Section 15.4.3.

§ 15.4.2 The issuance of a Certificate for Payment will constitute a representation by the Engineer to the Owner, based on the Engineer's evaluations of the Work and the data in the Application for Payment, that, to the best of the Engineer's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Engineer. However, the issuance of a Certificate for Payment will not be a representation that the Engineer has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 15.4.3 The Engineer may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Engineer's opinion the representations to the Owner required by Section 15.4.2 cannot be made. If the Engineer is unable to certify payment in the amount of the Application, the Engineer will notify the Contractor and Owner as provided in Section 15.4.1. If the Contractor and the Engineer cannot agree on a revised amount, the Engineer will promptly issue a Certificate for Payment for the amount for which the Engineer is able to make such representations to the Owner. The Engineer may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Engineer's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 9.2.2, because of

- **.1** defective Work not remedied;
- **.2** third-party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- **.4** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

.5 damage to the Owner or a Separate Contractor;

.6 reasonable evidence that the Work will not be completed within the Contract Time and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or

.7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 15.4.4 When either party disputes the Engineer's decision regarding a Certificate for Payment under Section 15.4.3, in whole or in part, that party may submit a Claim in accordance with Article 21.

§ 15.5 Progress Payments

§ 15.5.1 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to sub-subcontractors in a similar manner.

§ 15.5.2 Neither the Owner nor Engineer shall have an obligation to pay or see to the payment of money to a Subcontractor or supplier except as may otherwise be required by law.

§ 15.5.3 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 15.5.4 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 15.6 Substantial Completion

§ 15.6.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 15.6.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Engineer a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 15.6.3 Upon receipt of the Contractor's list, the Engineer will make an inspection to determine whether the Work or designated portion thereof is substantially complete. When the Engineer determines that the Work or designated portion thereof is substantially complete, the Engineer will issue a Certificate of Substantial Completion which shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 15.6.4 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 15.7 Final Completion and Final Payment

§ 15.7.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Engineer will promptly make such inspection and, when the Engineer finds the Work acceptable under the Contract Documents and the Contract fully performed, the Engineer will promptly issue a final Certificate for Payment stating that to the best of the Engineer's knowledge, information and

belief, and on the basis of the Engineer's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Engineer's final Certificate for Payment will constitute a further representation that conditions stated in Section 15.7.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 15.7.2 Final payment shall not become due until the Contractor has delivered to the Owner a complete release of all liens arising out of this Contract or receipts in full covering all labor, materials and equipment for which a lien could be filed, or a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including costs and reasonable attorneys' fees.

§ 15.7.3 The making of final payment shall constitute a waiver of claims by the Owner except those arising from

- **.1** liens, claims, security interests or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents;
- **.3** terms of special warranties required by the Contract Documents; or
- **.4** audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 15.7.4 Acceptance of final payment by the Contractor, a Subcontractor or supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of the final Application for Payment.

ARTICLE 16 PROTECTION OF PERSONS AND PROPERTY

§ 16.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- **.1** employees on the Work and other persons who may be affected thereby;
- **.2** the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- **.3** other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation, or replacement in the course of construction.

The Contractor shall comply with, and give notices required by, applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons and property and their protection from damage, injury, or loss. The Contractor shall promptly remedy damage and loss to property caused in whole or in part by the Contractor, a Subcontractor, a sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 16.1.2 and 16.1.3. The Contractor may make a claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Engineer or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 9.15.

§ 16.2 Hazardous Materials and Substances

§ 16.2.1 The Contractor is responsible for compliance with the requirements of the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents, and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Engineer of the condition. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

ARTICLE 17 INSURANCE AND BONDS

Reference Section 00800-Supplementary General Conditions, Article 17 for insurance requirements.

§ 17.3 Performance Bond and Payment Bond

§ 17.3.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in the Contract Documents on the date of execution of the Contract.

§ 17.3.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

ARTICLE 18 CORRECTION OF WORK

§ 18.1 The Contractor shall promptly correct Work rejected by the Engineer or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed, or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Engineer's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 18.2 In addition to the Contractor's obligations under Section 9.4, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 15.6.3, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty.

§ 18.3 If the Contractor fails to correct nonconforming Work within a reasonable time, the Owner may correct it in accordance with Section 8.3.

§ 18.4 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 18.5 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Article 18.

ARTICLE 19 MISCELLANEOUS PROVISIONS

§ 19.1 Assignment of Contract

Neither party to the Contract shall assign the Contract without written consent of the other, except that the Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 19.2 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 21.6.

§ 19.3 Tests and Inspections

Tests, inspections, and approvals of portions of the Work required by the Contract Documents or by applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities shall be made at an appropriate time. The Owner shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Owner shall give the Engineer timely notice of when and where tests and inspections are to be made so that the Engineer may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or

negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 19.4 The Owner's representative:
(Name, address, email address and other information)

«Justin Witt»
«Hamilton County Department of Education»
«2501 Dodds Avenue»
«Chattanooga, TN 37407»
«423-498-7255»
«»

§ 19.5 The Contractor's representative:
(Name, address, email address and other information)

«»

§ 19.6 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

ARTICLE 20 TERMINATION OF THE CONTRACT

§ 20.1 Termination by the Contractor

If the Engineer fails to certify payment as provided in Section 15.4.1 for a period of 30 days through no fault of the Contractor, or if the Owner fails to make payment as provided in Section 4.1.3 for a period of 30 days, the Contractor may, upon seven additional days' notice to the Owner and the Engineer, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 20.2 Termination by the Owner for Cause

§ 20.2.1 The Owner may terminate the Contract if the Contractor

- **.1** repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- **.2** fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
- **.3** repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- **.4** otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 20.2.2 When any of the reasons described in Section 20.2.1 exists, the Owner, upon certification by the Engineer that sufficient cause exists to justify such action, may, without prejudice to any other remedy the Owner may have and after giving the Contractor seven days' notice, terminate the Contract and take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor and may finish the Work by whatever reasonable method the Owner may deem expedient. Upon request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 20.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 20.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 20.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Engineer's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Engineer, upon application, and this obligation for payment shall survive termination of the Contract.

§ 20.3 Termination by the Owner for Convenience

The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause. The Owner shall pay the Contractor for Work executed; and costs incurred by reason of such termination, including costs attributable to termination of Subcontracts; and a termination fee, if any, as follows:
(Insert the amount of or method for determining the fee payable to the Contractor by the Owner following a termination for the Owner's convenience, if any.)

« »

ARTICLE 21 CLAIMS AND DISPUTES

§ 21.1 Claims, disputes, and other matters in question arising out of or relating to this Contract, including those alleging an error or omission by the Engineer but excluding those arising under Section 16.2, shall be referred initially to the Engineer for decision. Such matters, except those waived as provided for in Section 21.11 and Sections 15.7.3 and 15.7.4, shall, after initial decision by the Engineer or 30 days after submission of the matter to the Engineer, be subject to mediation as a condition precedent to binding dispute resolution.

§ 21.2 Notice of Claims

§ 21.2.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 18.2, shall be initiated by notice to the Engineer within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 21.2.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 18.2, shall be initiated by notice to the other party.

§ 21.3 Time Limits on Claims

The Owner and Contractor shall commence all claims and causes of action against the other and arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in this Agreement whether in contract, tort, breach of warranty, or otherwise, within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 21.3.

§ 21.4 If a claim, dispute or other matter in question relates to or is the subject of a mechanic's lien, the party asserting such matter may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 21.5 The parties shall endeavor to resolve their disputes by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with their Construction Industry Mediation Procedures in effect on the date of this Agreement. A request for mediation shall be made in writing, delivered to the other party to this Agreement, and filed with the person or entity administering the mediation. The request may be made concurrently with the binding dispute resolution but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 21.6 If the parties have selected arbitration as the method for binding dispute resolution in this Agreement, any claim, subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association, in accordance with the Construction Industry Arbitration Rules in effect on the date of this Agreement. Demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 21.7 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation;

(2) the arbitrations to be consolidated substantially involve common questions of law or fact; and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 21.8 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, any party to an arbitration may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of a Claim not described in the written Consent.

§ 21.9 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to this Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 21.10 Continuing Contract Performance

Pending final resolution of a Claim, except as otherwise agreed in writing, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 21.11 Waiver of Claims for Consequential Damages

The Contractor and Owner waive claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 20. Nothing contained in this Section 21.11 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
«Dr. Justin Robertson, »«Superintendent Hamilton County Department of Education»	« , »« »
(Printed name and title)	*(Printed name and title)*

SECTION 00800 - SUPPLEMENTARY GENERAL CONDITIONS

1. INTRODUCTION:

These Supplementary General Conditions and the Specifications bound herewith shall be subject to all the requirements of Form A104 of the "Standard Form of Agreement Between Owner and Contractor for a Project of Limited Scope", 2017 edition, issued by the American Institute of Architects, Washington, D.C., except that these Supplementary General Conditions shall modify, delete and/or add to the General Conditions. Where any article, paragraph or sub-paragraph in the General Conditions is supplemented by one of the following paragraphs, the provisions of such article, paragraph or sub-paragraph shall remain in effect and the supplemental provisions shall be considered as added thereto. Where any article, paragraph, or sub-paragraph in the General Conditions is amended, voided, or superseded by any of the following paragraphs, the provisions of such articles, paragraph, or sub-paragraph not so amended, voided, or superseded shall remain in effect.

2. SUPPLEMENTS AND CHANGES TO THE ABBREVIATED GENERAL CONDITIONS, A.I.A. FORM A104, 2017 EDITION.

ARTICLE 7.1 - CONTRACT DOCUMENTS: Add the following to 7.1 -

7.1.1 INTERPRETATION:

If, during the time that Contractors are preparing bids for this work, there should appear to be a conflict between plans and specifications, or a lack of clearness in either, they are requested to notify the Architect so that any necessary explanation may be given to all bidders. If no such notification is given it will be assumed that all conditions are fully understood.

7.1.2 DISCREPANCIES:

The following principles shall govern the settlement of disputes which may rise over discrepancies in contract documents: (a) as between figures given on drawings and the scaled measurements, figures shall govern; (b) as between large-scale drawings and small-scale drawings, the larger scale shall prevail: (c) as between drawings and specifications, the requirements of the specifications shall govern; (d) as between the Form of Agreement and the specifications, the requirements of the Form of Agreement shall govern. Discrepancies noted shall be reported to the Architect as soon as discovered. The principles set forth herein shall not alter provisions of Article 2 or the A.I.A. General Conditions.

7.1.3 MEASUREMENTS:

Before ordering any materials or doing any work, each Contractor shall verify all measurements of the building and shall be responsible for correspondence of same. No extra charge or compensation will be allowed on account of differences between actual dimensions and the measurements indicated on the Drawings. Any differences which may be found shall be submitted to the Architect for considerations before proceeding with the work.

ARTICLE 7.5 – OWNERSHIP AND USE OF ARCHITECT'S DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE: Add the following to 7.5-

7.5.3 ADDITIONAL OWNERSHIP

Hamilton County Department of Education shall be named as additional owner of any drawings, specifications or instruments of service prepared by the Architect in employ by Hamilton County Department of Education and will retain all common law, statutory and other reserved rights, in addition to the copyrights. Any legal right afforded to the Architect as stipulated in this article shall also be extended to Hamilton County Department of Education.

ARTICLE 8 - OWNER: Add the following:

8.1.4 The Architect shall furnish to the Contractor, without cost, five (5) sets of construction drawings and five (5) sets of the specifications. Additional sets of drawings and specifications will be furnished to the Contractor, at his request, at a cost as set forth in Section 1 of the Specifications, General Requirements.

ARTICLE 9.4 – WARRANTY: Add the following:

9.4.1 "A one (1) year warranty period for all labor and material shall begin at the time of Substantial Completion and shall cover all Work, regardless of the time of actual completion of any portion of the Work."

ARTICLE 13 - CHANGES IN THE WORK Add the following:

13.5 CHANGE ORDERS

13.5.1 Before each change order is issued, the General Contractor shall submit to the Architect a proposal, which shall be a complete itemized breakdown not limited to the following:

1) Unit costs of materials
2) Material costs
3) Labor costs
4) Contractor's allowance for overhead and profit
5) Total cost to Owner
6) Calendar days required for extension of contract for completion if required.

13.5.2 The allowance for overhead and profit combined, included in the total cost to the Owner shall be based upon the following schedule:

1) For the contractor, for any work performed by his own forces, 15% (10% overhead plus 5% profit) of the cost.
2) For each subcontractor or supplier involved, for work performed by his own forces, 15% (10% overhead plus 5% profit) of the cost with an additional 5% allowed to the Contractor.

ARTICLE 15 - PAYMENTS AND COMPLETION: Add the following:

15.2 – CERTIFICATES FOR PAYMENT:

15.2.5 Payments will be made on or about fifteen days after receipt of the Application for Payment for work and materials incorporated in the building or delivered on the site. Unless otherwise specified or agreed upon, five percent (5%) will be retained until the contract is substantially complete, at which time the amount retained may be reduced, or a specific amount withheld because of inability to do so, the Contractor shall furnish releases or show evidence that all bills have been paid.

ARTICLE 16 – PROTECTION OF PERSONS AND PROPERTY

16.2 - HAZARDOUS MATERIALS

16.2.2 Delete this paragraph in it's entirety.

16.2.3 Delete this paragraph in it's entirety.

ARTICLE 17 - INSURANCE

Paragraphs 17.1 though 17.2 of the General Conditions which pertain to insurance shall be deleted in it's entirety and replaced as follows:

All policies shall be purchased from Insurance Companies acceptable to the Architect and Owner.

17.1 Insurance to be purchased and maintained by Owner: None Contractor shall acknowledge that it, and its employees, serve as independent contractors and that HCDE shall not be responsible for any payment. insurance or incurred liability.

17.2 Insurance to be purchased by Contractor:

Before starting work, the Contractor shall furnish to the Architect and Owner duplicate certificates of insurance from an insurance company licensed in the state where this project occurs and covers the following items. Insurance carrier to carry Best's rating of A or higher. The certificates of insurance are to contain an agreement that such policy, or policies, will not be cancelled within thirty (30) days advance written notice of such cancellation being given to the Owner and the Architect. The Owner and The Architect are to be listed as additional insureds on the Policies except Worker's Compensation.

17.2.1 Builder's Risk Insurance:

The Contractor shall purchase Builder's Risk Insurance to cover building materials and structures and personal property against loss due to vandalism, malicious mischief and all risks associated with the construction project. Said insurance policy shall include the names of the Owner, the Contractor, and Sub-contractors, as their interest may appear, and to cover the full value of the property. Two copies of the certificates of this insurance shall be furnished to the Architect and Owner before the work is started.

17.2.2 Statutory Worker's Compensation and Employer's Liability Insurance:

1. This Worker's Compensation coverage must comply with the statutory provisions of the State of Tennessee.
2. Before any Sub-contractor is permitted to begin work on the premises, the Contractor shall obtain certificates of insurance from the Sub-contractor covering Worker's Compensation Insurance.
3. This policy shall include Employer's Liability Coverage for $1,000,000.00 per occurrence.

17.2.3 Business Automobile Liability Insurance:

1. This policy must contain limits of liability, as follows or $1,000,000.00 per occurrence for bodily injury and property damage.
2. The policy must provide coverage for all owned and non-owned automobiles.

17.2.4 Commercial General Liability:
The policy must contain minimum limits of liabliity as follows or $1,000,000.00 per occurrence for bodily injury and property damage, and include coverage for the following:
1. Premise / Operations
2. Products / Completed Operations
3. Personal Injury
4. XCU Operations
5. Contractual Liability
6. E & O

Add Subparagraph 17.3.3 to Paragraph 17.3.

17.3.3 Provide 100% Performance and Payment Bonds acceptable to the Owner in the event that the Contract Sum is One hundred thousand dollars ($100,000) or more.

ARTICLE 19 - MISCELLANEOUS PROVISIONS: Add the following:

19.5 LAYING OUT BUILDING
The General Contractor shall establish a permanent bench mark to which easy access may be had during the progress of the work, determine all lines and grades for the work, and verify same from time to time during the progress of the work. The Contractor shall be responsible for all layout work.

19.6 SUBSTITUTIONS
When reference is made to trade names or to names of manufacturers, such references are made solely to designate and identify the quality of material or equipment to be furnished and are not intended to restrict the use of equal material or equipment, except where specifically stated otherwise. In case the Contractor wishes to use materials and equipment other than those mentioned in the specifications, prior written approval of the Architect must be obtained. The Architect will approve such materials and equipment upon written request if he considers them to be suitable and equal to those specified.

19.7 PATTERNED WORK
This shall apply to ceramic floor and wall materials, plastic floor tile, acoustical ceilings, and all work resulting in a finished surface with a pattern. Units shall be laid out from the center of the area so that units at edges shall be equal and as large as possible. No unit shall be smaller than ½ size.

19.8 MANUFACTURER'S SPECIFICATIONS
All materials and equipment shall be installed in strict compliance with the most current, printed, published, specifications and instructions of the manufacturer or supplier of the materials and equipment, except the Architect's Specifications shall take precedence over any such printed matter.

19.9 AWARD
The right is reserved to accept or reject any or all proposals presented and to waive informalities therein.

END OF SECTION

The following licensed professionals are responsible for the various portions of the project manual by which their seal is affixed:

Division 01 - General Requirements
Division 03 – Concrete
- 03 30 00 Cast in Place Concrete

Division 05 – Metals
- 05 52 13 Pipe and Tube Railings

Division 31 – Earthwork
- 31 11 00 Clearing and Grubbing

Division 32 – Exterior Improvements
- 32 11 23 Aggregate Base Courses
- 32 16 00 Concrete Sidewalks
- 32 18 14 Infilled Synthetic Field Sport System
- 32 18 23.33 Running Track Surfacing
- 32 92 00 Seeding

Joseph B. Sawyer, Jr. PLA

Division 01 – General Requirements
- 01 57 13 Erosion Control

Division 31 – Earthwork
- 31 20 00 Earthwork
- 31 23 33 Trenching and Backfilling

Division 32 – Exterior Improvements
- 32 17 23 Pavement Markings

Division 33 – Utilities
- 33 40 00 Storm Drainage Utilities

Andrew Highlander, PE

Part 1 General

1.1 Section Includes

A. Work by Contractor.

B. Work by Owner.

C. Work by Others.

D. Owner-Furnished Items

E. Contractor Use of Site and Premises

F. Future Work

G. Owner Occupancy

H. Quantities

1.2 Work by Contractor

A. The work to be performed under this Contract shall consist of furnishing all labor, materials, tools, equipment and incidentals and performing all work required to construct complete in place and ready to operate the improvements shown in the Contract Documents. These improvements include, but are not limited to, the following:

1. Project area ingress and egress to include repairs necessary to existing track surfacing.

2. Earthwork – removing existing natural turf and excavating for geotextile, subdrainage, stone base and synthetic turf.

3. Track and field event improvements within the synthetic turf installation area (Ooltewah HS Only).

4. Track and field event improvements outside of the synthetic turf installation area (Ooltewah HS only)

5. Goalpost installation (Soddy-Daisy HS only)

6. Drainage improvements.

7. ADA improvements to include concrete sidewalks, handrails, striping, bleacher modifications, ramp installation (Ooltewah HS Only).

B. All work described above shall be performed as shown on the Drawings and as specified.

C. Project Location

1. The equipment and materials to be furnished will be installed at the locations shown on the Drawings.

a. Howard High School: 2500 Market Street Chattanooga, TN 37408
b. Ooltewah High School: 6123 Mountain View Road Ooltewah, TN 37363
c. Soddy-Daisy High School: 618 Sequoyah Access Road Soddy-Daisy, TN 37379

1.3 Work by Owner (Not Applicable)

1.4 Work by Others (Not Applicable)

1.5 Owner Furnished Items (Not Applicable)

1.6 Contractor Use of Site and Premises

A. Contractor has full use of the project area for the duration of the contract.

1.7 Future Work (Not Applicable)

1.8 Partial Owner Occupancy (Not Applicable)

1.9 Quantities

A. The Owner reserves the right to alter the quantities of work to be performed or to extend or shorten the improvements at any time when and as found necessary, and the Contractor shall perform the work as altered, increased or decreased. Payment for such increased or decreased quantity will be made in accordance with the Instructions to Bidders. No allowance will be made for any change in anticipated profits nor shall such changes be considered as waiving or invalidating any conditions or provisions of the Contract and Bond.

Part 2 Products

(NOT USED)

Part 3 Execution

(NOT USED)

END OF SECTION

Part 1 General

1.1 Scope

This section outlines the restrictions and requirements for substitutions, product and manufacturer options, and construction method options.

1.2 Definitions

A. For the purposes of these Contract Documents, a “substitute item” shall be defined as one of the following:

1. A product or manufacturer offered as a replacement to a specified product or manufacturer.

2. A product or manufacturer offered in addition to a specified product or manufacturer.

B. For the purposes of these Contract Documents, a “substitute construction method” shall be defined as one of the following:

1. A mean, method, technique, sequence or procedure of construction offered as a replacement for a specified mean, method, technique, sequence or procedure of construction.

2. A mean, method, technique, sequence or procedure of construction offered in addition to a specified mean, method, technique, sequence or procedure of construction.

1.3 General

A. An item or construction method, which is offered where no specific product, manufacturer, mean, method, technique, sequence or procedure of construction is specified or shown on the Drawings, shall not be considered a substitute and shall be at the option of the Contractor, subject to the provisions in the Contract Documents for that item or construction method.

B. For products specified only by a referenced standard, the Contractor may select any product by any manufacturer, which meets the requirements of the Specifications, unless indicated otherwise in the Contract Documents.

C. If the manufacturer is named on the Drawings or in the Specifications as an acceptable manufacturer, products of that manufacturer meeting all requirements of the Specifications and Drawings are acceptable.

D. Whenever the Engineer's design is based on a specific product of a particular manufacturer, that manufacturer will be shown on the Drawings and/or listed first in the list of approved manufacturers in the Specifications. Any Bidder intending to furnish products of other than the first listed manufacturer, or furnish substitute items, shall:

1. Verify that the item being furnished will fit in the space allowed, perform the same functions and have the same capabilities as the item specified,

2. Include in its Bid the cost of all accessory items which may be required by the other listed substitute product,

3. Include the cost of any architectural, structural, mechanical, piping, electrical or other modifications required, and

4. Include the cost of required additional work by the Engineer, if any, to accommodate the item.

1.4 Approvals

Approval, of a substitution as an acceptable manufacturer, of the Engineer is dependent on determination that the product offered is essentially equal in function, performance, quality of manufacture, ease of maintenance, reliability, service life and other criteria to that on which the design is based; and will require no major modifications to structures, electrical systems, control systems or piping systems.

1.5 Substitutions and Options

A. After Notice to Proceed

1. Substitute items will be considered only if the term “equal to” precedes the names of acceptable manufacturers in the Specification.

2. Where items are specified by referenced standard or specified as indicated in Article 1.3, Paragraph B above, such items shall be submitted to the Engineer for review.

3. The Contractor shall submit shop drawings on the substitute item for the Engineer's review in accordance with Section 01 33 00.

B. Prior to Opening of Bids

1. No consideration or approvals will be made for products specified by a referenced standard, or specified as indicated in Article 1.3, Paragraph B, above. Such consideration may occur only after the Notice to Proceed.

2. No consideration or approvals will be made for products being offered where the term “equal to” precedes the name of an approved product. Such substitution consideration may occur only after the Notice to Proceed.

Part 2 Products

(NOT USED)

Part 3 Execution

(NOT USED)

END OF SECTION

Part 1 General

1.1 Extensions of Contract Time

A. If the basis exists for an extension of time in accordance with Article 6 of the Conditions, an extension of time on the basis of weather may be granted only for the number of Weather Delay Days in excess of the number of days listed as the Standard Baseline for that month.

1.2 Standard Baseline for Average Climate Range

A. The Owner has reviewed weather data available from the National Oceanic and Atmospheric Administration (NOAA) and determined a Standard Baseline of average climatic range for the State of Tennessee.

B. Standard Baseline is defined as the normal number of calendar days for each month during which construction activity exposed to weather conditions is expected to be prevented and suspended by cause of adverse weather. Suspension of construction activity for the number of days each month as listed in the Standard Baseline is included in the Work and is not eligible for extension of Contract Time.

C. Standard Baseline is as follows:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
12	12	12	10	11	8	11	7	9	8	9	12

1.3 Adverse Weather and Weather Delays

A. Adverse Weather is defined as the occurrence of one or more of the following conditions within a twenty-four hour day that prevents construction activity exposed to weather conditions or access to the site:

1. Precipitation (rain, snow, or ice) in excess of one-tenth inch liquid measure;

2. Temperatures that do not rise above that required for the day's construction activity, if such temperature requirement is specified or accepted as standard industry practice; and/or,

3. Sustained wind in excess of twenty-five m.p.h.

B. Adverse Weather may include, if appropriate, "dry-out" or "mud" days:

1. Resulting from precipitation days that occur beyond the standard baseline;

2. Only if there is a hindrance to site access or sitework and Contractor has taken all reasonable accommodations to avoid such hindrance; and,

3. At a rate no greater than one make-up day for each day or consecutive days of precipitation beyond the standard baseline that total one inch or more, liquid measure, unless specifically recommended otherwise by the Engineer. A Weather

Delay Day may be counted if adverse weather prevents work on the project for fifty percent (50%) or more of the contractor's scheduled work day and critical path construction activities were included in the day's schedule, including a weekend day or holiday if Contractor has scheduled construction activity that day.

C. Contractor shall take into account that certain construction activities are more affected by adverse weather and seasonal conditions than other activities, and that "dry-out" or "mud" days are not eligible to be counted as a Weather Delay Day until the standard baseline is exceeded. Hence, Contractor should allow for an appropriate number of additional days associated with the Standard Baseline days in which such applicable construction activities are expected to be prevented and suspended.

1.4 Documentation and Submittals

A. Submit daily jobsite work logs showing which and to what extent critical path construction activities have been affected by weather on a monthly basis.

B. Submit actual weather data to support claim for time extension obtained from nearest NOAA weather station or other independently verified source approved by Engineer at beginning of project.

C. Use Standard Baseline data provided in this Section when documenting actual delays due to weather in excess of the average climatic range.

D. Organize claim and documentation to facilitate evaluation on a basis of calendar month periods, and submit in accordance with the procedures for Claims established in Article 10 of the Conditions.

E. If an extension of the Contract Time is appropriate, such extension shall be made in accordance with the provisions of Article 6 of the Conditions, and the applicable General Requirements.

END OF SECTION

Part 1 General

1.1 Scope

A. The work under this Section includes submittal to the Engineer of shop drawings, product data and samples required by the various Sections of these Specifications.

B. Submittal Contents: The submittal contents required are specified in each Section.

C. Definitions: Submittals are categorized as follows:

1. Shop Drawings

a. Shop drawings shall include technical data, drawings, diagrams, procedure and methodology, performance curves, schedules, templates, patterns, test reports, calculations, instructions, measurements and similar information as applicable to the specific item for which the shop drawing is prepared.

b. Provide newly-prepared information with graphic information at accurate scale (except as otherwise indicated) with name or preparer (firm name) indicated. The Contract Drawings shall not be reproduced by any method for use as or in lieu of detail shop drawings. Show dimensions and note dimensions that are based on field measurement. Identify materials and products in the work shown. Indicate compliance with standards and special coordination requirements. Do not allow shop drawings to be used in connection with the Work without appropriate final “Action” markings by the Engineer.

c. Drawings shall be presented in a clear and thorough manner. Details shall be identified by reference to sheet and detail, Specification Section, schedule or room numbers shown on the Contract Drawings.

d. Minimum assembly drawings sheet size shall be 11 x 17-inches.

e. Minimum detail sheet size shall be 8-1/2 x 11-inches.

f. Minimum Scale:

i. Assembly Drawings Sheet, Scale: 1-inch = 30 feet.

ii. Detail Sheet, Scale: 1/4-inch = 1 foot.

2. Product Data

a. Product data includes standard published information on materials, products and systems, not specially prepared for this Project, other than the designation of selections from among available choices printed therein.

b. Collect required data into one submittal for each unit of work or system, and mark each copy to show which choices and options are applicable to the Project. Include manufacturer's standard published recommendations for application and use, compliance with standards, application of labels and seals, notation of field measurements which have been checked and special coordination requirements.

3. Samples

a. Samples include both fabricated and un-fabricated physical examples of materials, products and units of work, both as complete units and as smaller portions of units of work, either for limited visual inspection or, where indicated, for more detailed testing and analysis.

b. Provide units identical with final condition of proposed materials or products for the work. Include “range” samples, not less than three units, where unavoidable variations must be expected, and describe or identify variations between units of each set. Provide full set of optional samples where the Engineer's selection is required. Prepare samples to match the Engineer's sample where indicated. Include information with each sample to show generic description, source or product name and manufacturer, limitations and compliance with standards. Samples are submitted for review and confirmation of color, pattern, texture and “kind” by the Engineer. Engineer will note “test” samples, except as otherwise indicated, for other requirements, which are the exclusive responsibility of the Contractor.

4. Miscellaneous submittals related directly to the work (non-administrative) include warranties, maintenance agreements, workmanship bonds, project photographs, survey data and reports, physical work records, statements of applicability, quality testing and certifying reports, copies of industry standards, record drawings, field measurement data, operating and maintenance materials, overrun stock, security/protection/safety keys and similar information, devices and materials applicable to the work but not processed as shop drawings, product data or samples.

1.2 Specific Category Requirements

A. General: Except as otherwise indicated in the individual work sections, comply with general requirements specified herein for each indicated category of submittal. Submittals shall contain:

1. The date of submittal and the dates of any previous submittals.

2. The Project title.

3. Unless indicated otherwise by the Engineer’s submittal management software, provide numerical submittal numbers, starting with 1.0, 2.0, etc. Revisions to be numbered 1.1, 1.2, etc.

4. The Names of:

    a. Contractor

    b. Supplier

    c. Manufacturer

5. Identification of the product, with the Specification Section number, permanent equipment tag numbers and applicable Drawing No.

6. Field dimensions, clearly identified as such.

7. Relation to adjacent or critical features of the work or materials.

8. Applicable standards, such as ASTM .

9. Notification to the Engineer in writing, at time of submissions, of any deviations on the submittals from requirements of the Contract Documents.

10. Identification of revisions on resubmittals.

12. Contractor's stamp, initialed or signed or affirmatively indicated on submittal, certifying to review of submittal, verification of products, field measurements and field construction criteria and coordination of the information within the submittal with requirements of the work and of Contract Documents.

13. Submittals showing more than the particular item under consideration shall have all but the pertinent description of the item for which review is requested crossed out.

1.3 Routing of Submittals

A. Submittals and routine correspondence shall be routed as follows:

1. Supplier to Contractor (through representative if applicable)

2. Contractor to Engineer

3. Engineer to Contractor and Owner

4. Contractor to Supplier

Part 2 Products

2.1 Shop Drawings

A. Unless otherwise specifically directed by the Engineer, make all shop drawings accurately to a scale sufficiently large to show all pertinent features of the item and its

method of connection to the work.

B. Submit all shop assembly drawings, as a digital image, pdf format, scanned at the original scale.

C. Submit all shop drawings as a digital image, pdf format, scanned at the original scale.

2.2 Manufacturer's Literature

A. Where content of submitted literature from manufacturers includes data not pertinent to this submittal, clearly indicate which portion of the contents is being submitted for the Engineer's review.

2.3 Samples

A. Samples shall illustrate materials, equipment or workmanship and established standards by which completed work is judged.

B. Unless otherwise specifically directed by the Engineer, all samples shall be of the precise article proposed to be furnished.

C. Submit all samples in the quantity which is required to be returned plus one sample which will be retained by the Engineer.

2.4 Colors

A. Unless the precise color and pattern is specifically described in the Contract Documents, wherever a choice of color or pattern is available in a specified product, submit accurate color charts and pattern charts to the Engineer for review and selection.

B. Unless all available colors and patterns have identical costs and identical wearing capabilities, and are identically suited to the installation, completely describe the relative costs and capabilities of each.

Part 3 Execution

3.1 Contractor's Coordination of Submittals

A. Prior to submittal for the Engineer's review, the Contractor shall use all means necessary to fully coordinate all material, including the following procedures:

1. Determine and verify all field dimensions and conditions, catalog numbers and similar data.

2. Coordinate as required with all trades and all public agencies involved.

3. Submit a written statement of review and compliance with the requirements of all applicable technical Specifications as well as the requirements of this Section.

4. Clearly indicate in a letter or memorandum on the manufacturer's or fabricator's letterhead, all deviations from the Contract Documents.

B. Each and every shop drawing and data sheet submittal shall bear the Contractor's stamp showing that they have been so checked. Shop drawings submitted to the Engineer without the Contractor's stamp will be returned to the Contractor for conformance with this requirement.

C. The Owner may backcharge the Contractor for costs associated with having to review a particular shop drawing, product data or sample more than two times to receive a “No Exceptions Taken” mark.

D. Grouping of Submittals

1. Unless otherwise specifically permitted by the Engineer, make all submittals in groups containing all associated items.

2. No review will be given to partial submittals of shop drawings for items which interconnect and/or are interdependent. It is the Contractor's responsibility to assemble the shop drawings for all such interconnecting and/or interdependent items, check them and then make one submittal to the Engineer along with Contractor's comments as to compliance, non-compliance or features requiring special attention.

E. Schedule of Submittals

1. Within 30 days of Contract award and prior to any shop drawing submittal, the Contractor shall submit a schedule showing the estimated date of submittal and the desired approval date for each shop drawing anticipated. A reasonable period shall be scheduled for review and comments. Time lost due to unacceptable submittals shall be the Contractor's responsibility and some time allowance for resubmittal shall be provided. The schedule shall provide for submittal of items which relate to one another to be submitted concurrently.

3.2 Timing of Submittals

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

B. In scheduling, allow sufficient time for the Engineer's review following the receipt of the submittal.

3.3 Reviewed Shop Drawings

A. Engineer Review

1. Allow a minimum of 10 days for the Engineer's initial processing of each submittal requiring review and response, except allow longer periods where processing must be delayed for coordination with subsequent submittals. The Engineer will advise the Contractor promptly when it is determined that a submittal being processed must be delayed for coordination. Allow a minimum of two weeks for reprocessing each submittal. Advise the Engineer on each submittal as to whether processing time is critical to progress of the work, and therefore the work would be expedited if processing time could be foreshortened.

2. Acceptable submittals without any comments will be marked “No Exceptions Taken”.

3. Submittals containing comments for clarification will be marked “Exceptions Noted”. .

4. Submittals marked “Revise and Resubmit” must be revised to reflect required changes and the initial review procedure repeated.

5. The “Rejected” notation is used to indicate products which are not acceptable. Upon return of a submittal so marked, the Contractor shall repeat the initial review procedure utilizing acceptable products.

B. No work or products shall be installed without a drawing or submittal bearing the “No Exceptions Taken” notation. The Contractor shall maintain at the job site a complete set of shop drawings bearing the Engineer's stamp.

C. Substitutions: In the event the Contractor obtains the Engineer's approval for the use of products other than those which are listed first in the Contract Documents, the Contractor shall, at the Contractor's own expense and using methods approved by the Engineer, make any changes to structures, piping and electrical work that may be necessary to accommodate these products.

D. Use of the “No Exceptions Taken” notation on shop drawings or other submittals is general and shall not relieve the Contractor of the responsibility of furnishing products of the proper dimension, size, quality, quantity, materials and all performance characteristics, to efficiently perform the requirements and intent of the Contract Documents. The Engineer's review shall not relieve the Contractor of responsibility for errors of any kind on the shop drawings. Review is intended only to assure conformance with the design concept of the Project and compliance with the information given in the Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site. The Contractor is also responsible for information that pertains solely to the fabrication processes or to the technique of construction and for the coordination of the work of all trades.

3.4 Resubmission Requirements

A. Shop Drawings

1. Revise initial Drawings as required and resubmit as specified for initial submittal, with the resubmittal number shown.

2. Indicate on Drawings all changes which have been made other than those requested by the Engineer.

B. Project Data and Samples: Resubmit new data and samples as specified for initial submittal, with the resubmittal number shown.

END OF SECTION

Part 1 General

1.1 Related Documents

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 Summary

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and quality-control requirements for individual utility construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.

2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.

3. Specific test and inspection requirements are not specified in this Section.

1.3 Definitions

A. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

B. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

C. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

D. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 Conflicting Requirements

A. Referenced Standards: If compliance with two or more standards is specified and the

standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Engineer for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Engineer for a decision before proceeding.

1.5 Informational Submittals

A. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

1.6 Reports and Documents

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.

13. Recommendations on retesting and re-inspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.

2. Statement on condition of substrates and their acceptability for installation of product.

3. Statement that products at Project site comply with requirements.

4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.

5. Results of operational and other tests and a statement of whether observed performance complies with requirements.

6. Statement whether conditions, products, and installation will affect warranty.

7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.

2. Statement that equipment complies with requirements.

3. Results of operational and other tests and a statement of whether observed performance complies with requirements.

4. Statement whether conditions, products, and installation will affect warranty.

5. Other required items indicated in individual Specification Sections.

1.7 Quality Assurance

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.

2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

1.8 Quality Control

A. Contractor Responsibilities: Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.

2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.

4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.

5. Testing and inspecting requested by the Contractor and not required by the Contract Documents are the Contractor's responsibility.

6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

B. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 33 00 - Submittal Procedures.

C. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in pre-installation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

D. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-

inspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Engineer and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Engineer and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.

2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.

3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.

4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.

5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.

6. Do not perform any duties of Contractor.

F. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

Part 2 Products

(NOT USED)

Part 3 Execution

3.1 Repair and Protection

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 00 - Execution.

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

Part 1 General

1.1 Scope

A. Temporary facilities required for this work include, but are not necessarily limited to:

1. Temporary utilities such as water and electricity.

2. First aid facilities.

3. Sanitary facilities.

4. Potable water.

5. Temporary enclosures and construction facilities.

1.2 General

A. First aid facilities, sanitary facilities and potable water shall be available on the Project site on the first day that any activities are conducted on site. The other facilities shall be provided as the schedule of the Project warrants.

B. Maintenance: Use all means necessary to maintain temporary facilities in proper and safe condition throughout progress of the work. In the event of loss or damage, immediately make all repairs and replacements necessary, at no additional cost to the Owner.

C. Removal: Remove all such temporary facilities and controls as rapidly as progress of the Work will permit.

1.3 Quality Assurance

A. Temporary Electric: Installation of all temporary electric facilities shall comply with NECA, NEMA and UL standards and regulations for such facilities. Install service to comply with NFPA 70.

1.4 Temporary Utilities

A. General

1. Provide and pay all costs for all water, electricity and other utilities required for the performance of the work.

2. Pay all costs for temporary utilities until Project completion.

3. Costs for temporary utilities shall include all power, water and the like necessary for testing equipment as required by the Contract Documents.

B. Temporary Water:

1. Connect to existing facility water system. Provide reduced pressure backflow prevention.

2. Provide all necessary temporary piping. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing, as necessary.

3. Upon completion of the Work, remove all such temporary piping.

4. Provide and remove water meters, as required by governing authority.

C. Temporary Electricity:

1. Provide all necessary wiring for the Contractor's use.

2. Provide main service disconnect and over-current protection at convenient location.

3. Existing receptacles may be utilized during construction.

D. Temporary Heating:

1. Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed equipment.

E. Temporary Sewer Facilities:

1. Prior to starting the work, the Contractor shall furnish, for use of Contractor's personnel on the job, all necessary toilet facilities which shall be secluded from public observation. These facilities shall be chemical toilets.

2. Existing sanitary facilities may not be used.

3. All facilities, regardless of type, shall be kept in a clean and sanitary condition and shall comply with the requirements and regulations of the area in which the work is performed. Adequacy of these facilities will be subject to the Owner’s review and maintenance of same must be satisfactory to the Owner at all times.

F. Telephone Service:

1. Provide, maintain, and pay for telephone service for the Contractor’s Project Manager and Field Superintendent.

2. Maintain a list of school and project specific telephone numbers.

1.5 First Aid Facilities

A. The Contractor shall provide a suitable first aid station, equipped with all facilities and medical supplies necessary to administer emergency first aid treatment. The

Contractor shall have standing arrangements for the removal and hospital treatment of any injured person. All first aid facilities and emergency ambulance service shall be made available by the Contractor to the Owner and the Owner's personnel.

1.6 Potable Water

A. The Contractor shall be responsible for furnishing a supply of potable drinking water for employees, subcontractors, inspectors, engineers and the Owner who are associated with the work.

1.7 Enclosures and Construction Facilities

A. Furnish, install and maintain for the duration of construction, padlocks to be used in conjunction with existing Owner's padlocks to ensure each field location is fully secure when work is not being performed.

B. All temporary enclosures and sheds located within construction areas or within 30 feet of existing building lines shall be noncombustible, in accordance with ASTM E136. Comply with NFPA 241.

1.8 Parking Facilities

A. Owner will designate temporary surface parking areas for the Contractor's and Contractor's subcontractors' personnel.

B. When site space is not adequate, provide additional off-site parking.

C. Maintain all roads, both temporary and permanent, in passable condition for all traffic. Any road blockage shall be coordinated with Engineer, Owner, and governing authorities.

1.9 Field Offices

A. The Owner will provide space for project meetings to be held.

B. Contractor shall maintain space provided by the Owner in good repair and acceptable appearance at all times.

1.10 Removal

A. Remove temporary above-ground or buried utilities, materials, equipment, services, and construction prior to Substantial Completion inspection.

B. Clean and repair damage caused by installation or use of temporary facilities.

C. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

Part 2 Products

(NOT USED)

Part 3 Execution

(NOT USED)

END OF SECTION

Part 1 General

1.1 Scope

A. The work specified in this Section consists of providing and maintaining temporary and permanent erosion and sedimentation controls as shown on the Drawings. This Section also specifies the subsequent removal of temporary erosion and sedimentation controls.

B. Temporary and permanent erosion and sedimentation controls include grassing and mulching of disturbed areas and structural barriers at those locations which will ensure that erosion during construction will be maintained within acceptable limits. Acceptable limits are as established by the Tennessee Water Quality Control Act of 1977, as amended, Section 402 of the Federal Clean Water Act, and applicable codes, ordinances, rules, regulations and laws of local and municipal authorities having jurisdiction. For installation and maintenance guidance, refer to the Tennessee Erosion and Sediment Control Handbook, latest edition.

C. Land disturbance activity shall not commence until the Land Disturbance Permit and all required stream crossing permits have been issued.

D. Land disturbance permit shall be obtained and paid for by the Contractor.

1.2 Submittals

A. Submit product data in accordance with the requirements of Section 01 33 23 of these Specifications.

B. Prior to any construction activity, the Contractor shall submit, for the Engineer's approval, a schedule for the accomplishment of temporary and permanent erosion and sedimentation control work. No work shall be started until the erosion and sedimentation control schedule and methods of operation have been approved by the Engineer.

1.3 Quality Assurance

A. The temporary and permanent erosion and sedimentation control measures shown on the Drawings are minimum requirements. Any additional erosion and sedimentation control measures required by the Contractor's means, methods, techniques and sequence of operation will be installed by the Contractor at no additional cost to the Owner.

B. Perform all work under this Section in accordance with all pertinent rules and regulations including, but not necessarily limited to, those stated in these Specifications. Where provisions of pertinent rules and regulations conflict with these Specifications, the more stringent provisions shall govern.

C. Provide all materials and promptly take all actions necessary to achieve effective erosion and sedimentation control in accordance with the Tennessee Water Quality Control Act of 1977, as amended, local ordinances, other permits, local enforcing agency guidelines

and these Specifications.

D. Basic Principles

1. Coordinate the land disturbance activities to fit the topography, soil types and conditions.

2. Minimize the disturbed area and the duration of exposure to erosive elements.

3. Provide temporary or permanent stabilization to disturbed areas immediately after rough grading is complete.

4. Safely convey run-off from the site to a stable outlet to prevent flooding and damage to downstream facilities resulting from increased runoff from the site.

5. Retain sediment on-site that was generated on-site.

6. Minimize encroachment upon watercourses.

E. Implementation

1. The Contractor is solely responsible for the control of erosion within the Project site and the prevention of sedimentation from leaving the Project site or entering waterways.

2. The Contractor shall install temporary and permanent erosion and sedimentation controls which will ensure that runoff from the disturbed area of the Project site shall pass through a filter system before exiting the Project site.

3. The Contractor shall provide temporary and permanent erosion and sedimentation control measures to prevent silt and sediment from entering the waterways. The Contractor will obtain a Land Disturbance Permit that allows encroachments on the 60 foot vegetative buffer in specific areas. The Contractor shall exercise extreme care during land disturbance operations within the 60 foot vegetative buffer to prevent degradation of the stream.

4. The Contractor shall limit land disturbance activity to those areas shown on the Drawings.

5. The Contractor shall maintain erosion and sedimentation control measures within disturbed areas on the entire site at no additional cost to the Owner until the acceptance of the Project. Maintenance shall include mulching, re-seeding, clean-out of sediment barriers and sediment ponds, replacement of washed-out or undermined rip rap and erosion control materials, to the satisfaction of the Engineer.

6. All fines imposed for improper erosion and sedimentation control shall be paid by the Contractor.

7. The Contractor shall use all means necessary to control dust on and near the work and all off-site borrow areas, in accordance to the Tennessee Erosion and

Sediment Control Handbook, latest edition. The Contractor should thoroughly moisten all surfaces as required to prevent dust from being a nuisance to the public, neighbors and concurrent performance of work on the site.

Part 2 Products

2.1 Sediment Barriers

A. Silt Fence

1. Type A silt fence shall meet the requirements of Tennessee Erosion and Sediment Control Handbook, latest edition. Posts shall be 4 feet in length and can either be made of steel, soft wood or oak. Steel posts shall be 1.3lb./ft. minimum. Soft wood post shall be 3" diameter or 2" x 4". Oak posts shall be 1.5" x 1.5". Fasteners for wood posts shall be wire staples or nails. Wire staples are to have a minimum 17 gauge, ¾" crown width, and a ½" leg length. Nails are to have a minimum 14 gauge, ¾" button head, and a 1" length.

2. Type C silt fence is a combination of Type A silt fence fabric with woven wire reinforcement. Type C silt fence woven wire reinforcement shall meet the requirements of Tennessee Erosion and Sediment Control Handbook, latest edition. Posts shall be 4 feet in length and shall be made of steel. Steel posts shall be 1.3lb./ft. minimum.

3. Silt fence fabric shall meet the requirements of the Tennessee Erosion and Sediment Control Handbook, latest edition.

2.2 Storm Drain Inlet Protection

A. Silt Fence Inlet Protection: Type C Silt fence supported by steel posts shall be used. See Silt Fence this Part.

B. Baffle Box Inlet Protection:

1. Shall be constructed of 2" x 4" boards spaced a maximum of 1 inch apart or of plywood with weep holes 2 inches in diameter.

2. Gravel: 1/2 to 3/4 inch gravel (#57 washed stone).

3. Type C filter fabric wrapping: See Silt Fence this Part.

C. Block and Gravel Inlet Protection

1. Concrete Masonry Block.

2. Gravel: 1/2 to 3/4 inch gravel (#57 washed stone).

3. Hardware cloth or comparable wire mesh with 1/2 inch openings.

D. Gravel Drop Protection

1. Gravel: 1/2 to 3/4 inch gravel (#57 washed stone).

E. Sod Inlet Protection

1. 1’ wide strips of sod. See Section 32 92 23 for correct placement and planting schedules.

2.3 Check Dams

A. Stone Check Dams

1. Stone check dams shall be constructed of graded size 2-10 inch stone.

2. The geotextile shall be in accordance with AASHTO M288 Section 7.3, Separation Requirements, Table 3.

B. Rock Check Dams

1. Stone sizing: The stone size shall be determined by the design criteria established in the Rip Rap section - Tennessee Erosion and Sediment Control Handbook, latest edition. The rock dam can be faced with smaller stone on the upstream side for additional filtering effect.

2. Geotextile: Geotextiles shall be used as a separator between the graded stone, the soil base, and the abutments. The geotextile shall be specified in accordance with AASHTO M288 Section 7.5, Permanent Erosion Control Recommendations.

2.4 Construction Exit

A. Stone: Use sound, tough, durable stone resistant to the action of air and water. Slabby or shaley pieces will not be acceptable. Aggregate size shall be TDOT #1 or #2 stone (1.5 to 3.5-inch stone).

B. Geotextile: The geotextile underliner must be placed the full length and width of the entrance. Geotextile selection shall be based on AASHTO M288-98 specification:

1. For subgrades with a CBR greater than or equal to 3 or shear strength greater than 90 kPa, geotextile must meet requirements of section AASHTO M288 Section 7.3, Separation Requirements.

2. For subgrades with a CBR between 1 and 3 or sheer strength between 30 and 90 kPa, geotextile must meet requirements of AASHTO M288 Section 7.4, Stabilization Requirements.

2.5 Rip Rap

A. Stone Rip Rap: Use sound, tough, durable stones resistant to the action of air and water.

Slabby or shaley pieces will not be acceptable. Sizes are shown in the Drawings for each design requiring rip rap construction. The following classifications shall be used in the construction of slope or channels as shown on the Drawings:

1. Graded Rip Rap - durable, dense, specifically selected and graded, quarried stone, placed to prevent erosion. Sizes shall be in accordance to the Tennessee Erosion and Sediment Control Handbook, latest edition.

2. Filter Bedding Stone - stone generally less than 6 inches in size, that may be placed under graded rip rap stone in a layer or combination of layers, designed and installed in such a manner as to prevent loss of underlying soil or finer materials because of moving water. Sizes shall be in accordance to the Tennessee Erosion and Sediment Control Handbook, latest edition.

3. Surge Stone - a quarry run ungraded, unscreened material which may or may not have fines.

2.7 Polyacrylamide (PAM)

A. Polyacrylamide (PAM) additives are permissible as a supplement to existing Best Management Practices and are not to be relied on as the only method for erosion control.

B. If the Contractor intends to use PAM additives, they shall provide adequate documentation and testing to show the polymer type and dosing has been matched to the soil type found in the work area. Testing and documentation shall be prepared by the manufacturer of the polymer or other licensed soil professional.

C. PAM products include, but are not limited to, additives to the soil, hydro-seeder, treated mat, treated checks dams, bars or logs. Due to the different nature of products, manufacturer's directions shall be provided to the Engineer prior to their use. Toxicology reports shall be supplied with all submittal data prior to use.

D. PAM products shall conform to the following guidelines:

1. Only the anionic form of PAM shall be used. Cationic PAM is toxic and shall NOT be used.

2. PAM and PAM mixtures shall be environmentally benign, harmless to fish, wildlife, and plants. PAM and PAM mixtures shall be noncombustible.

3. Anionic PAM, in pure form, shall have less than or equal to 0.05% acrylamide monomer by weight, as established by the Food and Drug Administration and the Environmental Protection Agency.

4. To maintain less than or equal to 0.05% of acrylamide monomer, the maximum application rate of PAM, in pure form, shall not exceed 200 pounds/acre/year. Do not over apply PAM. Excessive application of PAM can lower infiltration rate or suspend solids in water, rather than promoting settling.

5. Users of anionic PAM shall obtain and follow all Material Safety Data Sheet

requirements and manufacturer's recommendations.

6. Additives such as fertilizers, solubility promoters or inhibitors, etc. to PAM shall be non-toxic.

7. The manufacturer or supplier shall provide written application methods for PAM and PAM mixtures. The application method shall insure uniform coverage to the target and avoid drift to non-target areas including waters of the state. The manufacturer or supplier shall also provide written instructions to insure proper safety, storage, and mixing of the product.

8. Gel bars or logs of anionic PAM mixtures may be used in ditch systems. This application shall meet the same testing requirement as anionic PAM emulsions and powders.

9. To prevent exceeding the acrylamide monomer limit in the event of a spill, the anionic PAM in pure form shall not exceed 200 pounds/batch at 0.05% acrylamide monomer (AMD) or 400 pounds/batch at 0.025% AMD.

2.8 Erosion Control Matting and Blankets

A. All blanket and matting materials shall be in accordance to the Tennessee Erosion and Sediment Control Handbook, latest edition.

B. Temporary Erosion Control Blankets: Use in concentrated flow areas, all slopes steeper than 3:1 and with a height of ten feet or greater, and cuts and fills within stream buffers, shall be stabilized with the appropriate erosion control matting or blankets.

1. Straw blankets: Shall consist of weed-free straw from agricultural crops formed into a blanket. Blankets shall have a top side of photodegradable plastic mesh with a maximum mesh size of 5/16 x 5/16 inch sewn to the straw with biodegradable thread that is appropriate for slopes. The blanket shall have a minimum thickness of 3/8 inch and minimum dry weight of 0.5 pounds per square yard.

2. Excelsior blankets: Shall consist of curled wood excelsior (80% of fibers are six inches or longer) formed into a blanket. The blanket shall have clear markings indicating the top side of the blanket and be smolder resistant. Blankets shall have photodegradable plastic mesh having a maximum mesh size of 1- 1/2½ x 3 inches. The blanket shall have a minimum thickness of 1/4 of an inch and a minimum dry weight of 0.8 pounds per square yard. Slopes require excelsior matting with the top side of the blanket covered in the plastic mesh, and for waterways, both sides of the blanket require plastic mesh.

3. Coconut fiber blankets: Shall consist of 100% coconut fiber formed into a blanket. The minimum thickness of the blanket shall be 1/4 of an inch with a minimum dry weight of 0.5 pounds per square yard. Blankets shall have photodegradable plastic mesh, with a maximum mesh size of 5/8 x 5/8 inch and sewn to the fiber with a breakdown resistant synthetic yarn. Plastic mesh is required on both sides of the blanket if used in waterways. A maximum of two inches is allowable for the

stitch pattern and row spacing.

4. Wood fiber blankets: Shall consist of reprocessed wood fibers that does not possess or contain any growth or germination inhibiting factors. The blanket shall have a photodegradable plastic mesh, with a maximum mesh size of 5/8 x 3/4 inch, securely bonded to the top of the mat. The blanket shall have a minimum dry weight of 0.35 pounds per square yard. A maximum of two inches is allowable for the stitch pattern and row spacing. This practice shall be applied only to slopes.

5. Jute Mesh: To be applied to slopes. Jute mesh with a 48 inch width shall show between 76 and 80 warpings and a one yard length shall show between 39 to 43 weftings. The woven mesh shall be at least 45 inches wide. Yarn shall have a unit weight of at least 0.9 pounds per square yard, but not more than 1.5 pounds per square yard.

C. Permanent Matting: Use in concentrated flow areas, all slopes steeper than 3:1 and with a height of ten feet or greater, and cuts and fills within stream buffers, shall be stabilized with the appropriate erosion control matting or blankets.

1. Permanent matting shall consist of a lofty web of mechanically or melt bonded polymer nettings, monofilaments or fibers which are entangled to form a strong and dimensionally stable matrix. Polymer welding, thermal or polymer fusion, or the placement of fibers between two high strength, bi-axially oriented nets bound securely together by parallel lock stitching with polyolefin, nylon or polyester threads are all appropriate bonding methods. Mats shall maintain their shape before, during, and after installation, under dry or water saturated conditions. Mats must be stabilized against ultraviolet degradation and shall be inert to chemicals normally encountered in a natural soil environment.

2. The mat shall conform to the following physical properties:

Property	**Minimum Value**
Thickness	0.5 inch
Weight	0.6 PSY
Roll Width	38 inches
Tensile Strength	
Length (50% elongation)	15 lbs./in.
Length (ultimate)	20 lbs./in.
Width (50% elongation)	5 lbs./in.
Width (ultimate) (ASTM D 1682-6" strip)	10 lbs./in.
Ultraviolet Stability (1,000 hrs. in an Atlas ARC Weatherometer, ASTM G 23, Type D in accordance with ASTM D 822)	80%

D. Stapling and Anchoring Materials:

1. Temporary Blankets: Staples shall be used to anchor temporary blankets. U-shaped wire (11 gauge or greater) staples with legs at least 6 inches in length and a crown of one inch or appropriate biodegradable staples can be used. Staples shall be of sufficient thickness for soil penetration without undue distortion.

2. Permanent Matting: Sound wood stakes, 1 x 3 inches stock sawn in a triangular shape, shall be used. Depending on the compaction of the soil, select stakes with a length from 12 to 18 inches. U-shaped staples shall be 11 gauge steel or greater, with legs at a minimum of 8 inches length with a 2 inch crown.

2.9 Channel Stabilization

A. Vegetated Lining: Vegetated lining shall be designed to resist erosion when the channel is flowing at the 25-year frequency discharge. Temporary erosion control blankets or sod shall be used on all channels and concentrated flow areas to aid in the establishment of the vegetated lining. If a vegetated lining is desired in a channel with velocities between 5- 10 ft./sec., permanent soil reinforcement matting shall be used.

B. Rock Rip- Rap Lining: Rock rip rap shall be designed to resist displacement when the channel is flowing at the 25-year frequency discharge. Rock rip rap lining should be used when channel velocities are between 5 and 10 ft./sec.

C. Concrete Lining

1. Concrete shall be constructed in accordance with the plan and details in the Drawings.

2. A separation geotextile should be placed under concrete linings to prevent undermining in the event of stress cracks due to settlement of the base material. Geotextiles shall be in accordance with AASHTO M288 Section 7.5, Permanent Erosion Control Requirements.

2.10 Downdrain Structures

A. Temporary Downdrain:

1. Pipe: Design the slope drain using heavy-duty, flexible materials such as non-perforated, corrugated plastic pipe or specially designed flexible tubing. Use reinforced, hold-down grommets or stakes to anchor the pipe at intervals not to exceed 10 feet with the outlet end securely fastened in place. The pipe must extend beyond the toe of the slope.

2. Filter Ring: A stone filter ring shall be placed at the inlet for added sediment filtering capacity.

3. Storm Drain Outlet Protection: Rock rip rap shall be placed at the outlet for energy dissipation. A Tee outlet, flared end section, or other suitable device may be used in conjunction with the rip rap for additional protection.

B. Permanent Downdrain:

1. Pipe: Design the slope drain using heavy-duty, flexible materials such as non-perforated, corrugated plastic or steel pipe or specially designed flexible tubing. Use reinforced, hold-down grommets or stakes to anchor the pipe at intervals not to exceed 10 feet with the outlet end securely fastened in place. The pipe must extend beyond the toe of the slope.

2. Paved Flume: The paved flume may have a parabolic, rectangular or trapezoidal cross-section and shall consist of reinforced concrete or asphalt paving.

3. Filter Ring: A stone filter ring shall be placed at the inlet for added sediment filtering capacity.

4. Storm Drain Outlet Protection: Rock rip rap shall be placed at the outlet for energy dissipation. A Tee outlet, flared end section, or other suitable device may be used in conjunction with the rip rap for additional protection.

2.11 Filter Ring

A. Stone sizing:

1. When utilized at inlets with diameters less than 12 inches, the filter ring shall be constructed of TDOT Class A-3 stone no smaller than 2-6 inches (15 - 30 lbs.).

2. When utilized at pipes with diameters greater than 12 inches, the filter ring shall be constructed of TDOT Class A-1 stone no smaller than 2-15 inches (50 - 100 lbs.).

3. For added sediment filtering capabilities the upstream side of the rip- rap can be faced with TDOT #57 stone, minimum stone size of ¾ inch.

2.12 Temporary Sediment Basin

Temporary Sediment Basins shall be constructed in accordance with the plan and details shown in the Drawings.

2.13 Temporary Stream Crossing

Temporary Stream Crossing shall be constructed in accordance with the plan and details shown in the Drawings. Temporary crossings shall not be used on streams with drainage areas greater than one square mile and shall be a constructed as a culvert crossing, as shown in the Drawings.

2.14 Storm Drain Outlet Protection

A. Stone size: Stone size as indicated for each outlet in the Storm Drain Outlet Protection detail shown in the Drawings.

B. Geotextile: Geotextiles shall be used as a separator between the graded stone, the soil base, and the abutments. The geotextile shall be specified in accordance with AASHTO M288-96 Section 7.5, Permanent Erosion Control Recommendations.

C. Stone quality: Select stone for ripraprip rap from field stone or quarry stone. The stone should be hard, angular, and highly weather-resistant. The specific gravity of the individual stones should be at least 2.5.

2.15 Gradient Treatment

A. Contour Furrow: Contour furrows may be used for slopes which are 3:1 (H:V) or less..

B. Serrated Slope: A serrated slope may be used for slopes which are 2:1 (H:V) or less.

C. Stepped Slope: Graded areas steeper than 3:1 (H:V), which will not be mowed, should preferably have a stepped slope.

D. Terraced Slope: Should be used on most slopes which are longer than those allowed for other methods.

2.16 Temporary Mulching

A. Dry straw or hay: Shall be applied at a depth of 2 to 4 inches providing complete soil coverage. Material shall be clean, seed-free cereal hay or straw.

B. Wood waste (chips, sawdust or bark): Shall be applied at a depth of 2 to 3 inches. Organic material from the clearing stage of development should remain on site, be chipped, and applied as mulch.

C. Mulch Binder: Mulch on slopes exceeding 3 (horizontal) to 1 (vertical) shall be held in place by the use of a mulch binder, as approved by the Engineer. The mulch binder shall be non toxic to plant and animal life and shall be approved by the Engineer.

2.17 Temporary Grassing

A. Grassing materials shall meet the requirements of the Tennessee Erosion and Sediment Control Handbook, latest edition, section that includes “Disturbed Area Stabilization (With Temporary Vegetation)”.

B. Seed rate, fertilization, lime application and other requirements shall be provided as shown on the Drawings.

C. Water: Water shall be free of excess and harmful chemicals, organisms and substances which may be harmful to plant growth or obnoxious to traffic. Salt or brackish water shall not be used. Water shall be furnished by the Contractor.

2.18 Permanent Grassing and Sodding

As specified elsewhere in these Specifications.

2.20 Sediment Traps

A. The area under the embankment should be cleared, grubbed, and stripped of any vegetation and root mat.

B. Fill material for the embankment should be free of roots or other woody vegetation, organic material, large stones, and other objectionable material.

Part 3 Execution

3.1 General

A. Temporary and permanent erosion and sedimentation control measures shall prevent erosion and prevent sediment from exiting the site. If, in the opinion of the Engineer, the Contractor's temporary erosion and sedimentation control measures are inadequate, the Contractor shall provide additional maintenance for existing measures or additional devices to control erosion and sedimentation on the site at no additional cost to the Owner.

B. All erosion and sedimentation control devices and structures shall be inspected by the Qualified Personnel as defined in Section 01 57 23 of the Specifications at least once a week and within 24 hours of the end of a storm that is 0.5 inches or greater. Any device or structure found to be damaged will be repaired or replaced by the end of the day.

C. All erosion and sedimentation control measures and devices shall be constructed and maintained as indicated on the Drawings or specified herein until adequate permanent disturbed area stabilization has been provided and accepted by the Engineer. Once adequate permanent stabilization has been provided and accepted by the Engineer, all temporary erosion and sedimentation control structures and devices shall be removed.

3.2 Installation and Maintenance of Erosion and Sediment Controls

A. Sediment Barriers

1. Sediment barriers shall include, but are not necessarily limited to silt fences and any device which prevents sediment from exiting the disturbed area.

2. Sediment barriers shall not be used in any flowing stream, creek or river.

3. Sediment barriers shall be installed as shown on the Drawings and as directed by the Engineer.

4. Along stream buffers and other sensitive areas, two rows of Type C silt fence or one row of Type C silt fence backed by hay bales shall be used.

5. Sediment barriers shall be maintained to ensure the depth of impounded sediment is no more than one-half of the original height of the barrier or as directed by the

Engineer. Torn, damaged, destroyed or washed-out barriers shall be repaired, reinforced or replaced with new material and installed as shown on the Drawings and as directed by the Engineer.

6. Sediment Barrier Removal

a. Sediment barrier shall be removed once the disturbed area has been stabilized with a permanent vegetative cover and the sediment barrier is no longer required as directed by the Engineer.

b. Accumulated sediment shall be removed from the barrier and spread over the site.

c. All non-biodegradable parts of the barrier shall be disposed of properly.

d. The disturbed area created by barrier removal shall be permanently stabilized.

B. Storm Drain Inlet Protection

1. Inlet Sediment Traps shall include, but are not necessarily limited to, Silt Fence Inlet Protection, Baffle Box, Block and Gravel Inlet Protection, Gravel Inlet Protection, Sod Inlet Protection and any device which traps sediment and prevents it from exiting the disturbed area.

2. Inlet Sediment Traps shall be installed as shown on the Drawings and as directed by the Engineer.

3. For each Inlet Sediment Traps type the following installation guidelines shall be used:

a. Silt Fence Inlet Protection: Type C silt fence supported by steel posts shall be used. The stakes shall be spaced evenly around the perimeter of the inlet a maximum of 3 feet apart, and securely driven into the ground, approximately 18 inches deep. The fabric shall be entrenched 12 inches and backfilled with crushed stone or compacted soil. Fabric and wire shall be securely fastened to the posts, and fabric ends must be overlapped a minimum of 18 inches or wrapped together around a post to provide a continuous fabric barrier around the inlet.

b. Baffle Box: The baffle box shall be constructed of 2" x 4" boards spaced a maximum of 1 inch apart or of plywood with weep holes 2 inches in diameter. The weep holes shall be placed approximately 6 inches on center vertically and horizontally. Gravel shall be placed outside the box, all around the inlet, to a depth of 2 to 4 inches. The entire box is wrapped in Type C filter fabric that shall be entrenched 12 inches and backfilled.

c. Block and Gravel Inlet Protection: One block is placed on each side of the structure on its side in the bottom row to allow pool drainage. The foundation should be excavated at least 2 inches below the crest of the storm drain. The bottom row of blocks are is placed against the edge of the

storm drain for lateral support and to avoid washouts when overflow occurs. If needed, lateral support may be given to subsequent rows by placing 2" x 4" wood studs through block openings. Hardware cloth or comparable wire mesh with 1/2 inch openings shall be fitted over all block openings to hold gravel in place. Clean gravel should be placed 2 inches below the top of the block on a 2:1 slope or flatter and smoothed to an even grade.

d. Gravel Inlet Protection: Stone and gravel are used to trap sediment. The slope toward the inlet shall be no steeper than 3:1. A minimum 1 foot wide level stone area shall be left between the structure and around the inlet to prevent gravel from entering the inlet. On the slope toward the inlet, stone 3 inches in diameter and larger should be used. On the slope away from the inlet, 1/2 to 3/4 inch gravel (#57 washed stone) should be used at a minimum thickness of 1 foot.

e. Sod Inlet Protection: The sod shall be placed to form a turf mat covering the soil for a distance of 4 feet from each side of the inlet structure. Sod strips shall be staggered so that adjacent strip ends are not aligned.

5. The trap shall be inspected daily and after each rain and repairs made as needed. Sediment shall be removed when the sediment has accumulated to one-half the height of the trap. Sediment shall be removed from curb inlet protection immediately. For excavated inlet sediment traps, sediment shall be removed when one-half of the sediment storage capacity has been lost to sediment accumulation. Sod inlet protection shall be maintained as specified for Permanent Sodding.

6. Sediment Barrier Removal

a. Sediment barrier shall be removed once the disturbed area has been stabilized with a permanent vegetative cover and the sediment barrier is no longer required as directed by the Engineer.

b. Accumulated sediment shall be removed from the barrier and removed from the site.

c. All non-biodegradable parts of the barrier shall be disposed of properly.

d. The disturbed area created by barrier removal shall be permanently stabilized.

C. Check and Rock Dams

1. Check and rock dams shall not be used in any flowing stream, creek or river.

2. Check and rock dams shall be installed as shown on the Drawings and as directed by the Engineer.

3. Stone check dams: Mechanical or hand placement shall be required to insure complete coverage of entire width of ditch or swale and that center of dam is lower than edges.

4. Rock dams: Mechanical or hand placement will be required to insure that the rock dam extends completely across the channel and securely ties into both channel banks. The center of the dam must be no less than six inches lower than the lowest side, to serve as a type of weir. Gabions can be installed to serve as rock filter dams, but should follow recommended sizing and installation specifications. Refer to Gabions in this specification.

5. Height: The center of the check dam must be at least 9 inches lower than outer edges. Dam height should be 2 feet maximum measured to center of check dam.

6. Side Slopes: Side slopes shall be 2:1 or flatter.

7. Spacing: Two or more check dams in series shall be used for drainage areas greater than one acre. Maximum spacing between dams should be such that the toe of the upstream dam is at the same elevation as the top of the downstream dam.

8. A geotextile should be used as a separator between the graded stone and the soil base and abutments. The geotextile shall be placed immediately adjacent to the subgrade without any voids and extend five feet beyond the downstream toe of the dam to prevent scour.

9. Check and rock dams shall be maintained to ensure the depth of impounded sediment is no more than one-half of the original height of the check dam or as directed by the Engineer. Damaged, destroyed or washed-out check dams shall be repaired, reinforced or replaced with new material and installed as shown on the Drawings and as directed by the Engineer.

10. Check and Rock Dams removal

    a. Check and rock dams shall be removed [shall remain] once the disturbed area has been stabilized with a permanent vegetative cover and the sediment barrier is no longer required as directed by the Engineer.

    b. Accumulated sediment shall be removed from the check and rock dams when it reaches a depth of one-half of the original height of the dam and removed from the site.

c. All non-biodegradable parts of the barrier shall be disposed of properly.

    d. The disturbed area created by check or rock dam removal shall be permanently stabilized.

D. Construction Exit

1. Construction exit(s) shall be placed as shown on the Drawings and as directed by the Engineer. A construction exit shall be located at any point traffic will be leaving a disturbed area to a public right-of-way, street, alley, sidewalk or parking area.

2. Placement of Construction Exit Material: The ground surface upon which the

construction exit material is to be placed shall be prepared to a smooth condition free from obstructions, depressions or debris. The geotextile underliner shall be placed to provide a minimum number of overlaps and a minimum width of one foot of overlap at each joint. The stone shall be placed with its top elevation conforming to the surrounding roadway elevations. The stone shall be dropped no more than three feet during construction.

3. Construction Exit Maintenance: The Contractor shall regularly maintain the exit with the top dressing of stone to prevent tracking or flow of soil onto public rights-of-way and paved surfaces as directed by the Engineer. This shall require periodic top dressing with 1.5-3.5 inch stone, as conditions demand.

4. Construction Exit Removal: Construction exit(s) shall be removed and properly disposed of when the disturbed area has been properly stabilized, the tracking or flow of soil onto public rights-of-way or paved surfaces has ceased and as directed by the Engineer.

E. Rip Rap

1. Rip rap shall be placed as shown on the Drawings and as directed by the Engineer. Rip rap shall be placed at all points where natural vegetation is disturbed on the banks of streams or drainage ditches. Compact backfill and place rip rap to prevent subsequent settlement and erosion. This requirement applies equally to construction along side a stream or drainage ditch as well as crossing a stream or drainage ditch.

2. When trenching across a stream or drainage ditch, place rip rap over the entire disturbed area upstream and downstream of the trench excavation. Place rip rap across creek bottom, across creek banks and extend rip rap placement five feet beyond the top of each creek bank.

3. Preparation of Foundations: The ground surface upon which the rip rap is to be placed shall be brought to the correct lines and grades before placement is commenced. Where filling of depressions is required, the new material shall be compacted with hand or mechanical tampers. Unless at creek banks or otherwise shown or specified, rip rap shall begin in a toe ditch constructed in original ground around the toe of the fill or the cut slope. The toe ditch shall be two feet deep in original ground, and the side next to the fill or cut shall have that same slope. After the rip rap is placed, the toe ditch shall be backfilled and the excess dirt spread neatly within the construction easement or on the site.

4. Placement of Plastic Filter Fabric

   a. Plastic filter fabric shall be placed under all rip rap unless shown or specified otherwise.

   b. Filter fabric shall not be placed under rip rap on stream or drainage ditch crossings.

   c. The surface to receive filter fabric shall be prepared to a smooth condition free from obstructions, depressions and debris. The filter fabric shall be

installed with the long dimension running up the slope and shall be placed to provide a minimum number of overlaps. The fabric shall be placed to provide a minimum width of one foot of overlap at each joint. The fabric shall be placed so that the upstream strip overlaps the downstream strip. The fabric shall be anchored in place with securing pins of the type recommended by the fabric manufacturer. Pins shall be placed on or within 3-inches of the centerline of the overlap. The fabric shall be placed loosely to avoid stretching and tearing during placement of the stone. The fabric shall be protected at all times during construction from clogging due to clay, silts, chemicals or other contaminants. Contaminated fabric or fabric damaged during installation or during placement of rip rap shall be removed and replaced with uncontaminated and undamaged fabric at no additional cost to the Owner.

5. Placement of Rip Rap: Rip rap shall be placed on a 6-inch layer of soil, crushed stone or sand overlaying the filter fabric. Rip rap shall be placed with its top elevation conforming with the finished grade or the natural existing slope of the stream bank and stream bottom. The stone shall be dropped no more than three feet during construction.

    a. Stone Rip Rap: Stone rip rap shall be placed to provide a uniform surface to the thickness shown on the Drawings. The thickness tolerance for the course shall be -3-inches and +6-inches.

G. Polyacrylamide (PAM)

1. Application rates shall conform to manufacturer’s guidelines for application.

2. Maintenance will consist of reapplying anionic PAM to disturbed areas including high use traffic areas which interfere in the performance of this practice.

H. Erosion Control Matting and Blankets

1. Erosion Control Matting and Blankets be placed as shown on the Drawings and as directed by the Engineer.

2. After the site has been shaped and graded to the approved design, prepare a friable seedbed relatively free from clods and rocks more than one inch in diameter, and any foreign material that will prevent contact of the soil stabilization mat with the soil surface. Surface must be smooth to ensure proper contact of blankets or matting to the soil surface. If necessary, redirect any runoff from the ditch or slope during installation.

3. Follow manufacturer’s recommendations and follow details as shown on the Drawings for laying and stapling.

4. All erosion control blankets and matting should be inspected periodically following installation, particularly after rainstorms to check for erosion and undermining. Any dislocation or failure should be repaired immediately. If washouts or breakage occurs, reinstall the material after repairing damage to the slope or ditch. Continue to monitor these areas until they become permanently stabilized.

I. Channel Stabilization

1. Where needed, all trees, brush, stumps and other objectionable materials shall be removed so they will not interfere with the construction or proper functioning of the channel.

2. Where possible, trees will be left standing, and stumps will not be removed.

3. Excavation shall be at the locations and grades shown on the Drawings. The lining shall not compromise the capacity of the channel, e.g. the emergency spillway shall be over-excavated so that the lining will be flush with the slope surface.

4. The geotextile shall be placed on a smooth graded surface. The geotextile shall be placed in such a manner that it will not excessively stretch or tear upon placement of the overlying materials. Care should be taken to place the geotextile in intimate contact with the soil such that no void spaces exist between the underlying soil and the geotextile.

5. Construction plans will specifically detail the location and handling of spoils. Spoil material resulting from clearing, grubbing and channel excavation shall be disposed of in a manner which will:

    a. not cause an increase in flood stage,

    b. minimize overbank wash,

    c. not cause an adverse effect on the environmental integrity of the area,

    d. provide for the free flow of water between the channel and flood plain unless the valley routing and water surface profile are based on continuous dikes being installed,

    e. leave the right-of-way in the best condition feasible, and

    f. improve the aesthetic appearance of the site to the extent feasible.

6. Channel linings shall be established or installed immediately after construction or as soon as weather conditions permit.

7. Structures shall be installed according to lines and grades shown on the plan. The foundation for structures shall be cleared of all undesirable materials prior to the installation of the structures.

8. Materials used in construction shall be of permanency commensurate with the design frequency and life expectancy of the facility.

9. Earthfill, when used as a part of the structures, shall be placed according to the installation requirements for sediment basin embankments.

10. Construction operations shall be carried out in such a manner that erosion and air and water pollution will be minimized. State and local laws concerning pollution abatement shall be complied with.

11. Vegetation shall be established on all disturbed areas immediately after construction. If weather conditions cause a delay in establishing vegetation, the area shall be mulched in accordance with the standard for mulching.

12. All temporary access roads or travelways shall be appropriately closed to exclude traffic.

13. Trees and other fallen natural vegetation not causing a deterrent to stream flow should be left for the purpose of habitat.

J. Downdrain Structures

1. Place slope drains on undisturbed soil or well compacted fill at locations and elevations shown on the Drawings.

2. Slightly slope the section of pipe under the dike toward its outlet.

3. Hand tamp the soil under and around the entrance section in lifts not to exceed 6 inches.

4. Ensure that fill over the drain at the top of the slope has minimum dimensions of 1.5 ft. depth, 4 ft. top width, and 3:1 side slopes.

5. Ensure that all slope drain connections are watertight.

6. Ensure that all fill material is well-compacted. Securely fasten the exposed section of the drain with grommets or stakes spaced no more than 10 feet apart.

7. Place the drain slightly diagonally across the slope, extending the drain beyond the toe of the slope. Curve the outlet uphill and adequately protect the outlet from erosion.

8. If the drain is conveying sediment-laden runoff, direct all flows into a sediment trap or sediment basin.

9. Make the settled, compacted dike ridge no less than one foot above the top of the pipe at every point.

10. Immediately stabilize all disturbed areas following construction.

11. Install Storm Drain Outlet Protection as specified in this Part.

12. Maintenance: Inspect the slope drain and supporting diversion after every rainfall and promptly make necessary repairs. When the protected area has been permanently stabilized and the permanent stormwater disposal system is fully functional, temporary measures may be removed, materials disposed of properly, and all disturbed areas stabilized appropriately.

K. Filter Ring

1. Filter Rings be placed as shown on the Drawings and as directed by the Engineer.

2. The filter ring shall be constructed at a height no less than two feet from grade.

3. Mechanical or hand placement of stone shall be required to uniformly surround the structure to be supplemented. Refer to Rip Rap, within this specification, for rock rip rap specifications.

4. When utilized below a storm drain outlet, it shall be placed such that it does not create a condition causing water to back-up into the storm drain and inhibit the function of the storm drain system.

5. Maintenance: The filter ring must be kept clear of trash and debris. This will require continuous monitoring and maintenance, which includes sediment removal when one-half full. Structures are temporary and should be removed when the land-disturbing project has been stabilized.

L. Temporary Sediment Basin

1. Site Preparation: Areas under the embankment and under structural works shall be cleared, grubbed, and stripped of topsoil. All trees, vegetation, roots and other objectionable material shall be removed and disposed of by approved methods. In order to facilitate clean-out or restoration, the pool area (measured at the top of the pipe spillway) will be cleared of all brush and trees.

2. Cut-off Trench: A cut-off trench will be excavated along the centerline of earth fill embankments. The minimum depth shall be 2 feet. The cut-off trench shall extend up both abutments to the riser crest elevation. The minimum bottom width shall be 4 feet, but wide enough to permit operation of compaction equipment. The side slopes shall be no steeper than 1:1. Compaction requirements shall be the same as those for the embankment. The trench shall be drained during the backfilling and compaction operations.

3. Embankment: The fill material shall be taken from approved areas shown on the Drawings. It shall be clean mineral soil free of roots, woody vegetation, oversized stones, rocks or other objectionable material. Relatively pervious materials such as sand or gravel (Unified Soil Classes GW, GP, SW & SP) shall be placed in the downstream section of the embankment. Areas on which fills are to be placed shall be scarified prior to placement of fill. The fill material shall contain sufficient moisture so that it can be formed by hand into a ball without crumbling. If water can be squeezed out of the ball, it is too wet for proper compaction. Fill material shall be placed in six-inch to eight-inch thick continuous layers over the entire length of the fill. Compaction shall be obtained by routing and hauling the construction equipment over the fill so that the entire surface of the fill is traversed by at least one wheel or tread track of the equipment or by the use of a compactor. The embankment shall be constructed to an elevation 5 percent higher than the design height to allow for settlement.

4. Principal Spillway: The riser shall be securely attached to the pipe or pipe stub by welding the full circumference making a watertight structural connection. The pipe stub must be attached to the riser at the same percent (angle) of grade as the outlet conduit. The connection between the riser and the riser base shall be watertight. All connections between pipe sections must be achieved by approved watertight band assemblies. The pipe and riser shall be placed on a firm, smooth foundation of impervious soil as the embankment is constructed. Breaching the embankment is unacceptable. Pervious materials such as sand, gravel, or crushed stone shall not be used as backfill around the pipe or anti-seep collar. The fill material around the pipe spillway shall be placed in four inch layers and compacted under and around the pipe to at least the same density as the adjacent embankment. Care must be taken not to raise the pipe from firm contact with its foundation when compacting under the pipe haunches. A minimum depth of two feet of hand compacted backfill shall be placed over the pipe spillway before crossing it with construction equipment.

5. Emergency Spillway: The emergency spillway shall be installed in undisturbed ground. The achievement of planned elevations, grades, design width, entrance and exit channel slopes are critical to the successful operation of the emergency spillway and must be constructed within a tolerance of ± 0.2 feet. If the emergency spillway requires erosion protection other than vegetation, the lining shall not compromise the capacity of the emergency spillway, e.g. the emergency spillway shall be over-excavated so that the lining will be flush with the slope surface.

6. Vegetative Treatment: Stabilize the embankment and all other disturbed areas in accordance with the appropriate permanent vegetative measure, see Specification 32 92 19 - Seeding, immediately following construction. In no case shall the embankment remain unstabilized for more than seven days.

7. Erosion and Pollution Control: Construction operations will be carried out in such a manner that erosion and water pollution will be minimized. State and local law concerning pollution abatement shall be complied with.

8. Maintenance: Repair all damages caused by soil erosion or construction equipment at or before the end of each working day. Sediment shall be removed from the basin when it reaches the specified distance below the top of the riser. Sediment shall not enter adjacent streams or drainage ways during sediment removal or disposal. The sediment shall not be deposited downstream from the embankment, adjacent to a stream or floodplain.

9. Final Disposal: When temporary structures have served their intended purpose and the contributing drainage area has been properly stabilized, the embankment and resulting sediment deposits are to be leveled or otherwise disposed of in accordance with approved sediment control plan. The proposed use of a sediment basin site will often dictate final disposition of the basin and any sediment contained therein. If the site is scheduled for future construction, then the embankment and trapped sediment must be removed, safely disposed of, and backfilled with a structural fill. When the basin area is to remain open space, the pond may be pumped dry, graded and backfilled.

M. Temporary Stream Crossing

1. All Crossings:

a. Clearing of the stream bed and banks shall be kept to a minimum.

b. All surface water from the construction site shall be diverted onto undisturbed areas adjoining the stream. Line unstable stream banks with rip rap or otherwise appropriately stabilize them.

c. The structure shall be removed as soon as it is no longer necessary for Project construction.

d. Upon removal of the structure, the stream shall immediately be restored to its original cross-section and properly stabilized.

2. Temporary Bridge Crossing:

a. The temporary bridge shall be constructed at or above bank elevation to prevent the entrapment of floating materials and debris.

b. Abutments shall be placed parallel to and on stable banks.

c. Bridges shall be constructed to span the entire channel. If the channel width exceeds eight feet (as measured from the tops of the banks), a footing, pier or bridge support may be constructed within the waterway.

d. Bridges shall be securely anchored at only one end using steel cable or chain. Large trees, large boulders, or driven steel anchors can serve as anchors.

3. Temporary Culvert Crossing:

a. The invert elevation of the culvert shall be installed on the natural streambed grade.

b. The culvert(s) shall extend a minimum of one foot beyond the upstream and downstream toe of the aggregate placed around the culvert. In no case shall the culvert exceed 40 feet in length.

c. The culvert(s) shall be covered with a minimum of one foot of aggregate. If multiple culverts are used, they shall be separated by a minimum of 12 inches of compacted aggregate fill.

4. Maintenance: The structure shall be inspected after every rainfall and at least once a week, whether it has rained or not, and all damages repaired immediately. The structure shall be removed immediately after construction is finished, and the streambed and banks must be stabilized.

N. Storm Drain Outlet Protection

1. Ensure that the subgrade for the filter and rip rap follows the required lines and

grades shown in the plan. Compact any fill required in the subgrade to the density of the surrounding undisturbed material. Low areas in the subgrade on undisturbed soil may also be filled by increasing the rip rap thickness.

2. The rip rap and gravel filter must conform to the specified grading limits shown in the plans.

3. Geotextile must meet design requirements and be properly protected from punching or tearing during installation. Repair any damage by removing the rip rap and placing another piece of filter fabric over the damaged area. All connecting joints should overlap a minimum of 1 foot. If the damage is extensive, replace the entire filter fabric.

4. Rip rap may be placed by equipment, but take care to avoid damaging the filter.

5. The minimum thickness of the rip rap should be 1.5 times the maximum stone diameter.

6. Construct the apron on zero grade with no overfall at the end. Make the top of the rip rap at the downstream end level with the receiving area or slightly below it.

7. Ensure that the apron is properly aligned with the receiving stream and preferably straight throughout its length. If a curve is needed to fit site conditions, place it in the upper section of the apron.

8. Immediately after construction, stabilize all disturbed areas with vegetation.

9. Filter: Install a filter to prevent soil movement through the openings in the rip rap. The filter should consist of a graded gravel layer or a synthetic filter cloth.

10. Maintenance: Inspect rip rap outlet structures after heavy rains to see if any erosion around or below the rip rap has taken place or if stones have been dislodged. Immediately make all needed repairs to prevent further damage.

O. Gradient Treament

1. Contour Furrow: The maximum distance between furrows should be 40 feet, and the maximum slope length should be 200 feet. Refer to the Tennessee Erosion and Sediment Control Handbook, latest edition for detailed example of a contour furrow.

2. Serrated Slope: Bladed equipment will be needed to make numerous passes along a slope, beginning at the top and working downward. The maximum slope length should be 100 feet. Refer to the Tennessee Erosion and Sediment Control Handbook, latest edition for detailed example of a serrated slope.

3. Stepped Slope: Construct stepped slope as shown in the detailed example in the Tennessee Erosion and Sediment Control Handbook, latest edition. Steps should be wide enough to work with standard earth moving equipment. Preferably the horizontal distance should be at least 1.5 times the vertical cut distance. Slightly grade the horizontal bench inwards (e.g. back towards the top of slope). Do not

make individual vertical cuts more than 24 inches high in soft materials or more than 36 inches high in rocky materials.

4. Terraced Slope: Designed drainage channels are located in the slope at regular intervals and have a regular cross-section including slope and depth requirements. Locate intersecting channels to convey storm water to the bottom of the slope. The maximum slope height between terraces shall be 30 feet for cut slopes and 25 feet for fill slopes. Terrace widths should be at least 6 feet wide. Refer to the Tennessee Erosion and Sediment Control Handbook, latest edition for detailed example of a terraced slope.

5. Seeding: Roughened areas shall be seeded and mulched as soon as possible to obtain optimum seed germination and seeding growth. Refer to Specifications for temporary mulching, vegetation in this Specification and permanent vegetation in Section 32 92 19, Permanent Seeding and 32 92 23, Permanent Sodding and the seeding table contain within the Drawings.

P. Temporary Mulching

1. When mulch is used without seeding, mulch shall be applied to provide full coverage of the exposed area. Mulch shall be applied as follows:

   a. Dry straw or hay mulch and wood chips shall be applied uniformly by hand or by mechanical equipment.

   b. If the area will eventually be covered with perennial vegetation, 20-30 pounds of nitrogen per acre in addition to the normal amount shall be applied to offset the uptake of nitrogen caused by the decomposition of the organic mulches.

   c. Apply mulch binder on exposed areas, where indicated on the Drawings or as instructed by the Engineer.

2. Anchoring Mulch:

   a. Straw or hay mulch can be pressed into the soil with a disk harrow with the disk set straight or with a special “packer disk.” Disks may be smooth or serrated and should be 20 inches or more in diameter and 8 to 12 inches apart. The edges of the disk should be dull enough not to cut the mulch but to press it into the soil leaving much of it in an erect position.

   b. Straw or hay mulch shall be anchored immediately after application.

   c. Straw or hay mulch spread with special blower-type equipment may be anchored with emulsified asphalt (Grade AE-5 or SS-1). The asphalt emulsion shall be sprayed onto the mulch as it is ejected from the machine. Use 100 gallons of emulsified asphalt and 100 gallons of water per ton of mulch.

   d. For straw or hay mulch, plastic mesh or netting with mesh no larger than one inch by one inch shall be installed according to manufacturer’s

specifications.

e. Netting of the appropriate size shall be used to anchor wood waste. Openings of the netting shall not be larger than the average size of the wood waste chips.

Q. Temporary Grassing

1. Seed Bed Preparation:

a. When a hydraulic seeder is used, seedbed preparation is not required.

b. When using conventional or hand seeding, seedbed preparation is not required if the soil material is loose and not sealed by rainfall.

c. When soil has been sealed by rainfall or consists of smooth cut slopes, the soil shall be pitted, trenched or otherwise scarified to provide a place for seed to lodge and germinate.

2. Select a grass or grass-legume mixture suitable to the area and season of the year.

3. Seed shall be applied uniformly by hand, cyclone seeder, drill, culti-packer-seeder, or hydraulic seeder (slurry including seed and fertilizer). Drill or cultipacker seeders should normally place seed one-quarter to one-half inch deep. Appropriate depth of planting is ten times the seed diameter.

4. Soil should be “raked” lightly to cover seed with soil if seeded by hand.

5. Irrigation: During times of drought, water shall be applied at a rate not causing runoff and erosion. The soil shall be thoroughly wetted to a depth that will insure germination of the seed. Subsequent applications should be made when needed.

6. Temporary Stabilization: Temporary stabilization shall be provided as shown on the Drawings and conforming to these Specifications to control erosion on the site. Temporary stabilization shall be provided to any area which will not receive permanent stabilization within the next 7 calendar days. Partial payment requests may be withheld for those portions of the Project not complying with this requirement.

R. Permanent Grassing and Sodding

1. Refer to Specifications 32 92 19 Permanent Seeding and 32 92 23 Permanent Sodding and the seeding table contain within the Drawings for installation and maintenance.

2. Permanent Stabilization:

a. Permanent stabilization shall be provided as shown on the Drawings and conforming to these Specifications to control erosion on the site. Permanent stabilization shall be provided to all areas of land disturbance within seven

calendar days of the completion of land disturbance for any area greater than 0.25 acre.

b. Grass or sod removed or damaged in residential areas shall be replanted with the same variety within seven calendar days of the completion of work in any area.

c. Where permanent stabilization cannot be immediately established because of an inappropriate season, the Contractor shall provide temporary stabilization. The Contractor shall return to the site at the appropriate season to provide permanent stabilization in areas that received only temporary stabilization.

T. Sediment Traps

1. Installation:

a. The embankment should be compacted in 6-inch layers by traversing with construction equipment.

b. All cut and fill slopes should be 2:1 or less (except for excavated, wet storage area which may be at a maximum 1:1. grade).

c. Construction operations should be carried out in such a manner that erosion during construction of the structure is minimized.

d. The earthen embankment should be seeded with temporary or permanent seeding immediately after installation.

2. Removal: The structure should be removed and the area stabilized when the upslope drainage area has been stabilized.

3. Maintenance:

a. Sediment should be removed and the trap restored to its original dimensions when the sediment has accumulated to one half the design volume of the wet storage. Sediment removal from the basin should be deposited in a suitable area and in such a manner that it will not erode and cause sedimentation problems.

b. Maintenance needs identified in inspections or by other means should be accomplished before the next storm event if possible, but in no case more than seven days after the need is identified.

3.3 Clean-Up

A. Dispose of all excess erosion and sedimentation control materials in a manner satisfactory to the Engineer.

B. All temporary erosion control measures shall be removed after final stabilization of the

site has occurred, unless otherwise noted on the Drawings or instructed by the Engineer.

C. Final clean-up shall be performed in accordance with the requirements of Section 01 74 00 of these Specifications.

END OF SECTION

Part 1 General

1.1 Scope

A. Construction staking shall include all of the surveying work required to layout the work and control the location of the finished Project. The Contractor shall have the full responsibility for constructing the Project to the correct horizontal and vertical alignment, as shown on the Drawings, as specified, or as ordered by the Landscape Architect. The Contractor shall assume all costs associated with rectifying work constructed in the wrong location.

B. From the information shown on the Drawings and the information to be provided as indicated under Project Conditions below, the Contractor shall:

1. Be responsible for setting reference points and/or offsets, establishment of baselines, and all other layout, staking, and all other surveying required for the construction of the Project.

2. Safeguard all reference points, stakes, grade marks, horizontal and vertical control points, and shall bear the cost of re-establishing same if disturbed.

3. Stake out the permanent and temporary easements or the limits of construction to ensure that the work is not deviating from the indicated limits.

4. Be responsible for all damage done to reference points, baselines, center lines and temporary bench marks, and shall be responsible for the cost of re-establishment of reference points, baselines, center lines and temporary bench marks as a result of the operations.

C. Baselines shall be defined as the line to which the location of the work is referenced, i.e., edge of pavement, road centerline, property line, right-of-way or survey line.

D. Record Drawing surveys shall be performed in accordance with Section 01 78 39 of these Specifications.

1.2 Project Conditions

A. The Drawings provide the location and/or coordinates of principal components of the Project. The alignment of some components of the Project may be indicated in the Specifications. The Landscape Architect may order changes to the location of some of the components of the Project or provide clarification to questions regarding the correct alignment.

B. The survey points, control points, and baseline to be provided to the Contractor shall be limited to only that information which can be found on the Project site by the Contractor.

1.3 Quality Assurance

A. The Contractor shall furnish documentation, prepared by a surveyor currently registered in the State in which the Project is located, confirming that staking is being done to the horizontal and vertical alignment shown in the Contract Documents. This requires that the Contractor hire, at the Contractor's own expense, a currently registered surveyor, acceptable to the Owner, to provide ongoing construction staking or confirmation of such.

B. Any deviations from the Drawings shall be confirmed by the Landscape Architect prior to construction of that portion of the Project.

1.4 Site Work

A. Staking Precision: The precision of construction staking shall match the precision of a component's location indicated on the Drawings. Staking of utilities shall be done in accordance with generally accepted practice for the type of utility.

C. Paved Surfaces *(Ooltewah HS Only)*: The Contractor shall establish a reference point for establishing and verifying the paving subgrade and finished grade elevations. Any variance with plan grades shall be identified by the Contractor and confirmed by the Landscape Architect prior to constructing the base.

Part 2 Products

(NOT USED)

Part 3 Execution

(NOT USED)

END OF SECTION

Part 1 General

1.1 Related Documents

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 Summary

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.

B. Related Requirements:

1. Section 01 11 00 - Summary of Work
2. Section 01 33 00 - Submittal Procedures for submitting surveys.

1.3 Definitions

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 Quality Assurance

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

Part 2 Products

2.1 Materials

A. General: Comply with requirements specified in other Sections.

Part 3 Execution

3.1 Examination

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning site work, Contractor shall notify state “One Call” service and shall investigate and verify the existence and location of underground utilities, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection or crossing of stormwater piping, and water-service piping. Inform Engineer and Utility of any discrepancies or potential conflicts.

3.2 Preparation

A. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Engineer.

3.3 Construction Layout

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings. If discrepancies are discovered, notify Engineer promptly.

B. General: Contractor shall engage a land surveyor to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each stage of construction and elsewhere as needed to locate each element of Project.

2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.

3. Check the location and elevation of every major element as the Work progresses.

4. Notify Engineer when deviations from required lines and levels exceed allowable tolerances.

C. Site Improvements: Locate and lay out site improvements, including pipe slopes, and rim and invert elevations.

D. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Engineer.

3.4 Field Engineering

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Engineer. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Engineer before proceeding.

2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

3.5 Installation

A. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

B. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

C. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected after Substantial Completion.

3.6 Protection of Installed Construction

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

END OF SECTION

Part 1 General

1.1 Work Included

A. Section includes requirements for cleanup, re-stabilization, restoration, and disposal to maintain a safe and well-kept job site and properly repair disturbed areas.

1.2 Quality Assurance

A. Daily, and more often if necessary, conduct inspections verifying that requirements of cleanliness are being met.

B. In addition to the standards described in this Section, comply with all pertinent requirements of governmental agencies having jurisdiction.

1.3 Cleaning Materials and Equipment

A. Provide all required personnel, equipment and materials needed to maintain the specified standard of cleanliness.

B. Use only the cleaning materials, methods and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material or as approved by the Landscape Architect.

1.4 Cleaning During Construction

A. Throughout all phases of construction, including suspension of work, and until the Final Acceptance, the Contractor shall keep the site clean and free from rubbish and debris. The Contractor shall also abate dust nuisance by cleaning, sweeping and sprinkling with water, or other means as necessary. The use of water resulting in mud on driveways, parking lots or streets will not be permitted as a substitute for sweeping or other methods.

1. The paving surfaces(s) on the construction site shall be paved immediately after the installation of underground utilities and the construction and underground/final inspection of storm drainage and curbs.

2. Vehicles exiting the construction site shall be clean per the Stormwater Pollution Prevention Plans.

3. Materials and equipment shall be removed from the site as soon as they are no longer necessary. Before the final inspection, the site shall be cleared of equipment, unused materials and rubbish so as to present a satisfactory clean and neat appearance. All cleanup costs shall be included in the Contractor’s Bid.

4. Care shall be taken to prevent spillage on haul routes. Any such spillage shall be removed immediately, and the area cleaned.

5. Excess excavated material from catch basins or similar structures shall be removed from the site immediately. Sufficient material may remain for use as backfill if permitted by the Specifications. Forms and form lumber shall be removed from the site as soon as practicable after stripping.

B. Failure of the Contractor to comply with the Landscape Architect's cleanup orders may result in an order to suspend work until the condition is corrected. No additional compensation will be allowed as a result of such suspension.

1.5 Final Cleaning

A. Upon completion of the work, the Contractor shall remove from the site all plant, materials, tools and equipment belonging to him, and leave the site with an appearance acceptable to the Owner.

B. Restore or replace all landscape features scarred or damaged by the Contractor's equipment or operations as nearly as possible to original condition, at the Contractor's expense. The Owner will approve the method of restoration to be used.

C. The Contractor shall remove all signs of temporary construction facilities such as haul roads, work areas, stockpiles of excess or waste materials, or any other vestiges of construction, as directed by the Owner. The restored areas shall be filled, graded, and spread with sufficient topsoil to provide a minimum depth of four inches of suitable soil for the growth of grass, and the entire area shall be seeded or sodded with the original type of grass. Areas shall be restored to original contours as shown on the Plans. If the Plans do not cover the specific areas to be restored, the areas shall be graded to drain and give a smooth transition to the surroundings.

1.6 Measurement and Payment

A. No separate payment will be made for any items of work, materials, parts, equipment, supplies, or related items required to perform and complete the requirements of this section. The costs for all such items required shall be considered subsidiary to other items of this Contract and shall not be paid for separately.

1.7 Disposal of Waste

A. Except for items or materials to be salvaged, recycled, or otherwise reused, and except for options available below for vegetative waste generated by clearing and grubbing operations, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

B. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.

C. Remove and transport waste in a manner that will prevent spillage on adjacent surfaces and areas.

D. Burning: Except as allowed under Paragraph C above, do not burn waste materials on site.

E. Waste removed from the Project site shall be disposed of in sites permitted by the Tennessee Department of Environment and Conservation (TDEC) for the acceptance of type of waste being disposed in accordance with Rules of TDEC Solid Waste Management, including Chapter 0400-11-01. Landfill types include

1. Class IV Landfills - construction and demolition waste

F. The Contractor shall maintain records related to all waste removed from the Project site so as to allow the Owner or the Landscape Architect to readily determine the following:

1. Date waste removed from Project site.

2. Name of hauler (company and driver) transporting such waste.

3. General description of waste transported.

4. “Truck tickets” indicating the waste disposal site and amount of waste disposed therein.

Part 2 Products

(NOT USED)

Part 3 Execution

(NOT USED)

END OF SECTION

General

1.1 Summary

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.

2. Final completion procedures.

3. Repair of the Work.

1.2 Action Submittals

A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

B. Certified List of Incomplete Items: Final submittal at Final Completion.

1.3 Substantial Completion Procedures

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of ten (10) days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, and similar final record information.

2. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

3. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Owner. Label with manufacturer's name and model number where applicable.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of ten (10) days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Complete startup and testing of systems and equipment.

2. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Terminate and remove temporary facilities from Project site, along with construction tools, and similar elements.

3. Complete final cleaning requirements, including touchup painting.

4. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of ten (10) days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Engineer, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

2. Results of completed inspection will form the basis of requirements for final completion.

1.4 Final Completion Procedures

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Certified List of Incomplete Items: Submit certified copy of Engineer's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Engineer. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of ten (10) days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 List of Incomplete Items (Punch List)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Include the following information at the top of each page:
    a. Project name.
    b. Date.
    c. Name of Engineer.
    d. Name of Contractor.
    e. Page number.

Part 2 Products

(NOT USED)

Part 3 Execution

3.1 Repair of the Work

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired.

END OF SECTION

Part 1 General

1.1 Project Maintenance and Warranty

A. Maintain and keep in good repair the work covered by these Drawings and Specifications until acceptance by the Owner.

B. The Contractor shall warrant all work for a period of time as stated in the General Conditions. The Owner will give notice of observed defects with reasonable promptness.

C. The Contractor shall not be obligated to make replacements which become necessary because of ordinary wear and tear, or as a result of improper operation or maintenance, or as a result of improper work or damage by another Contractor or the Owner, or to perform any work which is normally performed by a maintenance crew during operation.

D. In the event of multiple failures of major consequences prior to the expiration of the Correction Period described in the General Conditions, the affected product shall be removed, inspected and modified or replaced as necessary to prevent further occurrences. All related components which may have been damaged or rendered non-serviceable as a consequence of the failure shall be replaced. A new warranty and Correction Period, as described in the General Conditions, against defective or deficient design, workmanship, and materials shall commence on the day that the item is reassembled and placed back into operation. As used herein, multiple failure shall be interpreted to mean two or more successive failures of the same kind in the same item or failures of the same kind in two or more items. Major failures may include, but are not limited to, cracked or broken housings, piping, or vessels, excessive deflections, bent or broken shafts, broken or chipped gear teeth, premature bearing failure, excessive wear or excessive leakage around seals. Failures which are directly and clearly traceable to operator abuse, such as operations in conflict with published operating procedures or improper maintenance, such as use of incorrect cleaning/grooming methods and/or equipment and using maintenance procedures not conforming with published maintenance instructions, shall be exempted from the scope of the eight-year warranty. Should multiple failures occur in a given item, all products shall replaced as necessary and rewarranted for eight years from the date of new installation.

E. The Contractor shall, at Contractor's own expense, furnish all labor, materials, tools and equipment required and shall make such repairs and removals and shall perform such work or reconstruction as may be made necessary by any structural or functional defect or failure resulting from neglect, faulty workmanship or faulty materials, in any part of the work performed by the Contractor.

F. The Contractor shall be responsible for all road and entrance reconstruction and repairs and maintenance of same for the duration of the Correction Period, as defined in the General Conditions. In the event the repairs and maintenance are not made immediately and it becomes necessary for the owner of the road to make such repairs, the Contractor shall reimburse the owner of the road for the cost of such repairs.

G. In the event the Contractor fails to proceed to remedy the defects upon notification within 15 days of the date of such notice, the Owner reserves the right to cause the required

materials to be procured and the work to be done, as described in the Drawings and Specifications, and to hold the Contractor and the sureties on Contractor's bond liable for the cost and expense thereof.

H. Notice to Contractor for repairs and reconstruction will be made in the form of a registered letter addressed to the Contractor at Contractor's home office.

I. Neither the foregoing paragraphs nor any provision in the Contract Documents, nor any special guarantee time limit implies any limitation of the Contractor's liability within the law of the place of construction.

Part 2 Products

(NOT USED)

Part 3 Execution

(NOT USED)

END OF SECTION

Part 1 General

1.1 Extent of the Work

A. The extent of concrete work is shown on the Drawings.

1.2 Quality Assurance

A. Comply with the provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:

1. ACI 304, Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete.

2. ACI 305, Hot Weather Concreting.

3. ACI 306, Cold Weather Concreting.

4. ACI 308, Standard Practice for Curing Concrete.

5. ACI 315, Detailing Manual.

6. ACI 318, Building Code Requirements for Reinforced Concrete.

7. ACI 347, Recommended Practice for Concrete Formwork.

8. ACI 350, Code Requirements for Environmental Landscape Architecting Concrete Structures and Commentary.

9. CRSI Manual of Standard Practice.

B. The Contractor is responsible for correcting concrete work that does not conform to the specified requirements, including requirements for strength, tolerances, and finishes. Correct deficient concrete as directed by the Landscape Architect.

C. Materials and installed work may require testing and retesting, as directed by the Landscape Architect and paid for by the Owner’s Allowance. Allow free access to material stockpiles and facilities at all times. Tests not specifically indicated to be done at the Owner's expense, including the retesting of rejected materials and installed work, shall be done at the Contractor's expense.

1.3 Submittals

A. Comply with applicable requirements of Section 01 33 00.

B. Submit manufacturer/supplier certifications for aggregate and cement. Provide the project identification name and number, date of report, name of Contractor, name of concrete testing service, source of concrete aggregates, materials manufacturer and

brand name for manufactured materials, values specified in the referenced specification for each material, and test results.

C. Submit manufacturer's product data with application and installation instructions for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing and sealing compounds, and others requested by the Landscape Architect.

D. Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with the ACI 315, Detailing Manual, showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Show on the shop drawings special reinforcement required and openings through concrete structures.

E. Submit mix design in accordance with ACI requirements. Provide for each mix design, the project name, city, general contractor, concrete strength, and it's intended use.

F. Submit 2 copies of laboratory test reports with standard deviation analysis or trial batch data. All concrete materials shall be listed.

G. Submittals shall be approved by the Landscape Architect prior to procurement or fabrication of materials.

Part 2 Product

2.1 Form Materials

A. Forms for Exposed Finish Concrete: Unless otherwise specified or shown on the Drawings, construct formwork for exposed concrete surfaces with plywood, metal, metal framed plywood, or other panel type materials acceptable to the Landscape Architect in order to provide exposed surfaces that are continuous, straight, and smooth. To minimize the number of joints and to conform to the joint system shown on the Drawings, furnish panels in the largest practicable sizes. Provide form material that is thick enough to withstand pressure of newly placed concrete without bowing or deflection.

B. Forms for Unexposed Finish Concrete: For surfaces that will be unexposed in the finished structure, form concrete with plywood, lumber, metal, or other material acceptable to the Landscape Architect. If lumber is used, it shall be dressed on at least two edges and one side for tight fit.

C. Form Coatings: Provide commercial formulation form coating compounds that will not bond with, stain, or adversely affect concrete surface and that will not impair subsequent treatments of concrete surfaces to be cured with water or curing compound.

2.2 Reinforcing Materials

A. Reinforcing Bar: ASTM A615, Grade 60.

B. Supports for Reinforcement: Provide supports for reinforcement, including bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Unless otherwise indicated on the Drawings, use wire type bar supports complying with CRSI recommendations. Wood, brick, and other devices will not be acceptable. Comply with the following:

1. For slabs on grade, where wetted base material will not support chair legs, use supports with sand plates or horizontal runners.

2. For concrete surfaces exposed to view, where leg supports are in contact with forms, provide supports with legs that are hot dip galvanized or protected by either plastic or stainless steel.

2.3 Concrete Materials

A. Portland Cement: ASTM C150, Type I or I/II. Use only one brand of cement throughout the project, unless otherwise acceptable to the Landscape Architect.

B. Fine and Coarse Aggregates: ASTM C33.

C. Water: Clean, fresh, drinkable.

D. Admixtures

1. Water Reducing Admixture: Eucon WR 75, WR-91 or MR by the Euclid Chemical Company, Pozzolith 220-N by Master Builders, or WRDA 15 by W.R. Grace. The admixture shall conform to ASTM C494, Type A, and not contain more chloride ions than are present in municipal drinking water.

2. Water Reducing, Retarding Admixture: Eucon Retarder 75 by the Euclid Chemical Company or Pozzolith 100 XR by Master Builders. The admixture shall conform to ASTM C494, Type D, and not contain more chloride ions than are present in municipal drinking water.

3. Mid-range Water Reducing Admixture: Eucon MR or Plastol 341 by the Euclid Chemical Company, Polyheed 997 by Master Builders or Daracem SD by W.R. Grace. The admixture shall conform to ASTM C494 Type A.

4. Nonchloride Accelerator: Accelguard 80, Accelguard 90 or NCA by the Euclid Chemical Company or Darex Set Accelerator by W. R. Grace. The admixture shall conform to ASTM C494, Type C or E, and not contain more chloride ions than are present in municipal drinking water.

5. Air Entraining Admixture: AEA-92 by Euclid Chemical Corporation, MB AE-90 by Master Builders, or Darex AEA by W.R. Grace. The admixture shall conform to ASTM C260.

6. Prohibited Admixtures: Calcium chloride, thiocyanates or admixtures containing more than 0.05 percent chloride ions are not permitted.

7. Certification: Written conformance to the aforementioned requirements and the

chloride ion content will be required from the admixture manufacturer prior to mix design review by the Landscape Architect.

2.4 Related Materials

A. Contraction/Construction Joint Filler: The joint filler shall be a two (2) component 100% solids compound, with a minimum shore A hardness of 80. Products: Subject to compliance with requirements, provide “Euco 700 or QWIK Joint” by the Euclid Chemical Company, “Sikadur 51 SL” by Sika Chemical Corporation, or MM-80 by Metzer/McGuire.

B. Moisture Retaining Covering: One of the following, complying with ASTM C171:

1. Polyethylene film.

2. Waterborne, Membrane Forming Compound: ASTM C309, Type 1, Class B.

C. Curing and Sealing Compound: Kurez DR VOX or Kurez W VOX by the Euclid Chemical Company, Master Kure 200W by Master Builders or Kure-n-Seal by Sonneborn. The compound shall conform to FS TT C 800A, 30 percent solids content minimum, and have test data from an independent laboratory indicating a maximum moisture loss of 0.030 gram per square centimeter when applied at a coverage rate of 300 square feet per gallon. Manufacturer's certification is required.

D. Bonding Compound: Euco Weld by Euclid Chemical Company or Weldcrete by the Larsen Company. The compound shall be a polyvinyl acetate, rewettable type.

E. Epoxy Adhesive: Euco Epoxy No. 452 or No. 620 by Euclid Chemical Company, Sikadur Hi Mod by Sika Chemical Corporation, or Epcon Ceramic 6 by ITW Ramset. The compound shall conform to ASTM C881, be a 2 component, 100 percent solids, 100 percent reactive compound suitable for use on dry or damp surfaces.

F. Nonshrink Grout: Euco NS by the Euclid Chemical Company or Masterflow 713 by Master Builders. The grout shall conform to CRD C 621 80, "Corps of Landscape Architects Specification for Nonshrink Grout."

2.5 Mix Design

A. Preparation

1. Prepare design mixes for each type and strength of concrete in accordance with applicable provisions of ACI-318 and ASTM C94. Use an independent testing facility acceptable to the Landscape Architect for preparing and reporting proposed mix designs. The testing facility shall not be the same one used for field quality control testing unless this is acceptable to the Landscape Architect. Submit to the Landscape Architect written reports of each proposed mix in accordance with Section 01 33 00.

2. The design mix shall provide normal weight concrete with compressive strength as indicated on the Drawings.

B. Water/Cementitious Ratio:

1. All concrete subject to freezing and thawing shall have a maximum water/cement ratio of 0.45 (4000 psi at 28 days or more). All trowel finished interior slabs, subjected to vehicular traffic, shall have a maximum water/cement ratio of 0.45.

C. Admixtures

1. All concrete slabs placed at air temperatures below 50 degrees F shall contain the specified nonchloride accelerator. All concrete required to be air entrained shall contain an approved air entraining admixture. All pumped concrete, fiber concrete, concrete for floor slabs, and concrete with a water/cement ratio below 0.50 shall contain the specified high range water reducing admixture (superplasticizer) or mid-range water reducing admixture.

   a. Use an air entraining admixture in all concrete structures and slabs exposed to freezing and thawing or subjected to hydraulic pressure:

      1) 2.5 percent to 5.5 percent for maximum 2 inches aggregate.
      2) 4.5 percent to 7.5 percent for maximum 3/4 inch aggregate.
      3) 5.5 percent to 8.5 percent for maximum 1/2 inch aggregate.

2. Use the amounts of admixtures recommended by the manufacturer for climatic conditions prevailing at the time of placing. Adjust quantities and types of admixtures as required to maintain quality control.

D. Slump Limits

1. All concrete containing the high range water reducing admixture (superplasticizer) shall have a maximum slump of 8 inches unless otherwise approved by the Landscape Architect. The concrete shall arrive at the job site at a slump of 2 inches to 3 inches and be verified; then the high range water reducing admixture shall be added to increase the slump to the approved level.

2. All other concrete shall have a maximum slump of 3 inches for curbs

2.6 Proportioning

A. Ready Mix Concrete

1. Comply with the requirements of ASTM C94 and of these specifications.

2. During hot weather or under conditions that contribute to rapid setting of concrete, a shorter mixing time than that specified in ASTM C94 may be required. When the air temperature is between 85 degrees and 90 degrees F, reduce the mixing and delivery time from 1 1/2 hours to 75 minutes; when the air temperature is above 90 degrees F, reduce the mixing time to 60 minutes.

3. Each load of concrete arriving at the job shall be accompanied by a delivery ticket that shall be collected by the Contractor and submitted to the Owner’s

representative and shall contain the following information:

a. The design mix and strength of mix of concrete being delivered.
b. The exact time the cement, aggregate, and water were discharged into the delivery truck.

Part 3 Execution

3.1 Forms

A. Design formwork so that it can be readily removed without impact, shock, or damage to cast in place concrete surfaces and adjacent materials.

B. Construct forms complying with ACI 347 and ACI SP-4 to the sizes, shapes, lines, and dimensions shown on the Drawings so that the finished work will be level and plumb and have accurate alignment, location, and grade within the tolerance limits of ACI 301. Provide for blocking, anchorages, and other features that the work requires. Use selected materials to obtain the required finishes. Butt joints solidly.

C. Fabricate forms so that they can be easily removed without hammering or prying against the concrete surfaces.

D. Chamfer exposed corners and edges as shown on the Drawings, using wood, metal, PVC, or rubber chamfer strips fabricated to produce smooth, uniform lines and tight edge joints.

E. Use metal form ties that are factory made, adjustable in length, designed to prevent form deflection, and either removable or snap off and that will prevent the concrete surface's being spalled when the ties are removed. If snap off ties are used, the portion remaining within the concrete after removal must be at least 1 1/2 inches inside the concrete and be provided with a waterproofing washer unless the Drawings indicate otherwise.

F. Clean thoroughly forms and adjacent surfaces that are to receive concrete. Remove chips, wood, sawdust, dirt, sediment, and any other debris just before the concrete is placed. After concrete placement, retighten forms if necessary to eliminate mortar leaks.

3.2 Placing Reinforcement

A. For details and methods of placing reinforcement and supports, comply with the specified codes and standards, the recommended practice of the CRSI as outlined in "Placing Reinforcing Bars," and these specifications.

B. Clean reinforcement to remove loose rust and mill scale, earth, ice, and other materials that reduce or destroy the bond with concrete.

C. Accurately position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcement with metal chairs, runners, bolsters, spacers, and hangers as required

for security.

D. Place reinforcement to obtain at least the minimum coverage for concrete protection as required by ACI 318 and ACI 350 as applicable. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so that ends are directed into the concrete, not toward exposed concrete surfaces.

E. Do not place reinforcing bars more than 2 inches beyond the last leg of continuous bar support. Do not use supports as bases for runways for concrete conveying equipment or similar construction loads.

F. Install welded wire fabric in lengths that are as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

3.3 Joints

A. Locate and install construction joints, as shown of the Drawings, or specified herein, so that the strength and appearance of the structure will not be impaired.

B. Install joint filler and sealant materials as specified by the manufacturer.

C. Construct contraction (control) joints in slabs on curbs to a depth of 1/3 curb thickness.

D. Install semi-rigid joint filler or joint sealant in accordance with the direction of the manufacturer.

E. The maximum joint spacing (in feet) of curbs on grade shall be 15-20 times the curb thickness (in inches) unless otherwise shown on the Drawings.

3.4 Preparation of Form Surfaces

A. Before placing reinforcement, coat the contact surfaces of forms with a form coating compound.

B. Thin the form coating compound only with the amount and type of thinning agent and only under the conditions recommended by the compound manufacturer. Do not allow excess form coating material to accumulate in the forms or to come into contact with concrete surfaces against which fresh concrete will be placed. Apply the form coating compound in compliance with the manufacturer's instructions.

C. Coat steel forms with a nonstaining, rust preventive form oil, or otherwise protect against rusting. Rust stained steel formwork is not acceptable.

3.5 Concrete Placement

A. Before placing concrete, inspect and complete the formwork installation, reinforcing steel. Wherever form coatings are not used, wet wood thoroughly just before placing concrete.

B. Coordinate the installation of joint materials and moisture barriers with the placement of forms and reinforcing steel.

C. Deposit concrete either continuously or in layers thick enough to prevent its being placed on concrete that has hardened enough to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as close to its final location as practicable in order to avoid segregation due to rehandling or flowing.

D. Until the placing of a curb is completed, deposit and consolidate concrete curbs in a continuous operation within construction joints.

E. Consolidate concrete during placing operations so that it is thoroughly worked around reinforcement and into corners.

F. Bring curb surfaces to the correct level with a straightedge and strike off leaving it free from humps and hollows. Do not sprinkle water on the plastic surface. Do not disturb the curb surfaces before starting finishing operations.

G. Maintain reinforcement in the proper position during placement operations.

H. Cold Weather Placement

1. Comply with ACI 306 and the requirements herein specified to protect concrete work from physical damage or reduced strength due to frost, freezing, or low temperatures.

2. When the air temperature has fallen or is expected to fall below 40 degrees F, heat all water and aggregates uniformly before mixing so that the concrete, at point of placement, will have a temperature of not less than 50 degrees nor more than 80 degrees F.

3. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

4. Use only the specified nonchloride accelerator. Do not use calcium chloride or admixtures containing more than 0.05 percent chloride ions.

I. Hot Weather Placement

1. When the weather is hot enough to impair the concrete's quality and strength, place the concrete as specified herein and in ACI 305.

2. Cool ingredients before mixing so that when the concrete is placed, its temperature is below 90 degrees F. Mixing water may be chilled, or else a portion of the water may be in the form of chopped ice.

3. If reinforcing steel becomes hotter than the ambient air temperature, cool it with water soaked burlap so that its temperature will not exceed the ambient air temperature.

4. When high temperatures and/or placing or humidity conditions dictate, the mix may be initially retarded by use of the water reducing, retarding formulation (Type D) of the specified water reducing admixture (Type A).

3.6 Finish of Formed Surfaces

A. Rough Form Finishes: For formed concrete surfaces not exposed to view in the finished work or covered by other construction, use a rough form finish unless otherwise indicated by the Drawings. Repair and patch tie holes and defective areas, and rub down or chip off fins and other projections more than 1/4 inch high.

B. Nonslip Broom Finish

1. Apply nonslip broom finish to exterior concrete curbs as indicated by the Drawings or schedules.

2. Immediately after float finishing, roughen the concrete surface slightly by brooming perpendicular to the main traffic route with a fiber bristle broom. Texture shall be as approval by the Landscape Architect from sample panels.

3.7 Curing

A. After placing and finishing the concrete, start initial curing of concrete as soon as free water has disappeared from concrete surface. Keep continuously moist for not less than 7 days.

B. Begin final curing immediately after final finishing. Continue final curing for at least 7 days in accordance with ACI 301 and ACI 308. Avoid rapid drying at the end of the final curing period.

C. Cure concrete by moist curing, moisture retaining cover curing, membrane curing, or combinations of these methods, as specified herein and ACI 308.

3.8 Removal and Reuse of Forms

A. Formwork not supporting weight of concrete may be removed after curing at a temperature of not less than 50 degrees F 24 hours after the concrete is placed, provided the concrete is hard enough not to be damaged by form removal operations and provided curing and protection operations are maintained.

B. Clean and repair surfaces of forms to be reused in the work. Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable. Apply new form coating compound material to concrete contact form surfaces as specified above for new formwork.

C. When forms are extended for successive concrete placement, clean surfaces thoroughly, remove fins and laitance, and tighten forms to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces.

3.9 Concrete Surface Repairs

A. Repair and patch defective areas with cement mortar immediately after removing forms.

B. Remove and replace concrete with defective surfaces if these effects cannot be repaired to the satisfaction of the Owner and Landscape Architect. Such surface defects include irregularities of color and texture, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

C. Where possible, repair concealed formed surfaces that contain defects which adversely affect the durability of the concrete. If such defects cannot be repaired, remove and replace the concrete.

D. Repair finished unformed surfaces that contain defects which adversely affect durability of the concrete. Such surface defects include crazing, spalling, pop outs, honeycomb, rock pockets, cracks that are more than 0.01 inch wide or that, regardless of width, penetrate either to reinforcement or completely through unreinforced sections, and other objectionable conditions.

E. After the concrete has cured at least 14 days, correct high areas in unformed surfaces by grinding.

F. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting them out and refilling with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to the Landscape Architect.

G. Repair defective areas (except for random cracks and single holes not more than 1 inch in diameter) by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts, and expose reinforcing steel with at least 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete, and apply the specified bonding compound. Place patching concrete after the bonding compound has dried. Mix patching concrete of the same materials to provide concrete of the same type or class as the original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in the same manner as adjacent concrete.

H. Repair isolated random cracks and single holes not over 1 inch in diameter by the dry pack method. Groove top of cracks, cut out holes until sound concrete is reached, and clean to remove dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply the specified bonding compound. Place dry pack after the bonding compound has dried. Dry pack shall consist of 1 part portland cement to 2 1/2 parts fine aggregate passing a No. 16 mesh sieve. Mix with no more water than is necessary for handling and placing. Compact dry pack mixture in place, and finish to match adjacent concrete. Keep patched area continuously moist for no less than 72 hours.

I. Repair methods not specified above may be used, subject to acceptance by the Landscape Architect.

3.10 Quality Control Testing During Construction

A. The Contractor will utilize the Owner's testing laboratory to perform any or all of the tests specified below and to submit reports on these tests. Sampling and testing for quality control during the placement of concrete may include the following, as directed by the Landscape Architect:

1. Sampling Fresh Concrete: ASTM C172, but modified for slump to comply with ASTM C94.

2. Slump: ASTM C143; one test for each concrete load at point of discharge and one test of each set of compressive strength test specimens.

3. Air Content: ASTM C173 volumetric method for lightweight concrete; ASTM C231 pressure method for normal weight concrete; one test for each set of compressive strength test specimens.

4. Water Content: The water content of freshly mixed concrete will be tested each time cylinders are made and as directed by the Landscape Architect in accordance with AASHTO TP 23, Standard Method of Test for Water Content of Freshly Mixed Concrete Using Microwave Oven Drying.

5. Concrete Temperature: Test hourly when air temperature is 40 degrees F and below or when 80 degrees F and above and each time a set of compression test specimens is made.

6. Compression Test Specimen: ASTM C31; one set of 6 standard cylinders for each compressive strength test, unless otherwise directed by the Landscape Architect. Mold and store cylinders of laboratory cured test specimens except when the Landscape Architect requires field cured test specimens.

B. The strength level shall be considered satisfactory as long as the averages of all sets of 3 consecutive strength test results equal or exceed the specified strength f'c, and no individual test result falls below the specified strength f'c by more than 500 psi.

C. When the strength of field cured cylinders is less than 85 percent of companion laboratory cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in place concrete.

D. Test results will be reported to the Landscape Architect and Contractor in writing on the same day that the test is made. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in the structure, design compressive strength at 28 days, concrete mix proportions and materials, and compressive breaking strength and type of break for both 7 day tests and 28 day tests.

E. Non-Compliant Test Reports: All test reports indicating non-compliance should be provided immediately to all parties on the test report distribution list.

F. The testing service will make additional tests of in place concrete when the test results

indicate that the required strength level has not been achieved and other characteristics have not been attained in the structure, as directed by the Landscape Architect. The testing service may conduct tests to determine the adequacy of concrete by cored cylinders that comply with ASTM C42 or by such other methods as are directed by the Landscape Architect. The Contractor shall pay for such tests and any additional testing that may be required when concrete is verified to be unacceptable.

END OF SECTION

Part 1 General

1.1 Summary

A. Section Includes:

1. Steel, painted pipe and tube railings.

1.2 Coordination

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

1.3 Action Submittals

A. Product Data: For the following:

1. Manufacturer's product lines of mechanically connected railings.

2. Railing brackets.

3. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each type of exposed finish required.

1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.

2. Fittings and brackets.

3. Assembled Sample of railing system, made from full-size components, including top rail, post, handrail, and infill. Sample need not be full height.

a. Show method of connecting and finishing members at intersections.

D. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 Informational Submittals

A. Qualification Data: For testing agency.

B. Welding certificates.

C. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.

D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

E. Product Test Reports: For pipe and tube railings, for tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

F. Evaluation Reports: For post-installed anchors, from ICC-ES.

1.5 Quality Assurance

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.6 Delivery, Storage, and Handling

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

1.7 Field Conditions

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

Part 2 Products

2.1 Manufacturers

A. Steel Pipe and Tube Railings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work is subject to the meeting the requirements contained herein.

B. Source Limitations: Obtain each type of railing from single source from single manufacturer.

2.2 Performance Requirements

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design railings, including attachment to building construction.

B. Structural Performance: Railings, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ ft. applied in any direction.
b. Concentrated load of 200 lbf applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F.

2.3 Steel

A. Tubing: ASTM A 500/A 500M (cold formed).

B. Bars: Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.

C. Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.4 Fasteners

A. General: Provide the following:

1. Railings: Galvanized-steel fasteners.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.

2.5 Miscellaneous Materials

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

1. For aluminum railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

B. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

C. Etching Cleaner for Galvanized Metal: Complying with MPI#25.

D. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

E. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

F. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

G. Shop Primer for Galvanized Steel: Water-based galvanized metal primer complying with MPI#134.

H. Epoxy Intermediate Coat: Complying with MPI#77 and compatible with primer and topcoat.

I. Polyurethane Topcoat: Complying with MPI#72 and compatible with undercoat.

J. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.6 Fabrication

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that are exposed to weather in a manner that excludes water. Provide weep holes where water may accumulate.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with either welded or nonwelded connections unless otherwise indicated.

H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove flux immediately.

4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

I. Welded Connections for Steel Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding.

J. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.

K. Form Changes in Direction as Follows:

1. By bending or by inserting prefabricated elbow fittings.

2. By flush bends or by inserting prefabricated flush-elbow fittings.

L. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

M. Close exposed ends of railing members with prefabricated end fittings.

N. Fittings, and Anchors: Provide flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

O. Provide inserts and other anchorage devices for connecting railings to concrete. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

P. For railing posts set in concrete, provide steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.

2.7 Steel Finishes

A. Galvanized Railings:

1. Hot-dip galvanize exterior steel and iron railings, including hardware, after fabrication.

2. Comply with ASTM A 123/A 123M for hot-dip galvanized railings.

3. Comply with ASTM A 153/A 153M for hot-dip galvanized hardware.

4. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.

B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

C. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

D. Preparing Nongalvanized Items for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

E. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

F. High-Performance Coating: Apply epoxy intermediate and polyurethane topcoats to prime-coated surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Apply at spreading rates recommended by coating manufacturer.

1. Color: Gloss Black.

Part 3 Execution

3.1 Installation, General

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.

2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.

3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1. Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

D. Adjust railings before anchoring to ensure matching alignment at abutting joints.

E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.2 Railing Connections

A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.

B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

3.3 Anchoring Posts

A. Use welded, galvanized steel plates for anchoring to the concrete surface. Anchor plate shall be consistent with railing finish. Final design of the plates and anchorage shall be delegated to the manufacturer. Anchorage information shall be included in all shop drawing information per “Submittal Procedures, Section 01 33 00”.

3.4 Adjusting and Cleaning

A. Clean steel by washing thoroughly with clean water and soap and rinsing with clean water.

B. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material

used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

3.5 Protection

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION

Part 1 General

1.1 Work Included

A. Provide labor, materials, equipment and incidentals necessary to perform operations in connection with clearing, grubbing, and disposal of cleared and grubbed materials.

1.2 Definitions

A. Interfering or Objectionable Material: Trash, rubbish, and junk; vegetation and other organic matter, whether alive, dead, or decaying; topsoil.

B. Clearing: Removal of interfering or objectionable material lying on or protruding above ground surface.

C. Grubbing: Removal of vegetation and other organic matter including stumps, buried logs, and roots greater than 2 inches caliper to a depth of 6 inches below subgrade.

D. Scalping: Removal of sod without removing more than upper 3 inches of topsoil.

E. Stripping: Removal of topsoil remaining after applicable scalping is completed.

F. Project Limits: Areas, as shown or specified, within which Work is to be performed.

1.3 Submittals

A. Submit work plan in accordance with Section 01 33 00.

B. The limits of clearing, grubbing and stripping are defined in Section 3.3 and detailed on the project plans.

1.4 Quality Assurance

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

1.5 Scheduling and Sequencing

A. Prepare site only after adequate erosion and sediment controls are in place. Limit areas exposed uncontrolled to erosion during installation of temporary erosion and sediment controls.

Part 2 Products

(NOT USED)

Part 3 Execution

3.1 General

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Clear, grub, and strip areas actually needed for staging area or site improvements within limits shown or specified. Do not injure or deface vegetation that is not designated for removal.

3.2 Preparation

A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place. Excavate for, and remove, underground utilities indicated to be removed.

1. Arrange with utility owners to shut-off indicated utilities.

B. The clearing limits shall not extend beyond the project limits.

3.3 Limits

A. As follows, but not to extend beyond Project limits.

1. Cut:

a. Clearing and Grubbing: Within project limits.

b. Stripping: Within project limits.

2. Other Areas: As shown.

B. Remove rubbish, trash, and junk from entire area within project limits.

3.4 Clearing

A. Clear areas within limits of construction.

3.5 Site Improvements

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

3.6 Grubbing

A. Grub areas within limits of construction.

3.7 Scalping

(NOT USED)

3.8 Stripping

A. Strip areas within limits to delineated subgrade. Do not remove subsoil with topsoil.

B. Stockpile strippings, meeting requirements of Section 31 20 00 – Earth Moving for topsoil, separately from other excavated material and in areas previously determined and approved.

3.9 Tree Removal Outside Clearing Limits

(NOT USED)

3.10 Pruning

(NOT USED)

3.11 Salvage

A. Sod with commercial value may be sold to Contractor’s benefit. Promptly remove from Project site.

3.12 Disposal

A. Clearing and Grubbing Debris:

1. Dispose of debris offsite.

2. Limit offsite disposal of clearing and grubbing debris to locations that are approved by federal, state, and local authorities, and that will not be visible from Project.

B. Strippings:

1. Dispose of strippings that are unsuitable for topsoil or that exceed quantity required for topsoil offsite.

2. Stockpile topsoil in sufficient quantity to meet Project needs. Dispose of excess strippings as specified for clearing and grubbing.

END OF SECTION

Part 1 General

1.1 Scope

A. This specification section includes earthwork and related operations, including, but not limited to, clearing and grubbing the construction site, dewatering, excavating all classes of material encountered, pumping, draining and handling of water encountered in the excavations, handling, storage, transportation, and disposal of all excavated and unsuitable material, construction of fills and embankments, backfilling around structures and pipe, backfilling all trenches and pits, compacting, all sheeting, shoring and bracing, preparation of subgrades, surfacing and grading, and any other similar, incidental, or appurtenant earthwork operation which may be necessary to properly complete the work.

B. The Contractor shall provide all services, labor, materials and equipment required for all earthwork and related operations necessary or convenient to the Contractor for furnishing a complete work as shown on the Drawings or specified in these Contract Documents.

1.2 General

A. The earthwork operations shall be performed in accordance with this specification and in accordance with the recommendations of the on-site Geotechnical Engineer or Owner's Representative.

B. The elevations shown on the Drawings as existing are taken from the best existing data and are intended to give reasonable, accurate information about the existing elevations. They are not precise, and the Contractor should satisfy himself as to the exact quantities of excavation and fill required.

C. Earthwork operations shall be performed in a safe and proper manner with appropriate precautions being taken against all hazards.

D. All excavated and filled areas for structures, trenches, fills, topsoil areas, embankments and channels shall be always maintained by the Contractor in good condition until final acceptance by the Owner. All damage caused by erosion or other construction operations shall be repaired by the Contractor using material of the same type as the damaged material.

E. No subsurface investigation has been performed for the surcharge material. The Owner and Engineer give no guarantee, either expressed or implied, regarding the material to be encountered performing the excavation and earthwork on this project.

F. Earthwork within the rights-of-way of the State Department of Transportation and City of Lebanon shall be done in accordance with requirements and provisions of the permits issued by those agencies for the construction within their respective rights-of-way. Such requirements and provisions, where applicable, shall take precedence and supersede the provisions of these Specifications.

G. The Contractor shall control grading in a manner to prevent water running into excavations. Obstruction of surface drainage shall be avoided, and means shall be provided whereby storm water can be uninterrupted in existing gutters, other surface rains, or temporary drains. Material for backfill or for protection of excavation in public roads from surface drainage shall be neatly placed and kept shaped so as to cause the least possible interference with public travel. Free access must be provided to all fire hydrants, water gates, meters, and private drives.

H. No classification of excavated materials will be made except for Mass Rock Excavation and Rock Excavation Requiring Vibratory Hammer, which are defined in Section 3.4B below. Excavation and trenching work shall include the removal and subsequent handling of all materials excavated or otherwise removed in performance of the contract work, regardless of the type, character, composition, or condition thereof. It is understood that any reference to rock, earth or other materials is not an indication of classified excavation, except for Mass Rock Excavation and Rock Excavation Requiring Vibratory Hammer.

I. Tests for compaction and density shall be conducted by an independent testing laboratory selected by the Owner. Costs of compaction tests performed by an independent testing laboratory shall be paid for directly by the Owner and not as a part of this Contract. The Contractor shall make all necessary excavations and shall supply any samples of materials necessary for conducting compaction and density tests. The cost of all retests made necessary by the failure of materials to conform to the requirements of these Contract Documents shall be paid by the Contractor.

J. All earthwork operations shall comply with the requirements of OSHA Construction Standards, Part 1926, Subpart P, Excavations, Trenching, and Shoring, and Subpart O, Motor Vehicles Mechanized Equipment, and Marine Operations, and shall be conducted in a manner acceptable to the Engineer.

K. It is understood and agreed that the Contractor has made a thorough investigation of the surface and subsurface conditions of the site and any special construction problems which might arise as a result of nearby watercourses and flood plains, particularly in areas where construction activities may encounter water-bearing sands and gravels or limestone solution channels. The Contractor shall be responsible for providing all services, labor, equipment, and materials necessary or convenient to him for completing the work within the time specified in these Contract Documents.

Part 2 Products

2.1 Backfilling Materials

A. Materials: Materials for backfilling shall conform to the following requirements:

1. Common Earth Backfill: Sound, loose earth containing optimum moisture content for compaction to 90 percent of maximum density, free from all wood, vegetable matter, debris, and other objectionable material, and having scattered clods, stones, or broken concrete and pavement less than 6 inches in maximum dimension. Such backfill shall be placed a minimum of one foot above top of pipe.

2. Sand: Natural or imported sand conforming to ASTM D1073.

3. Crushed Rock: Crushed rock conforming to Section 903 of the Tennessee Department of Transportation Standard Specifications for Road and Bridge Construction. Size and class as specified on the plans.

4. Class B Concrete: Class B concrete as specified in the Section entitled "Cast-In-Place Concrete" of these Specifications.

5. Shot Rock Fill: Well-graded rock, with sufficient fines (material passing the No. 4 sieve). No more than 20% fines by weight in the total composite fill material. Placed in a manner that promotes rock-to-rock contact between larger rock and fines to fill voids between larger diameter shot rock. Maximum particle size of 18 inches. Placed in lifts not to exceed 24 inches.

Part 3 Execution

3.1 Initial Site Preparation

A. Preparatory to beginning of construction operations, the Contractor shall remove from the site all vegetative growth, trees, brush, stumps, roots, debris, and any of other objectionable matter, including fences, buildings, and other structures shown on the Drawings in the construction areas which are designated for removal or which, if left in place, would interfere with the proper performance or completion of the contemplated work, would impair its subsequent use, or would form obstructions therein.

B. Stumps and roots shall be grubbed and removed to a depth not less than 5 feet below grade. All holes or cavities which extend below the subgrade elevation of the proposed work shall be filled with compacted layers of crushed rock or earth backfill conforming to the requirements specified here for backfill. Organic material from clearing operations shall not be incorporated in excavation backfill or embankment material.

C. The Contractor shall exercise special precautions for the protection and preservation of trees, cultivated shrubs, sod, fences, buildings, and other structures which are located in the construction area but not within designated clearing limits as shown on the Drawings or within the limits of embankments, excavations, or proposed structures. The Contractor shall be responsible for the repair and/or replacement of any of the aforementioned items damaged by his operation or construction activities.

D. The Contractor shall remove and dispose of all excess material resulting from clearing

or site preparation operations. The Contractor shall dispose of such materials in a manner acceptable to the Engineer and at an approved location where such materials can be lawfully disposed. Burning shall not be permitted.

3.2 Dewatering

A. The Contractor shall provide and maintain at all times during construction ample means and devices with which to promptly remove and properly dispose of all water from any source entering the excavations or other parts of the work. Dewatering shall be accomplished by methods which will ensure a dry excavation and preservation of the final lines and grades of the bottoms of excavations. Methods of dewatering may include sump pumps, well points, deep wells, or other suitable methods which do not damage or weaken structures, foundations, or subgrades. Shallow excavations may be dewatered using open ditches provided such ditches are kept open and free-draining at all times. The actual dewatering methods used shall be acceptable to the Engineer.

B. Unless specifically authorized by the Engineer, no concrete or mortar shall be placed in water nor shall water be allowed to rise over newly-placed concrete or mortar for at least 24 hours after placement. No concrete structure shall be exposed to unequal hydrostatic forces until the concrete has reached its specified 28-day strength. Water shall not be allowed to rise above bedding during pipe laying operations. The Contractor shall exercise care to prevent damage to pipelines or structures resulting from flotation, undermining, or scour. Dewatering operations shall commence when ground or surface water is first encountered and shall be continuous until such times as water can safely be allowed to rise in accordance with the provisions of this section. Excavations shall be protected from the entrance of surface water to the extent possible by the use of dikes and/or covers.

C. Standby pumping equipment shall be on the job site. A minimum of one standby unit (a minimum of one for each ten in the event well points are used) shall be available for immediate installation should any pumping unit fail. The design and installation of well points or deep wells shall be suitable for the accomplishment of the work. Drawings or diagrams on proposed well point or deep well dewatering systems shall be submitted to the Engineer for review.

D. If foundation soils are disturbed or loosened by the upward seepage of water or an uncontrolled flow of water, the affected areas shall be excavated and replaced with crushed rock at no cost to the Owner.

E. The Contractor shall dispose of the water from the work in a suitable manner without damage to adjacent property. Conveyance of the water shall be such as to not interfere with traffic flow or treatment facilities operation. No water shall be drained into work built or under construction without prior consent of the Engineer. The Contractor will be held responsible for the condition of any pipe or conduit which he may use for drainage purposes, and all such pipes or conduits shall be left clean and free of sediment.

F. Sedimentation and desilting basins shall be provided as necessary or when directed

by the Engineer to prevent the entrance of excessive or injurious amounts of sand and silt from surface runoff or dewatering operations into storm drains or receiving waters. The system used for desanding or desilting the water shall be a baffled structure and shall provide not less than five minutes detention time and shall be designed to have a "flow-through" velocity not exceeding 0.2 feet per second at the anticipated peak flow. The method of desanding or desilting and the point of disposal shall be subject to the approval of the Engineer.

G. Water shall be disposed of in such a manner as not to be a menace to the public health and in accordance with applicable local, state and federal rules, regulations and permits.

H. Stone valley drains wrapped with filter fabric shall be installed as shown on the drawings as part of the project.

3.3 Sheeting, Shoring, And Bracing

A. The sides of all excavations shall be sufficiently sheeted, shored, and braced as necessary to prevent slides, cave-ins, settlement or movement of the banks, to maintain the excavation clear of all obstructions, and to provide safe working conditions. Wood or steel sheeting of approved design and type shall be used in wet, saturated or flowing ground. All sheeting, shoring, and bracing shall have sufficient strength and rigidity to withstand the pressure exerted and to maintain shape and position under all circumstances.

B. The responsibility for correctly assessing the need for sheeting and analyzing the stresses induced shall be the total responsibility of the Contractor. Since the Engineer does not dictate or determine the Contractor's sequence or limits of excavation, the Engineer assumes no responsibility for sheeting and shoring. The Contractor must employ or otherwise provide for adequate professional structural and geotechnical engineering supervision to assess the need for sheeting and shoring and design same. Results of sheeting and shoring analysis and design shall be submitted to the Engineer on request.

C. Excavations adjacent to existing or proposed buildings and structures or in paved streets or alleys shall be sheeted, shored, and braced adequately to prevent undermining beneath or subsequent settlement of such structures or pavements. Underpinning of adjacent structures shall be done when necessary to maintain structures in safe condition. Any damage to structures or pavements occurring through settlements, water or earth pressures, slides, caves, or other causes; due to failure or lack of sheeting or bracing, or due to improper bracing; or occurring through negligence or fault of the Contractor in any other manner shall be repaired by the Contractor at his own expense.

D. Sheeting, shoring, or bracing materials shall not be left in place unless otherwise specified or shown on the Drawings or ordered by the Engineer in writing. Such materials shall be removed in such manner that no danger or damage will occur to new or existing structures or property, public or private, and so that cave-ins or slides will not take place. Trench sheeting shall be left in place until backfill has been brought

to a level 12 inches above the top of the pipe. It shall then be cut off and the upper portion removed. Sheeting for structures shall be left in place until backfill has been brought to a level of 12 inches above the top of the bottom footing. It shall then be cut off and the upper portion removed.

E. All holes and voids left in the work by the removal of sheeting, shoring, or bracing shall be filled and thoroughly compacted.

3.4 Excavation

A. General

1. Excavation shall include the removal of all material from an area necessary for the construction of a utility, pipeline, structure, basin, flume, or building. Excavations shall provide adequate working space and clearances for the work to be performed therein.

2. Except where otherwise shown on the Drawings, specified herein, or authorized by the Engineer, all material excavated below the bottom of concrete walls, footings, and foundations shall be replaced, by and at the expense of the Contractor, with Class B Concrete to the lines and grades shown on the Drawings.

3. Where quicksand, soft clay, spongy, swampy, or other materials unsuitable or subgrade or foundation purposes are encountered below the excavation limits, they shall be removed and disposed of to the level of suitable material. Areas so excavated shall be backfilled with Class B Concrete or with compacted layers of crushed rock, sand, or other approved material conforming to the requirements specified herein for backfill to the lines and grades shown on the Drawings.

4. Barriers shall be placed at each end of all excavations and at such places as may be necessary along excavations to warn all pedestrian and vehicular traffic of such excavations. Lights shall also be placed along excavations from sunset each day to sunrise of the next day until the excavations are backfilled. All excavations shall be barricaded in such a manner to prevent persons from falling or walking into any excavation.

5. Prior to fill placement on excavated areas the subgrade shall be proofrolled.

B. Rock Excavation

1. Where rock is encountered remove it to a depth of one foot below final sub-grade with no points extending above this elevation. Leave rock surface so no water will be pocketed. On-site blasting will be permitted subject to approval of A/E.

2. Rock and large boulders in trenches shall be excavated over the horizontal limits of excavation and to depths as shown on the Drawings.

3. The space below grade for utilities and pipe lines shall then be backfilled to the proper grade with compacted layers of crushed rock or sand conforming to the requirements specified herein for backfill. Where pipe sewers are constructed on concrete cradles, rock shall be excavated to the bottom of the cradle as shown on the Drawings.

4. Rock under structures shall be excavated to lines and grades shown on the Drawings. Unless specified otherwise, where rock excavation has been carried below grade, the contractor shall backfill to grade with Class B concrete at his own expense.

5. Where rock foundation is obtained at grade for any one structure, the rock shall be removed for a depth of 12 inches below grade and the space below grade shall be backfilled to the proper grade with compacted layers of crushed rock conforming to the requirements specified herein for backfill.

6. Drilling and blasting operations shall be conducted with due regard for the safety of persons and property in the vicinity and in strict conformity with requirements of all ordinances, laws and regulations governing blasting and the use of explosives. Rock excavation near existing pipelines or other structures shall be conducted with the utmost care to avoid damage. Injury or damage to other structures and properties shall be promptly repaired to the satisfaction of the Owner by the Contractor at his own expense.

7. Rock excavation for all structures and adjacent trenches under this Contract and any other rock excavation directed by the Engineer shall be completed before the construction of any structure is started in the vicinity.

8. Rock Excavation Requiring Vibratory Hammer shall be classified as material that cannot be ripped by a Caterpillar D9 Dozer with a single ripper tooth. The contractor is required to coordinate with the A/E, owner’s representative and Geotechnical Engineer on the determination of the location and elevation of Rock Excavation Requiring Vibratory Hammer.

   This classified material will be measured and paid for by the cubic yard of material in the natural state according to the accepted unit price. A survey of the approved rock surface shall be performed. The Contractor shall than perform periodic pay quantity surveys for all applicable rock excavations. These surveys will serve as the basis of quantities submitted. The Contractor shall provide copies of all survey field notes, data, drawings, sketches or other information used in the determination of pay quantities on a monthly basis. All surveys are to be performed and certified by a Tennessee Registered Land Surveyor. Load counts, truck counts or other similar measurement methods will not be acceptable. The costs of the survey work is not a pay item but shall be considered incidental to Rock Excavation Requiring Vibratory Hammer and included therein.

   This price shall be full compensation for the removal and satisfactory disposal of the acceptable fill material in embankments in accordance with the Drawings and Specifications and for all work incidental thereto, including the furnishing of

all labor, materials, and equipment required to complete the item. Contractor will not be paid for rock excavated in excess of what is required for construction of project improvements in accordance with lines and grades provided in the plans and specifications.

All materials removed in this rock excavation, which are suitable for the purpose shall be used to the extent possible for backfilling embankment fills or for such other purposes as may be shown on the Drawings. All materials not used for such purposes including excess excavated materials, shall be considered as waste materials and the disposal thereof shall be made by the Contractor on site or offsite as authorized by the Owner at no additional cost to the Owner in a manner and at locations subject to the approval of the Engineer

9. Mass Rock Excavation shall be classified as material that cannot be ripped by a Caterpillar D9 Dozer with a single ripper tooth or broken down with a machine mounted Hydraulic Vibratory Hammer. The contractor is required to coordinate with the A/E, owner's representative and Geotechnical Engineer on the determination of the location and elevation of mass rock considered for payment under this bid item.

   Mass Rock Excavation that cannot be ripped or removed with a machine-mounted Hydraulic Vibratory Hammer and is classified as rock shall be measured and paid for by the cubic yard of material in the natural state according to the accepted unit price. A survey of the approved mass rock surface shall be performed. The Contractor shall than perform periodic pay quantity surveys for all applicable mass rock excavations. These surveys will serve as the basis of quantities submitted. The Contractor shall provide copies of all survey field notes, data, drawings, sketches or other information used in the determination of pay quantities on a monthly basis. All surveys are to be performed and certified by a Tennessee Registered Land Surveyor. Load counts, truck counts or other similar measurement methods will not be acceptable. The costs of the survey work is not a pay item but shall be considered incidental to Mass Rock Excavation and included therein.

   This price shall be full compensation for the removal and satisfactory disposal of the acceptable fill material in embankments in accordance with the Drawings and Specifications and for all work incidental thereto, including the furnishing of all labor, materials, and equipment required to complete the item. Contractor will not be paid for rock excavated in excess of what is required for construction of project improvements in accordance with lines and grades provided in the plans and specifications.

   All materials removed in mass rock excavation, which are suitable for the purpose shall be used to the extent possible for backfilling embankment fills or for such other purposes as may be shown on the Drawings. All materials not used for such purposes including excess excavated materials, shall be considered as waste materials and the disposal thereof shall be made by the Contractor on site or offsite as authorized by the Owner at no additional cost to the Owner in a manner and at locations subject to the approval of the Engineer.

C. Borrow Excavation

1. Wherever the backfill of excavated areas or the placement of embankments or other fills requires specified material not available at the site or material in excess of suitable material available from the authorized excavations, such material shall be obtained from other sources. This may require the opening of borrow pits at points not immediately accessible from the work. In such cases the Contractor shall make suitable arrangements with the property owner and shall pay all costs incident to the borrowed material including royalties, if any, for the use of the material. Before a borrow pit is opened, the quality and suitability of the material to be obtained from there shall be approved by the Engineer. Borrow pits shall be included in an amended SWPPP if the borrow pits are located beyond the limits of the site SWPPP coverage area. The cost to amend the SWPPP shall be paid by the contractor.

2. Borrow pits shall be cleared, grubbed and finish graded in accordance with the requirements specified herein.

D. Roadway Excavation

1. Roadway excavation shall consist of excavation for roadways and parking areas in conformity with lines, grades, cross sections, and dimensions shown on the Drawings. After shaping to line, grade, and cross section, the subgrade shall pass proofroll and be compacted to a depth of at least 6 inches to 95 percent of the maximum density at optimum water content as determined by Standard Proctor (ASTM D698). This operation shall include any reshaping and wetting required to obtain proper compaction. All soft or otherwise unsuitable material shall be removed and replaced with suitable material.

E. Trench Excavation

1. Trench excavation shall consist of the removal of materials necessary for the construction of water, sewer, and other pipelines and all appurtenant facilities including manholes, inlets, outlets, headwalls, collars, concrete saddles, piers and pipe protection called for on the Drawings.

2. Excavation for pipelines shall be made in open cut unless shown otherwise on the drawings. Trenches shall be cut true to the lines and grades shown on the Drawings or established by the Engineer on the ground. The banks of trenches shall be cut in vertical, parallel planes equidistant from the pipe centerline. From an elevation 12 inches above the top of the pipe to the bottom of the trench, the horizontal distance between vertical planes for different sizes of pipe shall not exceed those shown on the Drawings. When sheeting is used, the width of the trench shall be considered as the distance between the inside faces of the sheeting. The bottom of the trench shall be cut carefully to the required grade of the pipe except where bedding materials or cradles are shown, in which case the excavation shall extend to the bottom of the bedding or cradles as shown on the Drawings. Minimum pipe cover shall be as shown on the Drawings or specified in these Contract Documents.

3. The use of a motor-powered trenching machine will be permitted but full responsibility for the preservation, replacement, and/or repair of damage to any existing utility services and private property shall rest with the Contractor.

4. Bell holes for bell and spigot pipe and/or mechanical joint pipe shall be excavated at proper intervals so the barrel of the pipe will rest for its entire length upon the bottom of the trench. Bell holes shall be large enough to permit proper installation of all joints in the pipe. Bell holes shall not be excavated more than 10 joints ahead of pipe laying. No part of any bell or coupling shall be in contact with the trench bottom, trench walls, or granular embedment when the pipe is jointed.

5. Excavation for manholes, outlets, collars, saddles, piers, and other pipeline structures shall conform to the additional requirements specified herein for structural excavation.

6. Pipe trenches shall not be excavated more than 200 feet in advance of pipe laying and all work shall be performed to cause the least possible inconvenience to the public. Adequate temporary bridges or crossings shall be constructed and maintained where required to permit uninterrupted vehicular and pedestrian traffic.

7. Unless otherwise specified herein or shown on the Drawings, wherever pipe trenches are excavated below the elevation shown on the Drawings, the Contractor, at his own expense, shall fill the void thus made to the proper grade with Class B Concrete or with compacted layers of crushed rock or sand conforming to the requirements specified herein for backfill.

8. In all cases where materials are deposited along open trenches, they shall be placed so that no damage will result to the work and/or adjacent property in case of rain or other surface wash.

F. Structural Excavation

1. Structural excavation shall consist of the removal of all materials necessary for the construction of structures, including tanks, foundations, footings, wet wells, dry wells, box culverts, flumes, channels, buildings, and other miscellaneous structures.

2. The bottom of structural excavations shall be true to the lines and grades shown on the Drawings. Faces of excavations shall not be undercut for extended footings. Except as provided herein for excavation of unsuitable material or rock, where the excavation is carried below the grade elevation shown on the Drawings, the Contractor shall backfill the void thus made to the proper grade with Class B concrete at his own expense.

3.5 Backfilling

A. General

1. Prior to fill placement on excavated areas the subgrade shall be proofrolled in accordance with section 4.2.4 of the Geotechnical Engineering Report for Lebanon Bark by ECS Southeast, LLP dated July 19, 2021.

2. Unless otherwise specified herein, earth backfill shall be compacted as shown in the below table from Geotechnical Engineering Report for Lebanon Park by ECS Southeast, LLP dated July 19, 2021:

Table 4.3.1.2 – Structural Fill Compaction Recommendations

Subject	Requirement
Compaction Standard	Standard Proctor, ASTM D698
Required Compaction	95% of Max. Dry Density
Moisture Content	-2 to +3 % points of the soil's optimum value
Loose Thickness	8 inches prior to compaction (18-inch for shotrock fill)

3. Material that is too dry for adequate compaction shall receive a prior admix of sufficient water to secure optimum moisture content. Material having excessive water content shall not be placed at any time.

4. Unless otherwise specified herein backfill material required to be compacted shall be placed in horizontal layers not to exceed 6 inches in thickness (before compaction) and compacted in place by ramming, tamping, or rolling. Compaction shall be accomplished by power driven tools and machinery wherever possible. Compaction and consolidation of sand and crushed rock backfill shall be accomplished using vibrating equipment in a manner acceptable to the Engineer.

5. All structural subgrades for structures and pavement shall be proofrolled in accordance with section 4.2.4 of the Geotechnical Engineering Report for Lebanon Bark by ECS Southeast, LLP dated July 19, 2021.

6. Fill Compaction Control shall be in accordance with the requirements of the Geotechnical Engineering Report for Lebanon Bark by ECS Southeast, LLP dated July 19, 2021. Field density testing of fills shall be performed at the frequencies shown in Table 4.3.1.3, but not less than 2 tests per lift.

Table 4.3.1.3 Frequency of Compaction Tests in Fill Areas

Location	Frequency of Tests
Expanded Building Limits	1 test per 2,500 sq. ft. per lift
Pavement Areas	1 test per 10,000 sq. ft. per lift
Utility Trenches	1 test per 200 linear ft. per lift

B. Backfilling Trenches

1. The backfilling of sewer, water, and other pipeline trenches shall be started immediately after the construction of same has been inspected and approved by the Engineer. Structural backfill or bedding material if specified shall be placed in the trench under and on each side of the pipe in 6-inch layers for the full width of the trench and thoroughly and uniformly compacted by ramming and/or tamping to a minimum of the maximum density determined as specified herein. Select earth backfilling shall start above the class of pipe bedding as specified or shown the Drawings. Sufficient select earth backfill shall be placed around the pipe and compacted to provide a cover of not less than 12 inches over the top of the pipe. Mechanical compactors or tampers shall not be used within 12 inches of pipe. Compaction in this area shall be accomplished by hand methods. Sand or specified crushed stone bedding material shall be substituted for select earth backfill when the pipe is bituminous coated steel pipe or wrapped steel pipe or when crushed stone trench backfill is required. Backfilling shall proceed simultaneously on both sides of the pipe to prevent lateral displacement. From a point 12 inches above the pipe, the trench backfill shall be placed in loose lifts of 3-4 inches and compacted with portable compaction equipment to achieve the specified degree of compaction.

2. Caution shall be used during backfill operations for PVC or other flexible thermoplastic pipe (non-pressure or sewer pipe) to prevent pipe deformation. PVC or other flexible thermoplastic pipe (sewer pipe) shall not be subjected to roller or wheel loads until a minimum of 36 inches of backfill has been placed over the top of the pipe and a hydro hammer shall NOT be used until a minimum depth of 48 inches backfill has been placed over the top of the pipe.

3. Backfilling of PVC pressure pipe or other flexible thermoplastic pipe (water pipe) shall be as described in Paragraph 1 above.

4. In streets, alleys, across sidewalks and driveways, paved areas, and at any other places subject to vehicular traffic or other superimposed loads, washed stone backfill shall be placed and compacted from the level of 12 inches above the top of the pipe upward for the full depth of the trench, except for the top 48 inches of backfill, which shall be compacted pugmill mix. Crushed rock shall be clean, uniform-sized stone placed in lifts of 12 inches maximum and compacted by use of a hydro-hammer or approved vibratory compactor for the full depth of the trench, except for the top 48 inches of crushed rock backfill, which shall be compacted pugmill mix.

5. Trenches under concrete slabs and footings of structures shall be completely backfilled with compacted sand or crushed rock or filled with Class B concrete as shown on the Drawings.

6. In all other areas not affected by superimposed loads, common earth backfill may be placed from a level of 12 inches above the top of pipe upward for the full depth of the trench without compaction. At these places, backfill shall be neatly rounded over the trench to sufficient height to allow for settlement to grade after consolidation. In no event, however, will storm water be allowed to pond due to the backfilled trench.

7. All backfilling shall be done in such a manner that the pipe or structure over or against which it is being placed will not be disturbed or injured. Any pipe or structure injured, damaged, or moved from its proper line or grade during backfilling operations shall be removed and repaired to the satisfaction of the Engineer and then re-backfilled.

C. Backfilling Around Structures

1. Backfilling around structures shall consist of common earth backfill placed in 6-inch layers and compacted by tamping to a minimum of 90% of the maximum density determined as specified herein for the full depth of the excavation from the bottom to the finished grade. No backfill shall be placed against concrete structures until the concrete has reached its specified 28-day compressive strength. Where practical, compaction of structural backfill shall be accomplished by power-driven tamping equipment.

2. Where crushed rock mats under slabs and foundations are called for on the Drawings, the Contractor shall excavate below grade to the depth of the crushed rock mat as shown on the Drawings and shall install a compacted crushed rock bed. This shall be finished to a true line or plane and even with the subgrade of the concrete foundations, piers, footings or slabs. Before placing any crushed rock, all loose earth or debris shall be removed. This crushed rock mat shall extend 12 inches beyond all slabs and foundations or to edges of sheet piling.

3. Crushed rock mats, 12 inches or less in thickness shall be constructed of compacted layers of crushed rock conforming to Section 903.22, Size Number 67 or 57, of the Tennessee Department of Transportation, Standard Specifications for Road and Bridge Construction.

4. Crushed rock mats of thickness greater than 12 inches shall have the top 12 inches constructed of compacted layers of crushed rock as specified above. That portion below the top 12 inches shall be constructed of compacted layers of crushed rock conforming to TDOT Standard Specifications Section 903.05, Class A, Grade D.

5. Unless otherwise shown on the Drawings, the use of earth backfill to support footings, foundations, and structures shall not be permitted.

3.6 Fills and Embankments

A. Fills and embankments shall consist of all earth fills except backfills in trenches or around structures. Unless special material is specified or shown on the Drawings, material for fills and embankments shall consist of excavated material from structures or of a mixture of such excavated materials and materials borrowed from other sources by the Contractor. All material used for fills and embankments shall be free from wood, vegetable matter, debris, soft or spongy earth or clay, large rock, or other

objectionable material and shall be acceptable to the Engineer. The fill shall contain no rock fragments larger than 4 inches in any dimension. It is feasible to use weathered rock in structural fills if the placement and compaction is monitored on a full time basis by a technician experienced with the placement of weathered rock. Any soil/rock fill should be capped with a minimum of 3 feet of clean compacted soil fill to facilitate foundation and utility construction.

B. The area over which the fill or embankment is to be constructed shall first be cleared of all vegetation, debris, and other objectionable material and, if the ground is in a loose, un-compacted condition, it shall be compacted to a maximum density determined as specified herein.

C. No material shall be placed beyond the sloping lines of embankment unless so ordered by the Engineer. Material allowed to be placed beyond the lines of embankment shown on the Drawings will be compacted as required above unless otherwise authorized by the Engineer.

D. Wherever a pipe passes through a fill or embankment, the fill or embankment material shall be placed and compacted to an elevation 12 inches above the top of the pipe before the excavation of the trench begins.

3.7 Disposal of Waste and Unsuitable Materials

A. All materials removed by excavation, which are suitable for the purpose shall be used to the extent possible for backfilling pipe trenches, foundation, and footings and for making embankment fills or for such other purposes as may be shown on the Drawings. All materials not used for such purposes including excess excavated materials, shall be considered as waste materials and the disposal thereof shall be made by the Contractor on site or offsite as authorized by the Owner at no additional cost to the Owner in a manner and at locations subject to the approval of the Engineer.

B. Waste materials shall be spread in uniform layers and neatly leveled and shaped. Spoil banks shall be provided with sufficient and adequate openings to permit surface drainage of adjacent lands.

C. Unsuitable materials, consisting of wood, vegetable matter, debris, soft or spongy clay, peat, and other objectionable material so designated by the Engineer shall be removed from the work site and disposed of by the Contractor in a manner and at a location approved by the Engineer.

D. No unsuitable or waste material shall be dumped on private property unless written permission is furnished by the Owner of the property and unless a dumping permit is issued from the local jurisdiction.

3.8 Final Grading

A. After other earthwork operations have been completed, the sites of all structures, roads, and embankments shall be graded within the limits and to the elevations shown on the Drawings. Grading operations shall be so conducted that materials shall not

be removed or loosened beyond the required limits. The finished surfaces shall be left in smooth and uniform planes such as are normally obtainable from the use of hand tools. If the Contractor is able to obtain the required degree of evenness by means of mechanical equipment, he will not be required to use hand labor methods. Slopes and ditches shall be neatly trimmed and finished to slopes shown on the Drawings unless otherwise approved by the Engineer.

B. Unless otherwise specified or shown on the Drawings, all finished ground surfaces shall be graded and dressed to present a surface varying not more than plus or minus 0.05 foot as regards local humps or depressions and shall be acceptable to the Engineer.

3.9 Topsoil

A. All areas are to be planted with shrubs/groundcover and grass seed or sod. See Section 32 90 00 – Exterior Landscape, Part 2.2 – Topsoil for information.

3.10 Settlement

A. The Contractor shall be responsible for all settlement of backfill, fills, and embankments which may occur within one (1) year after final acceptance of the work by the Owner.

B. The Contractor shall make, or cause to be made, all repairs or replacement made necessary by settlement within 30 days after receipt of written notice from the Engineer or Owner.

3.11 Prevention of Blasting Damage

A. General

1. The Contractor shall be responsible for all property damage and personal injury caused by blasting for excavation work on this project. This includes events in which flying debris, air blast, or ground vibrations cause personal injury or property damage.

B. Preventing Damage by Fly-Rock

1. A qualified Explosive Engineer and experienced Powder Foreman shall be available to direct and supervise the design of the blasting work. This shall consist of selecting the correct burden, spacing and stemming dimensions for the explosives used and the rock being blasted. This includes, but is not limited to, controlling water in the blast hole and using the proper stemming. The objective is to select the optimum blast dimensions which ensure that just enough explosive is available to break the rock, and that there is no excess explosive to propel the rock fragments beyond safe limits.

2. Blasting mats and/or backfill materials shall be used for each "shot" to help confine the limits of fly-rock in populated areas.

3. Traffic and access to blasting areas shall be closed off and blasting signals audible for 2,000 feet shall be sounded in time for all workers and nearby residents to get under cover. Also, residents immediately adjacent to a blast should be notified personally before any blast occurs.

C. Preventing Damage by Air Blast

1. Design measures shall be taken to reduce or control air blast to levels below which actual damage will not occur. Microphones to which a metering device is attached to record over pressure levels shall be used to monitor air results of all blasts. These records shall be filed and maintained throughout the construction of the project.

2. The use of detonating cord on the surface shall be avoided.

3. The use of sufficient burden, spacing and stemming to prevent the premature release of explosive gases shall be required for all blasting in closely populated areas.

4. The specific gravity of stemming material shall always be equal to or greater than that of the rock, and its length equal to 0.7 of the burden. The shape of the stemming material shall be coarse and angular.

5. There should be no top priming of any holes.

6. Decking shall be used to bridge limestone cavities or other weak areas in any hole.

7. In closely populated areas, all blast shall be designed to limit the peak particle velocity to less than two inches per second.

D. Preventing Damage by Ground Vibrations

1. The Explosive Engineer and Powder Foreman shall design each "shot" to obtain the desired fragmentation without providing extra explosives which could be used to produce ground vibrations. In closely populated areas where old residential or auxiliary structures in poor condition exist, the two (2) inches per second peak particle velocity limit shall be lowered. Monitoring of these structures with seismographs shall be required and the data filed and maintained for the duration of the project.

2. Delay intervals such as millisecond caps or millisecond connectors shall be used to reduce the vibration effects of large blasts to the range of smaller charges at reduced peak particle velocity.

3. Tight confined shots that require increased powder charges shall not be attempted.

4. Excessive sub-drilling shall not be permitted.

5. In decking charges where small weights of powder are used, the inert material between decks shall be one to two feet thick.

6. The use of sensitive explosives such as straight dynamite shall not be permitted.

7. In drilling blast holes with cavities, the driller shall measure the depth and size of each cavity encountered. This log shall be used by the Powder Foreman in loading the explosive in the rock parts and filling with the stemming material in cavity parts.

8. Delay pattern shall be designed to provide maximum number of free faces which reduces the amount of energy-transfer in ground vibrations.

9. Where potential settlement of a structure is involved, a pre-split line shall be required to help reduce the peak particle velocity beneath the structure to be protected.

END OF SECTION

Part 1 General

1.1 Section Includes

A. Clearing and grubbing.

B. Excavation and disposal of all wet and dry materials (including rock) encountered that must be removed for construction purposes.

C. Sheeting, shoring, bracing, and timbering.

D. Dewatering of trenches and other excavations.

E. Pipe bedding.

F. Backfilling and tamping of trenches, foundations, and other structures.

1.2 Definitions

A. Degree of Compaction: Degree of compaction is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D698, for general soil types, abbreviated as percent laboratory maximum density.

B. Hard Materials: Weathered rock, dense consolidated deposits, or conglomerate materials which are not included in the definition of "rock" but which usually require the use of heavy excavation equipment, ripper teeth, or jack hammers for removal.

C. Rock: Solid homogeneous interlocking crystalline material with firmly cemented, laminated, or foliated masses or conglomerate deposits, neither of which can be removed without systematic drilling and blasting, drilling and the use of expansion jacks or feather wedges, or the use of backhoe-mounted pneumatic hole punchers or rock breakers; also large boulders, buried masonry, or concrete other than pavement.

1.3 Submittals

A. The following shall be submitted in accordance with Section 01 33 00 - Submittal Procedures:

B. Preconstruction Submittals - Submit 15 days prior to starting work:

1. Shoring and Sheeting Plan.

2. Dewatering work plan.

C. Test Reports – Submit copies of all laboratory and field test reports within 24 hours of the completion of the test.

1. Borrow Site Testing: Fill and backfill test.
2. Select material test.
3. Porous fill test for capillary water barrier.
4. Density tests.
5. Moisture Content Tests.

1.4 Delivery, Storage, and Handling

A. Perform in a manner to prevent contamination or segregation of materials.

1.5 Requirements for Off Site Soil

A. Soils brought in from off site for use as backfill shall be tested for petroleum hydrocarbons, BTEX, PCBs and HW characteristics (including toxicity, ignitability, corrosivity, and reactivity). Backfill shall not contain concentrations of these analytes above the appropriate State and/or EPA criteria, and shall pass the tests for HW characteristics. Determine petroleum hydrocarbon concentrations by using appropriate State protocols. Determine BTEX concentrations by using EPA SW-846.3-3 Method 5035/8260B. Perform complete TCLP in accordance with EPA SW-846.3-3 Method 1311. Perform HW characteristic tests for ignitability, corrosivity, and reactivity in accordance with accepted standard methods. Perform PCB testing in accordance with accepted standard methods for sampling and analysis of bulk solid samples. Provide borrow site testing for petroleum hydrocarbons and BTEX from a grab sample of material from the area most likely to be contaminated at the borrow site (as indicated by visual or olfactory evidence), with at least one test from each borrow site. For each borrow site, provide borrow site testing for HW characteristics from a composite sample of material, collected in accordance with standard soil sampling techniques. Do not bring material onsite until tests results have been received and approved by the Owner.

1.6 Field Measurements

A. Verify that survey bench mark and intended elevations for the Work are as shown on the drawings.

1.7 Coordination

A. Verify work associated with lower elevation utilities is complete before placing higher elevation utilities.

1.8 Quality Assurance

A. Shoring and Sheeting Plan: Submit drawings and calculations, certified by a registered professional engineer, describing the methods for shoring and sheeting of excavations. Drawings shall include material sizes and types, arrangement of members, and the sequence and method of installation and removal. Calculations shall include data and references used.

1. The Contractor is required to hire a Professional Geotechnical Engineer to provide inspection of excavations and soil/groundwater conditions throughout construction. The Geotechnical Engineer shall be responsible for performing pre-construction and periodic site visits throughout construction to assess site conditions. The Geotechnical Engineer shall update the excavation, sheeting and dewatering plans as construction progresses to reflect changing conditions and shall submit an updated plan if necessary. A written report shall be submitted, at least monthly, informing the Contractor and Owner of the status of the plan and an accounting of the Contractor's adherence to the plan addressing any present or potential problems.

B. Dewatering Work Plan: Submit procedures for accomplishing dewatering work.

C. Utilities: Movement of construction machinery and equipment over pipes and utilities during construction shall be at the Contractor's risk. Perform work adjacent to non-Owner utilities as indicated in accordance with procedures outlined by utility company. Excavation made with power-driven equipment is not permitted within two feet of known utility or subsurface construction. For work immediately adjacent to or for excavations exposing a utility or other buried obstruction, excavate by hand. Start hand excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured. Support uncovered lines or other existing work affected by the contract excavation until approval for backfill is granted by the Engineer. Report damage to utility lines or subsurface construction immediately to the Engineer.

Part 2 Products

2.1 Soil Materials

A. Satisfactory Materials: Any materials classified by ASTM D2487 as GW, GP, GM, GP-GM, GW-GM, GC,GP-GC, GM-GC, SW, or SP, free of debris, roots, wood, scrap material, vegetation, refuse, soft unsound particles, and frozen, deleterious, or objectionable materials. Unless specified otherwise, the maximum particle diameter shall be one-half the lift thickness at the intended location.

B. Unsatisfactory Materials: Materials which do not comply with the requirements for satisfactory materials. Unsatisfactory materials also include man-made fills, trash, refuse, or backfills from previous construction. Unsatisfactory material also includes material classified as satisfactory which contains root and other organic matter, frozen material, and stones larger than 3 inches. The Engineer shall be notified of any contaminated materials.

C. Backfill and Fill Material: Provide ASTM D2321 materials as listed in Tables 1, 2, and 3.

D. Topsoil: Provide as specified in Section 32 92 19 - Seeding.

2.2 Utility Bedding Material

A. Provide ASTM D2321 materials as listed in Tables 1, 2, and 3.

2.3 Borrow

A. Obtain borrow materials required in excess of those furnished from excavations from sources outside of Owner’s property.

2.4 Buried Warning and Identification Tape

A. Warning Tape for Non-metallic Piping: Metallic core or metallic-faced, acid- and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 inch minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing shall be permanent, unaffected by moisture or soil.

Warning Tape Color Codes	
Red:	Electric
Yellow:	Gas, Oil; Dangerous Materials
Orange:	Telephone and Other Communications
Blue:	Potable Water Systems
Green:	Sewer Systems
White:	Steam Systems
Gray:	Compressed Air
Purple:	Non-Potable, Reclaimed Water, Irrigation and Slurry lines

B. Warning Tape for Metallic Piping: Acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of tape shall be 0.003 inch. Tape shall have a minimum strength of 1500 psi lengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.

OR

A. Warning Tape for All Piping: Acid and alkali-resistant polyethylene plastic tape. Minimum thickness of tape shall be 0.003 inch. Provide tape on rolls, 3-inch minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing shall be permanent, unaffected by moisture or soil. Tape shall have a minimum strength of 1500 psi lengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.

Warning Tape Color Codes	
Red:	Electric
Yellow:	Gas, Oil; Dangerous Materials
Orange:	Telephone and Other Communications
Blue:	Potable Water Systems
Green:	Sewer Systems
White:	Steam Systems
Gray:	Compressed Air
Purple:	Non-Potable, Reclaimed Water, Irrigation and Slurry lines

B. Tracer Wire for Non-Metallic Piping: Tracer wire shall be a #12 AWG (minimum) copper conductor, insulated with a minimum 30 mil, high-density, high molecular weight polyethylene (HDPE) insulation, and rated for direct burial use. HDPE insulation shall be RoHS compliant and utilize virgin grade material.

Part 3 Execution

3.1 Protection

A. Shoring and Sheeting

1. Take special care to avoid damage wherever excavation is being done. Sufficiently sheet, shore, and brace the sides of all excavations to prevent slides, cave-ins, settlement, or movement of the banks and to maintain the specified trench widths. Use solid sheets in wet, saturated, or flowing ground. All sheeting, shoring, and bracing shall have enough strength and rigidity to withstand the pressures exerted, to keep the walls of the excavation properly in place, and to protect all persons and property from injury or damage. Separate payment will not be made for sheeting, shoring, and bracing, which are considered an incidental part of the excavation work.

2. Wherever employees may be exposed to moving ground or cave-ins, shore and

lay back exposed earth excavation surfaces more than 5 feet high to a stable slope, or else provide some equivalent means of protection. Effectively protect trenches less than 5 feet deep when examination of the ground indicates hazardous ground movement may be expected. Guard the walls and faces of all excavations in which employees are exposed to danger from moving ground by a shoring system, sloping of the ground, or some equivalent protection.

3. Trench excavation safety protection shall be accomplished as required by the most recent provisions of Part 1926, Subpart P - Excavations, Trenching, and Shoring of the Occupational Safety and Health Administration (OSHA) Standards and Interpretations, as may be amended. Comply with all OSHA standards in determining where and in what manner sheeting, shoring, and bracing are to be done. The sheeting, shoring, and bracing system shall be designed by a professional engineer licensed in the State of Tennessee and shall be subject to approval by the Engineer. However, such approval does not relieve the Contractor of the sole responsibility for the safety of all employees, the effectiveness of the system, and any damages or injuries resulting from the lack or inadequacy of sheeting, shoring, and bracing.

4. Where excavations are made adjacent to existing buildings or structures or in paved streets or alleys, take particular care to sheet, shore, and brace the sides of the excavation so as to prevent any undermining of or settlement beneath such structures or pavement. Underpin adjacent structures wherever necessary, with the approval of the Engineer.

5. Do not leave sheeting, shoring, or bracing materials in place unless this is called for by the Drawings, ordered by the Engineer, or deemed necessary or advisable for the safety or protection of the new or existing work or features. Remove these materials in such a manner that the new structure or any existing structures or property, whether public or private, will not be endangered or damaged and that cave-ins and slides are avoided.

6. Fill and compact all holes and voids left in the work by the removal of sheeting, shoring, or bracing as specified herein.

7. The Contractor may use a trench box, which is a prefabricated movable trench shield composed of steel plates welded to a heavy steel frame. The trench box shall be designed to provide protection equal to or greater than that of an appropriate shoring system.

8. A “Qualified Person”, as defined by OSHA regulations, shall be on-site at all times during activities requiring trench safety provisions.

B. Drainage and Dewatering

1. Provide for the collection and disposal of surface and subsurface water encountered during construction.

2. Drainage: So that construction operations progress successfully, completely drain construction site during periods of construction to keep soil materials sufficiently dry. Where applicable, the Contractor shall establish/construct storm

drainage features (ponds/basins) at the earliest stages of site development and throughout construction grade the construction area to provide positive surface water runoff away from the construction activity and/or provide temporary ditches, swales, and other drainage features and equipment as required to maintain dry soils and prevent erosion and undermining of foundations. When unsuitable working platforms for equipment operation and unsuitable soil support for subsequent construction features develop, remove unsuitable material and provide new soil material as specified herein. It is the responsibility of the Contractor to assess the soil and ground water conditions presented by the plans and specifications and to employ necessary measures to permit construction to proceed. Excavated slopes and backfill surfaces shall be protected to prevent erosion and sloughing. Excavation shall be performed so that the site, the area immediately surrounding the site, and the area affecting operations at the site shall be continually and effectively drained.

3. Dewatering:

   a. Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. French drains, sumps, ditches or trenches will not be permitted within 3 feet of the foundation of any structure, except with specific written approval, and after specific contractual provisions for restoration of the foundation area have been made. Control measures shall be taken by the time the excavation reaches the water level in order to maintain the integrity of the in situ material. While the excavation is open, the water level shall be maintained continuously, at least 2 feet below the working level.

   b. [Operate dewatering system continuously until construction work below existing water levels is complete. Submit performance records weekly.] [Measure and record performance of dewatering system at same time each day by use of observation wells or piezometers installed in conjunction with the dewatering system.] [Relieve hydrostatic head in pervious zones below subgrade elevation in layered soils to prevent uplift.]

C. Underground Utilities

1. Location of the existing utilities indicated is approximate. The Contractor shall physically verify the location and elevation of all existing utilities prior to starting construction. The Contractor shall contact the State One-Call Service and affected utilities for assistance in locating existing utilities.

D. Machinery and Equipment: Movement of construction machinery and equipment over pipes during construction shall be at the Contractor's risk. Repair, or remove and provide new pipe for existing or newly installed pipe that has been displaced or damaged.

3.2 Surface Preparation

A. Clear and grub project area in accordance with Section 31 11 00 - Clearing and Grubbing.

B. Identify required lines, levels, contours, and datum.

C. Protect plant life, lawns, and other features remaining as part of final landscaping.

D. Maintain and protect above and below grade utilities which are to remain.

3.3 Excavation

A. Excavate to contours, elevation, and dimensions indicated. Reuse excavated materials that meet the specified requirements for the material type required at the intended location. Keep excavations free from water. Excavate soil disturbed or weakened by Contractor's operations, soils softened or made unsuitable for subsequent construction due to exposure to weather. Excavations below indicated depths will not be permitted except to remove unsatisfactory material.

1. Blasting: Where permitted and allowed by the Owner and Engineer as an acceptable trenching option, blasting shall be performed in accordance with appropriate criteria established by the National Fire Protection Association 37 TAC PART 13 and all Local, County, State, and Federal codes and ordinances. The Contractor shall be responsible for obtaining all permits at no cost to the Owner. Blasting for utility excavation must be done in such a manner as to minimize the fracturing of rock beyond the required excavation. The Contractor shall consider the elevation of utilities in relation to the blasting charge and the relative alignment of existing and proposed trenches. Blasting within such areas shall be accomplished only by qualified Contractors who hold blasting licenses from a qualified agency. Any damage to existing utilities resulting from blasting shall be repaired at the Contractor’s expense. Sand shall not be used for bedding for backfill in trenches that have been blasted.

B. Wherever muck, quicksand, soft clay, swampy ground, or other material unsuitable for foundations, subgrade, or backfilling is encountered, remove it and continue excavation until suitable material is encountered. The material removed shall be disposed of in the manner described below. Then refill the areas excavated for this reason with 1 inch to 2 inch sized crushed stone up to the level of the lines, grades, and/or cross sections shown on the Drawings. The top 6 inches of this refill shall be No. 67 (TDOT) ASTM D2321 Class I crushed stone for bedding

C. Unless specified otherwise, refill excavations cut below indicated depth with bedding material and compact to 95 percent of ASTM D698maximum density. Satisfactory material removed below the depths indicated, without specific direction of the Engineer, shall be replaced with satisfactory materials to the indicated excavation grade. Determination of elevations and measurements of approved overdepth excavation of unsatisfactory material below grades indicated shall be done under the direction of the Engineer.

D. Pipe Trenches:

1. Unless the construction of lines by tunneling, jacking, or boring is called for by the Drawings or specifically authorized by the Engineer, make excavation for pipelines in open cut and true to the lines and grades shown on the Drawings or established by the Engineer on the ground. Cut the banks of trenches between vertical parallel planes equidistant from the pipe centerline. The horizontal distance between the vertical planes (or, if sheeting is used, between the inside faces of that sheeting) shall vary with the size of the pipe to be installed, but shall not be more than the distance determined by the following formula: 4/3d + 15 inches, where "d" represents the internal diameter of the pipe in inches. When approved in writing by the Engineer, the banks of trenches from the ground surface down to a depth not closer than 1 foot above the top of the pipe may be excavated to nonvertical and nonparallel planes, provided the excavation below that depth is made with vertical and parallel sides equidistant from the pipe centerline in accordance with the formula given above. Any cut made in excess of the formula 4/3d + 15 inches shall be at the expense of the Contractor and may be cause for the Engineer to require that stronger pipe and/or a higher class of bedding be used at no cost to the Owner.

2. Grade bottom of trenches to provide uniform support for each section of pipe after pipe bedding placement. Tamp if necessary to provide a firm pipe bed. Recesses shall be excavated to accommodate bells and joints so that the pipe will be uniformly supported for the entire length. Rock, where encountered, shall be excavated to a depth of at least 6 inches below the bottom of the pipe.

3. Excavate bell holes for bell and spigot pipe at proper intervals so that the barrel of the pipe will rest for its entire length upon the bottom of the trench. Bell holes shall be large enough to permit proper jointing of the pipe. Do not excavate bell holes more than 2 joints ahead of pipe laying.

4. Provide minimum depths of “Bedding Material” as defined in Tables 1, 2, and 3.

5. Do not excavate pipe trenches more than 200 feet ahead of the pipe laying, and perform all work so as to cause the least possible inconvenience to the public. Construct temporary bridges or crossings when and where the Engineer deems necessary to maintain vehicular or pedestrian traffic.

6. In all cases where materials are deposited along open trenches, place them so that in the event of rain no damage will result to the work and/or to adjacent property.

E. Hard Material and Rock

1. Any material that is encountered within the limits of the required excavation that cannot be removed except by drilling and/or blasting, including rock, boulders, masonry, hard pan, chert, shale, street and sidewalk pavements, and/or similar materials, shall be considered as unclassified excavation, and no separate payment will be made therefor.

2. Should rock be encountered in the excavation, remove it by blasting or other methods. Where blasts are made, cover the excavation with enough excavation material and/or timber or steel matting to prevent danger to life and property.

The Contractor shall secure, at his own expense, all permits required by law for blasting operations and the additional hazard insurance required. Observe all applicable laws and ordinances pertaining to blasting operations.

3. Excavate rock over the horizontal limits of excavation and to a depth of not less than 6 inches below the bottom of pipe up to 30 inches in diameter and not less than 12 inches below the bottom of larger pipes if rock extends to such depth. Then backfill the space below grade with No. 67 (TDOT) ASTM D2321 Class I crushed stone or other approved material, tamp to the proper grade, and make ready for construction.

F. Excavated Materials

1. Satisfactory excavated material required for fill or backfill shall be placed in the proper section of the permanent work required or shall be separately stockpiled if it cannot be readily placed. Satisfactory material in excess of that required for the permanent work and all unsatisfactory material shall be disposed of as specified in Paragraph "DISPOSITION OF SURPLUS MATERIAL."

3.4 Filling and Backfilling

A. Fill and backfill to contours, elevations, and dimensions indicated. Compact each lift before placing overlaying lift.

B. Backfill and Fill Material Placement for Utilities

1. Begin backfilling after the line construction is completed and then inspected and approved by the Engineer. Place this backfill simultaneously on either side of the pipe in even layers that before compaction are no more than 6 inches deep. Thoroughly and completely tamp each layer into place before placing additional layers.

C. At locations of improvements subject to damage by displacement, tamp and thoroughly compact the backfill in layers that, before compaction, are 6 inches deep. In other areas, the backfill for the upper portion of the trenches may be placed without tamping but shall be compacted to a density equivalent to that of adjacent earth material as determined by laboratory tests. Use special care to prevent the operation of backfilling equipment from causing any damage to the pipe.

D. If earth material for backfill is, in the opinion of the Engineer, too dry to allow thorough compaction, then add enough water so that the backfill can be properly compacted. Do not place earth material that the Engineer considers too wet or otherwise unsuitable.

E. Wherever excavation has been made within easements across private property, the top 1 foot of backfill material shall consist of topsoil, as defined in Section 32 92 19 - Seeding.

F. Wherever trenches have been cut across or along existing pavement and driveways, including gravel or dirt drives, temporarily pave the backfill of such trenches by placing TDOT Class A, Grade D ASTM D2321 Class I crushed stone as the top 12

inches of the backfill. Maintain this temporary pavement either until the permanent pavement is restored or until the project is accepted by the Owner.

G. Conduct backfilling around manholes, inlets, outfalls, and/or structures in the same manner as specified above for pipelines except that even greater care is necessary to prevent damage to the utility structure.

H. Do not use power operated tampers to tamp that portion of the backfill around the pipe within 1 foot above the pipe.

I. Perform backfilling so as not to disturb or injure any pipe and/or structure against which the backfill is being placed. If any pipe or structure is damaged and/or displaced during backfilling, open up the backfill and make whatever repairs are necessary, whenever directed to do so by the Engineer.

J. Backfilling and clean-up operations shall closely follow pipe laying; failure to comply with this provision will result in the Engineer requiring that the Contractor's other activities be suspended until backfilling and clean-up operations catch up with pipe laying.

K. Compaction Requirements: Under buildings and 2 times the depth of pipe beyond, and under roads and 2 times the depth beyond the shoulder, compact to 98 percent maximum density in accordance with ASTM D698. In all other locations, compact to 90 percent maximum density.

3.5 Borrow

A. Whenever the backfill of excavated areas or the placement of embankments requires more material than is available from authorized excavations, or whenever the backfill material from such excavations is unsuitable, then obtain additional material from other sources. This may require the opening of borrow pits at points accessible to the work. In such cases, make suitable arrangements with the property owner and pay all incidental costs, including any royalties, for the use of the borrowed material. Before a borrow pit is opened, the quality and suitability of its material shall be approved by the Engineer.

B. Excavate borrow pits in such a way that the remaining surfaces and slopes are reasonably smooth and that adequate drainage is provided over the entire area. Construct drainage ditches wherever necessary to provide outlets for water to the nearest natural channel, thus preventing the formation of pools in the pit area. Leave the sides of borrow pit cuts at a maximum slope of 2:1 unless otherwise directed by the Engineer.

C. Properly clear and grub borrow pits, and remove all objectionable matter from the borrow pit material before placing it in the backfill.

D. The taking of materials from borrow pits for use in the construction of backfill, fills, or embankments shall be considered an incidental part of the work; no separate payment shall be made for this.

3.6 Buried Warning and Identification Tape

A. Provide buried utility lines with utility identification tape. Bury tape 12 inches below finished grade; under pavements and slabs, bury tape 6 inches below top of subgrade.

3.7 Finish Operations

A. Grading: Finish grades as indicated within one-tenth of one foot. Grade areas to drain water away from structures. Maintain areas free of trash and debris. For existing grades that will remain but which were disturbed by Contractor's operations, grade as directed.

B. Protection of Surfaces: Protect newly backfilled, graded, and topsoiled areas from traffic, erosion, and settlements that may occur. Repair or reestablish damaged grades, elevations, or slopes.

3.8 Disposition of Surplus Material

A. Whenever practicable, all materials removed by excavation that are suitable for backfilling pipe trenches or for other purposes shown on the Drawings or directed by the Engineer shall be used for these purposes. Any materials not so used shall be considered waste materials and disposed of by the Contractor as specified below.

B. Once any part of the work is completed, properly dispose of all surplus or unused materials (including waste materials) left within the construction limits of that work. The Contractor shall dispose of these surplus and waste materials off-site in an appropriate manner in conformity with pertinent codes and ordinances. Leave the surface of the work in a neat and workmanlike condition, as described below.

C. The disposal of waste materials shall be considered an integral part of the excavation work and one for which no separate payment shall be allowed.

3.9 Field Quality Control

A. Sampling: Take the number and size of samples required to perform the following tests.

B. Testing: Perform one of each of the following tests for each material used. Provide additional tests for each source change.

1. Bedding Material and Fill and Backfill Material Testing: Test fill and backfill material in accordance with ASTM C136 for conformance to ASTM D2487 gradation limits; ASTM D1140 for material finer than the No. 200 sieve; ASTM D4318 for liquid limit and for plastic limit; ASTM D698 or ASTM D1557 for moisture density relations, as applicable.

2. Density Tests: Test density in accordance with ASTM D1556, or ASTM D6938. When ASTM D6938 density tests are used, verify density test results by performing an ASTM D1556 density test at a location already ASTM D6938

tested as specified herein. Perform an ASTM D1556 density test at the start of the job, and for every 10 ASTM D6938 density tests thereafter. Test each lift at randomly selected locations with one test per 400 linear feet in each lift.

Table 1: Backfilling and Compaction of Trenches for Pressure Pipes in Unimproved Areas

	Depth			**Material****			
Layer*	≤15" Ø	18"-38" Ø	>38" Ø	DIP	PVC	HDPE	Conc
A	4" min	6" min	12" min	I B	II	II	I B
B1	½ OD			III	II	II	III
B2	½ OD			III	II	II	III
C	6"			III	II	II	III
D	6"			IV A	II	II	IV A
E	Varies			IV A	IV A	IV A	IV A
F	12"			As specified in Section 32 92 19			

*See Figure 1.

**Bedding material to be used in wet conditions for all layers.

Table 2: Backfilling and Compaction of Trenches for Gravity Lines in Unimproved Areas

	Depth			**Material****			
Layer*	≤15" Ø	18"-38" Ø	>38" Ø	DIP	PVC	HDPE	Conc
A	4" min	6" min	12" min	I B	II	II	I B
B1	½ OD			I B	II	II	I B
B2	½ OD			III	II	II	III
C	6"			III	II	II	III
D	6"			IV A	II	II	IV A
E	Varies			IV A	IV A	IV A	IV A
F	12"			As specified in Section 32 92 19			

*See Figure 1.

**Bedding material to be used in wet conditions for all layers.

Table 3: Backfilling and Compaction of Trenches in Paved Areas

	Depth			Material			
Layer*	≤15" Ø	18"-38" Ø	>38" Ø	DIP	PVC	HDPE	Conc
A	4" min	6" min	12" min	I B	II	II	I B
B1	½ OD			I B	II	II	I B
B2	½ OD			I B	II	II	I B
C	6"			I B	II	II	I B
D	6"			I B	II	II	I B
E	Varies			I B	II	II	I B
F	12"			As required for pavement base			

*See Figure 1.

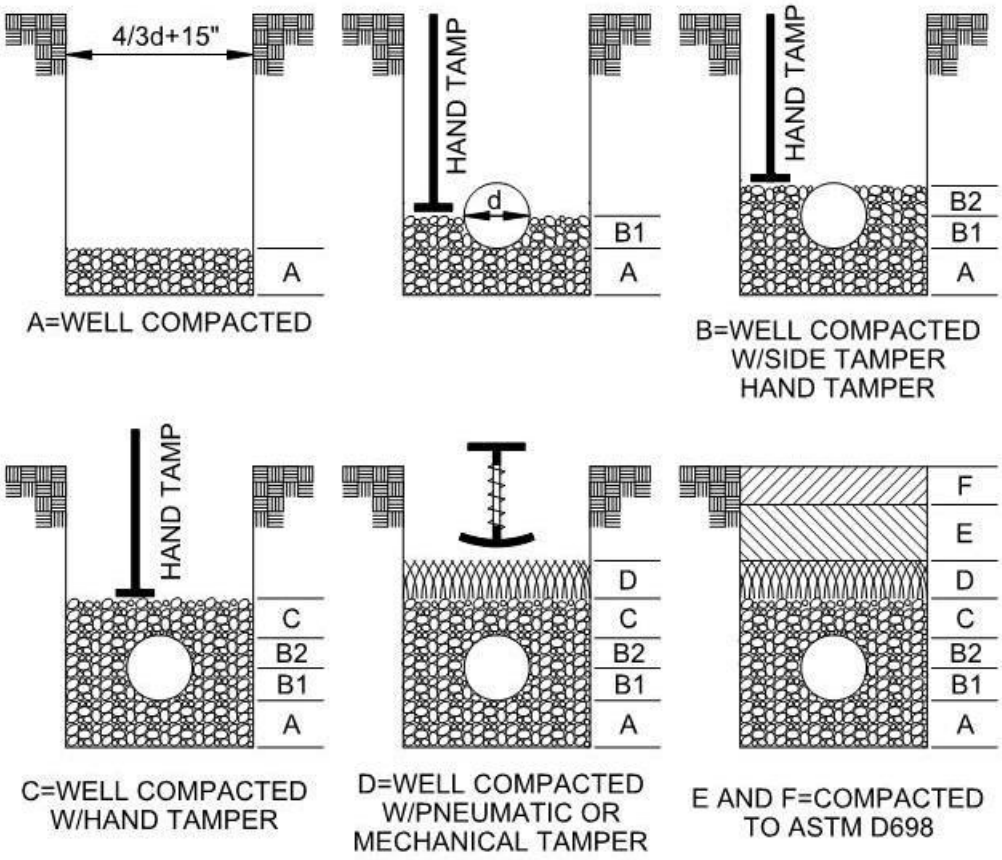

Figure 1: Backfilling and Compaction of Trenches

END OF SECTION

Part 1 General

1.1 Work Included

A. Aggregate base courses for sidewalk construction, including materials, placement, and quality control

1.2 Related Sections

A. Related sections include the following:

1. Section 31 20 00 – Earthwork.

1.3 References

A. Tennessee Department of Transportation (TDOT) Standard Specifications, latest edition.

1.4 Definitions

A. Completed Course: Compacted, unyielding, free from irregularities, with smooth, tight, even surface, true to grade, line, and cross-section.

B. Completed Lift: Compacted with uniform cross-section thickness.

1.5 Submittals

A. Informational Submittals:

1. Certified Test Results on Source Materials: Submit copies from commercial testing laboratory 14 days prior to delivery of materials to Project showing materials meeting the physical qualities specified.

2. Certified results of in-place density tests from independent testing agency.

Part 2 Products

2.1 Base Course

A. Type A Base, Grading D as specified in Section 303 of the Tennessee Department of Transportation Standard Specifications, latest edition.

2.2 Source Quality Control

A. Perform tests necessary to locate acceptable source of materials meeting specified requirements.

B. Final approval of aggregate material will be based on test results of installed materials.

C. Should separation of coarse from fine materials occur during processing or stockpiling, immediately change methods of handling materials to correct uniformity in grading.

Part 3 Execution

3.1 Subgrade Preparation

A. As Specified in 31 20 00 – Earthwork.

B. Obtain Engineer's acceptance of subgrade before placing base course or surfacing material.

C. Do not place base course or surfacing materials on soft, muddy, or frozen subgrade.

3.2 Equipment

A. Compaction Equipment: Adequate in design and number to provide compaction and to obtain specified density for each layer.

3.3 Hauling and Spreading

A. Hauling Materials:

1. Do not haul over surfacing in process of construction.

2. Loads: Of uniform capacity.

3. Maintain consistent gradation of material delivered; loads of widely varying gradations will be cause for rejection.

B. Spreading Materials:

1. Distribute material to provide required density, depth, grade, and dimensions with allowance for subsequent lifts.

2. Produce even distribution of material upon roadway or prepared surface without segregation.

3. Should segregation of coarse from fine materials occur during placing, immediately change methods of handling materials to correct uniformity in grading.

3.4 Construction of Courses

A. Untreated Aggregate Base Course:

1. Maximum Completed Lift Thickness: 6 inches.

2. Completed Course Total Thickness: As shown in the design Drawings.

3. Spread lift on preceding course to required cross-section.

4. Lightly blade and roll surface until thoroughly compacted.

5. Add keystone to achieve compaction and as required when aggregate does not compact readily due to lack of fines or natural cementing properties, as follows:

a. Spread evenly on top of base course, using spreader boxes or chip spreaders.

b. Roll surface until keystone is worked into interstices of base course without excessive displacement.

c. Continue operation until course has become thoroughly keyed, compacted, and will not creep or move under roller.

6. Blade or broom surface to maintain true line, grade, and cross-section.

3.5 Compaction

A. Commence compaction of each layer of base after spreading operations 98 percent of maximum density has been achieved as determined by ASTM D698.

B. Apply water as needed to obtain specified densities.

C. Place and compact each lift to required density before succeeding lift is placed.

D. Remove floating or loose stone from surface of preceding course before placing leveling course.

E. Surface Defects: Remedy by loosening and recompacting.

F. Finished surface shall be true to grade before proceeding with surface paving.

3.6 Surface Tolerances

A. Blade or otherwise work surfacing as necessary to maintain grade and cross-section at all times, and to keep surface smooth and thoroughly compacted.

B. Finished Surface of Untreated Aggregate Base Course: Within plus or minus 0.04 foot of grade shown at any individual point.

C. Overall Average: Within plus or minus 0.02 foot from crown and grade specified.

3.7 Field Quality Control

A. In-Place Density Tests:

1. Provide Engineer and testing laboratory at least 24 hours advance notification prior to testing.

2. Show proof that areas meet specified requirements before requesting that Engineer identify density test locations.

3.8 Cleaning

A. Remove excess material from the Work area. Clean stockpile and staging areas of all excess aggregate.

END OF SECTION

Part 1 General

1.1 Work Included

A. Concrete sidewalks.

1.2 Measurement for Payment

A. Sidewalks: The quantities of sidewalks to be paid for will be the number of square yards of each depth of sidewalk constructed as indicated.

1.3 Submittals

A. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

B. Submit manufacturer/supplier certifications for aggregate and cement. Provide the project identification name and number, date of report, name of Contractor, name of concrete testing service, source of concrete aggregates, materials manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material, and test results.

C. Submit mix design in accordance with ACI requirements. Provide for each mix design, the project name, city, general contractor, concrete strength, and it's intended use.

D. Submit 2 copies of laboratory test reports with standard deviation analysis or trial batch data. All concrete materials shall be listed.

1.4 Environmental Requirements

A. Placing During Cold Weather

1. Do not place concrete when the air temperature reaches 40 degrees F and is falling, or is already below that point.

2. Placement may begin when the air temperature reaches 35 degrees F and is rising, or is already above 40 degrees F. Make provisions to protect the concrete from freezing during the specified curing period.

3. If necessary to place concrete when the temperature of the air, aggregates, or water is below 35 degrees F, placement and protection shall be approved in writing. Approval will be contingent upon full conformance with the following provisions.

4. The underlying material shall be prepared and protected so that it is entirely free of frost when the concrete is deposited.

5. Mixing water shall be heated as necessary to result in the temperature of the in-place concrete being between 50 and 85 degrees F. Methods and equipment for heating shall be approved.

6. The aggregates shall be free of ice, snow, and frozen lumps before entering the mixer.

7. Covering and other means shall be provided for maintaining the concrete at a temperature of at least 50 degrees F for not less than 72 hours after placing, and at a temperature above freezing for the remainder of the curing period.

B. Placing During Warm Weather

1. The temperature of the concrete as placed shall not exceed 85 degrees F except where an approved retarder is used. The mixing water and/or aggregates shall be cooled, if necessary, to maintain a satisfactory placing temperature. The placing temperature shall not exceed 95 degrees F at any time.

Part 2 Products

2.1 Concrete

A. Provide concrete conforming to the applicable requirements of Section 03 30 00 CAST-IN-PLACE CONCRETE except as otherwise specified. Concrete shall have a minimum compressive strength of 3500 psi at 28 days. Maximum size of aggregate shall be one inch. Submit copies of certified delivery tickets for all concrete used in the construction.

B. Air Content

1. Mixtures shall have air content by volume of concrete of 5 to 7 percent, based on measurements made immediately after discharge from the mixer.

C. Slump

1. The concrete slump shall be 2 inches plus or minus 1 inch where determined in accordance with ASTM C143.

2.2 FIBER REINFORCEMENT

A. Synthetic Fiber: Monofilament polypropylene fibers engineered and designed for use in concrete paving, complying with ASTM C 1116, Type III, 1/2 to 1-1/2 inches long.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Monofilament Fibers:

1) Axim Italcementi Group, Inc.; FIBRASOL II P.
2) Euclid Chemical Company (The), an RPM company; Fiberstrand 100, Fiberstrand 150.
3) FORTA Corporation.
4) Grace, W. R. & Co. - Conn.; Grace MicroFiber.
5) Metalcrete Industries; Polystrand 1000.
6) QC Construction Products; QC FIBERS.

2.2 Concrete Curing Materials

A. Impervious Sheet Materials: Impervious sheet materials shall conform to ASTM C171, type optional, except that polyethylene film, if used, shall be white opaque.

B. Burlap: Burlap shall conform to AASHTO M 182.

C. White Pigmented Membrane-Forming Curing Compound: White pigmented membrane-forming curing compound shall conform to ASTM C309, Type 2.

2.3 Concrete Protection Materials

A. Concrete protection materials shall be a linseed oil mixture of equal parts, by volume, of linseed oil and either mineral spirits, naphtha, or turpentine. At the option of the Contractor, commercially prepared linseed oil mixtures, formulated specifically for application to concrete to provide protection against the action of deicing chemicals may be used, except that emulsified mixtures are not acceptable.

2.4 Joint Filler Strips

A. Contraction Joint Filler for Curb and Gutter: Contraction joint filler for curb and gutter shall consist of hard-pressed fiberboard.

B. Expansion Joint Filler, Premolded

1. Expansion joint filler, premolded, shall conform to ASTM D1751 or ASTM D1752, 1/2 inch thick, unless otherwise indicated.

2.5 Joint Sealants

A. Joint sealant, cold-applied shall conform to ASTM C920 or ASTM D5893.

2.6 Form Work

A. Design and construct form work to ensure that the finished concrete will conform accurately to the indicated dimensions, lines, and elevations, and within the tolerances specified.

B. Forms shall be of wood or steel, straight, of sufficient strength to resist springing during depositing and consolidating concrete.

1. Wood forms shall be surfaced plank, 2 inches nominal thickness, straight and free from warp, twist, loose knots, splits or other defects.

a. Wood forms shall have a nominal length of 10 feet.

b. Radius bends may be formed with 3/4 inch boards, laminated to the required thickness.

2. Steel forms shall be channel-formed sections with a flat top surface and with welded braces at each end and at not less than two intermediate points.

a. Ends of steel forms shall be interlocking and self-aligning.

b. Steel forms shall include flexible forms for radius forming, corner forms, form spreaders, and fillers.

c. Steel forms shall have a nominal length of 10 feet with a minimum of 3 welded stake pockets per form. Stake pins shall be solid steel rods with chamfered heads and pointed tips designed for use with steel forms.

C. Sidewalk Forms: Sidewalk forms shall be of a height equal to the full depth of the finished sidewalk.

Part 3 Execution

3.1 Subgrade Preparation

A. The subgrade shall be constructed to the specified grade and cross section prior to concrete placement.

B. Subgrade shall be placed and compacted in conformance with Section 32 11 23.

C. Sidewalk Subgrade: The subgrade shall be tested for grade and cross section with a template extending the full width of the sidewalk and supported between side forms.

D. Maintenance of Subgrade: The subgrade shall be maintained in a smooth, compacted condition in conformity with the required section and established grade until the concrete is placed. The subgrade shall be in a moist condition when concrete is placed. The subgrade shall be prepared and protected to produce a subgrade free from frost when the concrete is deposited.

3.2 Form Setting

A. Set forms to the indicated alignment, grade and dimensions.

B. Hold forms rigidly in place by a minimum of 3 stakes per form placed at intervals not to exceed 4 feet.

1. Corners, deep sections, and radius bends shall have additional stakes and braces, as required.

2. Clamps, spreaders, and braces shall be used where required to ensure rigidity in the forms.

C. Forms shall be removed without injuring the concrete.

1. Bars or heavy tools shall not be used against the concrete in removing the forms.

D. Any concrete found defective after form removal shall be promptly and satisfactorily repaired.

E. Forms shall be cleaned and coated with form oil each time before concrete is placed.

1. Wood forms may, instead, be thoroughly wetted with water before concrete is placed, except that with probable freezing temperatures, oiling is mandatory.

F. Sidewalks

1. Set forms for sidewalks with the upper edge true to line and grade with an allowable tolerance of 1/4 inch in any 10 foot long section.

2. After forms are set, grade and alignment shall be checked with a 10 foot straightedge.

3. Forms shall have a transverse slope as indicated with the low side adjacent to the roadway. Side forms shall not be removed for 12 hours after finishing has been completed.

3.3 Sidewalk Concrete Placement and Finishing

A. Formed Sidewalks

1. Place concrete in the forms in one layer. When consolidated and finished, the sidewalks shall be of the thickness indicated.

2. After concrete has been placed in the forms, a strike-off guided by side forms shall be used to bring the surface to proper section to be compacted.

3. The concrete shall be consolidated by tamping and spading or with an approved vibrator, and the surface shall be finished to grade with a strike off.

B. Concrete Finishing

1. After straightedging, when most of the water sheen has disappeared, and just before the concrete hardens, finish the surface with a scored surface produced by brooming with a fiber-bristle brush in a direction transverse to that of the traffic, followed by edging.

2. Edge and Joint Finishing:

   a. All slab edges, including those at formed joints, shall be finished with an edger having a radius of 1/8 inch.

   b. Transverse joint shall be edged before brooming, and the brooming shall eliminate the flat surface left by the surface face of the edger.

   c. Corners and edges which have crumbled and areas which lack sufficient mortar for proper finishing shall be cleaned and filled solidly with a properly proportioned mortar mixture and then finished.

C. Surface and Thickness Tolerances: Finished surfaces shall not vary more than 5/16 inch from the testing edge of a 10-foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

3.4 Sidewalk Joints

A. Sidewalk joints shall be constructed to divide the surface into rectangular areas.

1. Transverse contraction joints shall be spaced at a distance equal to the sidewalk width or 5 feet on centers, whichever is less, and shall be continuous across the slab.

2. Longitudinal contraction joints shall be constructed along the centerline of all sidewalks 10 feet or more in width.

3. Transverse expansion joints shall be installed at sidewalk returns and opposite expansion joints in adjoining curbs.

B. Expansion joints shall be formed about structures and features which project through or into the sidewalk pavement, using joint filler of the type, thickness, and width indicated.

1. Expansion joints are not required between sidewalks and curb that abut the sidewalk longitudinally.

C. Sidewalk Contraction Joints: The contraction joints shall be formed in the fresh concrete by cutting a groove in the top portion of the slab to a depth of at least one-fourth of the sidewalk slab thickness, using a jointer to cut the groove, or by sawing a groove in the hardened concrete with a power-driven saw, unless otherwise approved.

1. Sawed joints shall be constructed by sawing a groove in the concrete with a 1/8 inch blade to the depth indicated.

2. An ample supply of saw blades shall be available on the job before concrete placement is started, and at least one standby sawing unit in good working order shall be available at the jobsite at all times during the sawing operations.

D. Sidewalk Expansion Joints

1. Expansion joints shall be formed with 1/2 inch joint filler strips. Joint filler in expansion joints surrounding structures and features within the sidewalk may consist of preformed filler material conforming to ASTM D1752 or building paper.

2. Joint filler shall be held in place with steel pins or other devices to prevent warping of the filler during floating and finishing.

3. Immediately after finishing operations are completed, joint edges shall be rounded with an edging tool having a radius of 1/8 inch, and concrete over the joint filler shall be removed.

4. At the end of the curing period, expansion joints shall be cleaned and filled with cold-applied joint sealant.

5. Joint sealant shall be gray or stone in color.

6. The joint opening shall be thoroughly cleaned before the sealing material is placed.

7. Sealing material shall not be spilled on exposed surfaces of the concrete.

8. Concrete at the joint shall be surface dry and atmospheric and concrete temperatures shall be above 50 degrees F at the time of application of joint sealing material.

9. Excess material on exposed surfaces of the concrete shall be removed immediately and concrete surfaces cleaned.

3.5 Curing and Protection

A. General Requirements

1. Protect concrete against loss of moisture and rapid temperature changes for at least 7 days from the beginning of the curing operation.

2. Protect unhardened concrete from rain and flowing water.

3. All equipment needed for adequate curing and protection of the concrete shall be on hand and ready for use before actual concrete placement begins.

4. Protection shall be provided as necessary to prevent cracking of the pavement due to temperature changes during the curing period.

3.6 Backfilling

A. After curing, debris shall be removed and the area adjoining the concrete shall be backfilled, graded, and compacted to conform to the surrounding area in accordance with lines and grades indicated.

3.7 Protection

A. Completed concrete shall be protected from damage until accepted.

B. Repair damaged concrete and clean concrete discolored during construction. Concrete that is damaged shall be removed and reconstructed for the entire length between regularly scheduled joints. Refinishing the damaged portion will not be acceptable. Removed damaged portions shall be disposed of as directed.

3.8 Field Quality Control

A. Submit copies of all test reports within 24 hours of completion of the test.

B. General Requirements

1. Perform the inspection and tests described and meet the specified requirements for inspection details and frequency of testing.

2. Based upon the results of these inspections and tests, take the action and submit reports as required below, and any additional tests to ensure that the requirements of these specifications are met.

C. Concrete Testing

1. Strength Testing: Provide molded concrete specimens for strength tests. Samples of concrete placed each day shall be taken not less than once a day nor less than once for every 250 cubic yards of concrete. The samples for strength tests shall be taken in accordance with ASTM C172. Cylinders for acceptance shall be molded in conformance with ASTM C31 by an approved testing laboratory. Each strength test result shall be the average of 2 test cylinders from the same concrete sample tested at 28 days, unless otherwise specified or approved. Concrete specified on the basis of compressive strength will be considered satisfactory if the averages of all sets of three consecutive strength test results equal or exceed the specified strength, and no individual strength test result falls below the specified strength by more than 500 psi.

2. Air Content: Determine air content in accordance with ASTM C173 or ASTM C231. ASTM C231 shall be used with concretes and mortars made with relatively dense natural aggregates. Two tests for air content shall be made on randomly selected batches of each class of concrete placed during each shift. Additional tests shall be made when excessive variation in concrete workability is reported by the placing foreman or the Owner's inspector. If results are out of tolerance, the placing foreman shall be notified and he shall take appropriate action to have the air content corrected at the plant. Additional tests for air content will be performed on each truckload of material until such time as the air content is within the tolerance specified.

3. Slump Test: Two slump tests shall be made on randomly selected batches of each class of concrete for every 250 cubic yards, or fraction thereof, of concrete placed during each shift. Additional tests shall be performed when excessive variation in the workability of the concrete is noted or when excessive crumbling or slumping is noted along the edges of slip-formed concrete.

4. Thickness Evaluation: The anticipated thickness of the concrete shall be determined prior to placement by passing a template through the formed section or by measuring the depth of opening of the extrusion template of the curb forming machine. If a slip form paver is used for sidewalk placement, the subgrade shall be true to grade prior to concrete placement and the thickness will be determined by measuring each edge of the completed slab.

5. Surface Evaluation: The finished surface of each category of the completed work shall be uniform in color and free of blemishes and form or tool marks.

3.9 Surface Deficiencies and Corrections

A. Thickness Deficiency: When measurements indicate that the completed concrete section is deficient in thickness by more than 1/4 inch the deficient section will be removed, between regularly scheduled joints, and replaced.

B. High Areas: In areas not meeting surface smoothness and plan grade requirements, high areas shall be reduced either by rubbing the freshly finished concrete with carborundum brick and water when the concrete is less than 36 hours old or by grinding the hardened concrete with an approved surface grinding machine after the concrete is 36 hours old or more. The area corrected by grinding the surface of the hardened concrete shall not exceed 5 percent of the area of any integral slab, and the depth of grinding shall not exceed 1/4 inch. Areas requiring grade or surface smoothness corrections in excess of the limits specified above shall be removed and replaced.

C. Appearance: Exposed surfaces of the finished work will be inspected by the Owner and any deficiencies in appearance will be identified. Areas which exhibit excessive cracking, discoloration, form marks, or tool marks or which are otherwise inconsistent with the overall appearances of the work shall be removed and replaced.

END OF SECTION

Part 1 General

1.1 Summary

A. Section Includes traffic and parking lines, legends and markings on asphalt surfaces; and waterborne traffic paint.

1.2 References

A. AASHTO M247 - Standard Specification for Glass Beads Used in Traffic Paint.

B. TDOT Standard Specifications for Road and Bridge Construction, latest edition, published by the Tennessee Department of Transportation.

1.3 Performance Requirements

A. Paint Adhesion: Adhere to road surface forming smooth continuous film one minute after application.

B. Paint Drying: Tack free by touch so as not to require coning or other traffic control devices to prevent transfer by vehicle tires within 10 minutes after application.

1.4 Submittals

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit paint formulation for each type of paint and glass beads if required.

C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.5 Qualifications

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum 5 years' experience.

B. Applicator: Company specializing in performing work of this section with minimum 5 years' experience.

1.6 Delivery, Storage, and Handling

A. Invert containers several days prior to use when paint has been stored more than two

months. Minimize exposure to air when transferring paint. Seal drums and tanks when not in use.

B. Where glass beads are required, store glass beads in cool, dry place. Protect from contamination by foreign substances.

Part 2 Products

2.1 Painted Pavement Markings

A. Manufacturers:

1. Ennis Paint Co., (ennispaint.com).
2. Franklin Paint Company (franklinpaint.com).
3. EZ-Liner Industries (ezliner.com).
4. TAPCO, Inc. (tapconet.com).
5. Pervo Paint Company (pervo.com).

B. Furnish materials in accordance with Division 910 - Paint of TDOT Standard Specifications.

C. Waterborne Paint: Ready mixed, fast dry waterborne traffic paints, lead-free, non-toxic, suitable for roadway or parking lots.

2.2 EQUIPMENT

A. Machine Calibration: Calibrate machines to meet specified tolerances.

B. Other Equipment: For application of crosswalks, intersections, stop lines, legends and other miscellaneous items by walk behind stripers, hand spray or stencil trucks, apply with equipment meeting requirements of this section. Do not use hand brushes or rollers. Optionally apply glass beads by hand.

Part 3 EXECUTION

3.1 PREPARATION

A. Surface Preparation.

1. Do not apply paint to concrete surfaces until concrete has cured for 28 days.

2. Clean and dry paved surface prior to painting. Blow or sweep surface free of dirt, debris, oil, grease, or gasoline.

3. Spot location of final pavement markings as specified and as indicated on Drawings by applying pavement spots 25 feet on center.

3.2 APPLICATION

A. Agitate paint for 1-15 minutes prior to application to ensure even distribution of paint pigment.

B. Dispense paint at temperature recommended by manufacturer to wet-film thickness of 15 mils.

C. Apply markings to indicated dimensions at indicated locations.

D. Prevent splattering and over spray when applying markings.

E. Unless material is track free at end of paint application convoy, use traffic cones to protect markings from traffic until track free.

F. When vehicle crosses a marking and tracks it or when splattering or overspray occurs, eradicate affected marking and resultant tracking and apply new markings.

G. Collect and legally dispose of residues from painting operations.

3.3 PROTECTION OF FINISHED WORK

A. Protect painted pavement markings from vehicular and pedestrian traffic until paint is dry and track free. Follow manufacturer's recommendations or use minimum of 30 minutes. Consider barrier cones as satisfactory protection for materials requiring more than two minutes dry time.

3.4 SCHEDULES

A. Pavement Markings:

Items	Location
4 inch white paint	Parking lot lines
blue paint	ADA symbols, lines, and hatching

END OF SECTION

Part 1 General

1.1 Summary

A. Furnish all labor, materials, tools and equipment necessary to install a tufted, polyethylene, grass-like fabric coated with a secondary backing of high-grade polyurethane as indicated on the plans and as specified herein; including components and accessories required for a complete installation including but not limited to:

1. Removal of existing sod and topsoil and other required excavation down to subgrade for the synthetic turf field.

2. Aggregate base course, sub-base material (tested for permeability), grading and compacting.

3. Subdrainage piping below base stone layer *(Ooltewah HS, Soddy-Daisy HS)*.

4. Maintenance of existing subdrainage system *(Howard HS)*.

5. Construction of a concrete curb for attachment inside an existing track *(Ooltewah HS)*.

6. Acceptance by turf manufacturer of prepared sub-base.

7. Synthetic turf installation.

8. Coordination with related trades to ensure a complete, integrated, and timely installation.

1.2 Contractor Qualifications

A. Only Tennessee licensed contractors shall be eligible to submit a bid.

B. Contractors shall specialize in performing the work of this section and must have installed at least ten outdoor synthetic turf fields similar in size and scope to this project within the last three years.

C. Contractor shall have experience with the installation of underground sports field drainage systems for synthetic turf fields similar to those as set forth in the drawings and specifications for this project. The Contractor shall have installed such drainage systems on at least five fields within the last 3 years.

D. The Contractor shall provide an on-site construction superintendent having at least three (3) years' experience constructing athletic fields using laser grading systems and with the installation of synthetic turf fields.

E. The Contractor shall have experience with automatically controlled laser guided

grading equipment, specifically a dual slope hydraulically actuated soil plane adjustable to 1/100 of a foot. The contractor shall also use other specialized sports field equipment such as tractors, disc harrows, power rakes, etc. in construction of athletic fields.

F. The Contractor must demonstrate the ability to accomplish the work in accordance with the Owner's schedule as evidenced by their current and projected workload and the availability of equipment and resources to accomplish the work. Contractors must, in the opinion of the Owner, have sufficient experience and resources to accomplish a project of this size and scope, in a quality manner, within the Owner's schedule.

1.3 Submittals

A. Contractor Qualifications: Bidders shall submit a qualifications statement as part of Tab 1 within the RFP. The Owner will evaluate the qualification statement and render a decision with regard to whether the bidder meets the minimum qualifications required to be eligible to be considered as a responsive bidder. Bids received which do not include a fully completed Qualifications Statement will not be considered. The decision with regard to whether a Contractor is qualified or not lies solely with the Owner.

B. Substitutions: Substitution for other products specified herein is acceptable if in compliance with all requirements of these specifications. Submit alternate products to the Owner for approval a minimum of 8 days prior to the bid date; requests received after this time will not be considered. No substitutions will be considered for synthetic turf products which do not meet the Minimum Synthetic Turf Properties as set forth in Section 2.1-B.

C. Synthetic Turf Shop Drawings:

1. Indicate field layout; field marking plan and details for the specified sports; roll/seaming layout; methods of attachment, field openings and perimeter conditions.

2. Cross section indicating infill materials with specific system dimensions of the materials to be used.

3. Show installation methods and construction indicating field verified conditions, clearances, measurements, methods of attachment, field openings, perimeter conditions, terminations, drainage.

4. Proposed locations of all seams in fabric surfacing. Show installation methods and construction.

5. Field lining and marking - Submit a complete scale and dimensional drawing of inlaid or tufted-in field lines and marking boundaries.

6. Logos – Submit a complete scale and dimensional drawing of proposed logos to be placed on the field.

D. Synthetic Turf Product Data:

1. Submit manufacturer's catalog cuts, material safety data sheets (MSDS), brochures, specifications; preparation and installation instructions and recommendations; storage, handling requirements and recommendations.

2. Submit fiber manufacturer's name, type of fiber and composition of fiber.

3. Submit data in sufficient detail to indicate compliance with the contract documents.

4. Submit manufacturer's instructions for installation.

5. Submit manufacturer's instructions for maintenance for the proper care and preventative maintenance of the synthetic turf system, including painting and markings.

6. Samples:

a. 12 x 12 inches sample of the exact synthetic turf that is proposed to meet the project specifications.

b. Infill mix in accordance with project specifications.

E. Synthetic Turf Product Certifications:

1. Submit manufacturer’s certification that products and materials comply with requirements of the specifications. It is the responsibility of the Bidder to prove that any substitution is equal to or greater than the criteria specified herein.

2. Submit test results indicating compliance with Reference Standards.

3. Project Record Documents: Record actual locations of seams, drains and other pertinent information.

4. Warranties: Submit warranty and ensure that forms have been completed in Owner’s name and registered with approved manufacturer.

5. Testing data to the Owner to substantiate that the finished field meets the required shock attenuation.

6. Maintenance and Operations Data: At the completion of the project submit 3 complete sets, in manual form, of all the manufacturer’s recommended procedures and materials for, but not limited to general maintenance, line/marking installation, small repair procedures, cleaning, etc.

F. Subsurface Drainage System *(Ooltewah and Soddy-Daisy HS only)*:

1. Submit permeability laboratory test data for all grades of synthetic turf base stone prior to stone installation.

2. Submit product data on all subsurface drain components including fabric, HDPE pipe, fittings, etc.

G. Synthetic Turf Base

1. Submit field survey prepared by a Tennessee licensed surveyor of the finished base stone surface for approval prior to proceeding with turf installation demonstrating compliance with the specified field slopes.

2. Submit synthetic turf manufacturer's written acceptance of the base prior to synthetic turf fabric installation.

3. Submit field compaction tests of finished base stone.

H. Synthetic Turf Groomer

1. Submit turf manufacturer recommended groomer. One groomer shall be included with the cost of the turf installation for each field.

I. Submittals are to be submitted to the Landscape Architect.

1.4 Quality Assurance

A. Manufacturer Qualifications. Company specializing in manufacturing products specified in this section. The turf manufacturer shall be experienced in the manufacture in the United States of America of specified type of infilled slit-film synthetic grass system for a minimum of 10 years and have manufactured a minimum of 300 fields over this time period. Obtain synthetic turf through one source from a single manufacturer; turf shall be specifically manufactured for this project.

B. All components and their installation method shall be designed and manufactured for use on outdoor athletic fields.

C. The materials as hereinafter specified, should be able to withstand full climatic exposure, be resistant to insect infestation, rot, fungus and mildew; to ultra-violet light and heat degradation, and shall have the basic characteristic of flow-through drainage allowing free movement of surface run-off through the turf and directly into prepared granular base and into the field drainage system.

D. Installer: The Contractor shall be responsible for the complete synthetic turf field including laser grading and installation of the base, drainage, concrete curb and synthetic turf and infill. However, the Contractor may subcontract the installation of the synthetic turf fabric and infill to a company licensed and approved by the turf manufacturer. The Contractor and/or the installation sub-contractor shall specialize in performing the work of this section. The Contractor shall provide competent workmen skilled in this specific type of synthetic grass installation.

1. The designated Supervisory Personnel on the project shall be certified, in writing by the turf manufacturer, as competent in the installation of specified

slit-film material, including sewing or gluing seams and proper installation of the infill mixture.

2. Installer shall be certified by the manufacturer and licensed.

3. The installer supervisor shall have a minimum of 3 years' experience as a supervisor of synthetic turf installations.

4. Synthetic Turf Fabric Pre-Installation Conference: Conduct conference at project site at time to be determined by the Owner. Review methods and procedures related to installation including, but not limited to, the following:

5. Inspect and discuss existing conditions and preparatory work performed under other contracts.

6. In addition to the Contractor and the installer, arrange for the attendance of installers affected by the Work including the Owner's representative.

7. The Contractor shall verify special conditions required for the installation of the system.

8. The Contractor shall notify the Landscape Architect of any discrepancies.

1.5 Delivery, Storage, and Handling

A. Prevent contact with materials that may cause dysfunction.

B. Deliver and store components with labels intact and legible.

C. Store materials/components in a safe place, under cover, and elevated above grade.

D. Protect from damage during delivery, storage, handling and installation. Protect from damage by other trades.

E. Inspect all delivered materials and products to ensure they are undamaged and in good condition.

F. Comply with manufacturer's recommendations.

G. Installation of the turf fabric shall commence within a minimum of 2 weeks of delivery of the fabric to the job site.

1.6 Sequencing and Scheduling

A. Coordinate the Work with installation of work of related trades as the Work proceeds.

1. Sequence the Work in order to prevent deterioration of installed system.

1.7 Warranty and Guarantee

A. The Contractor shall provide a warranty to the Owner that covers defects in materials and workmanship of the synthetic turf for a period of eight (8) years from the date of substantial completion. The synthetic turf manufacturer must verify that their representative has inspected the installation and that the work conforms to the manufacturer's requirements. The manufacturer's warranty shall include general wear and damage caused from UV degradation. Other items that must be addressed include the following:

1. Acceptable uses for the field(s)
2. Fading
3. Color match with the specifications
4. Excessive fiber wear
5. Wrinkling and panel movement
6. Shock absorbency (Gmax)
7. Seam integrity
8. Drainage (through the turf only)
9. Flammability
10. Response time required for repairs/replacement

B. The warranty shall specifically exclude vandalism, and acts of God beyond the control of the Owner, Manufacturer or the Installer. The warranty shall be fully third party insured; pre-paid for the entire 8 year term and be non-prorated. The Contractor shall provide a warranty to the Owner that covers defects in the installation workmanship, and further warrant that the installation was done in accordance with both the manufacturer's recommendations and any written directives of the manufacturer's representative. Prior to final payment for the synthetic turf, the Contractor shall submit to Owner notification in writing that the field is officially added to the annual policy coverage, guaranteeing the warranty to the Owner. The insurance policy must be underwritten by an “AM Best” A- rated or greater carrier and must reflect the following values:

1. Pre-Paid 8-year insured warranty.
2. Insured Warranty Coverage must be provided in the form of 1 single policy
3. Minimum maximum per claim coverage amount of $5,000,000.
4. Minimum of fifteen million dollar ($15,000,000) annual aggregate for all warranties issued during each 12 month period of the 8 year warranty.

5. Must cover full 100% replacement value of total square footage installed, minimum of $7.00 per sq ft. (in case of complete product failure, which will include removal and disposal of the existing surface)

6. Policies that include self-insurance or self-retention clauses shall not be considered.

7. Policy cannot include any form of deductible amount.

8. Sample policy must be provided at time contract award to prove that policy is in force. A letter from an agent or a sample Certificate of Insurance will not be acceptable.

C. The synthetic turf system must maintain a G-max of less than 175 per ASTM F 355 for the life of the Warranty.

1.8 Maintenance Service

A. Contractor shall train the Owner's facility maintenance staff in the use of the turf manufacturer's recommended maintenance equipment.

B. Installer shall provide written maintenance guidelines to the facility maintenance staff.

1.9 Materials and Products

A. Acceptable turf manufacturers and product:

1. Shaw Sports Turf – 866-703-4004 – www.shawsportsturf.com

2. AstroTurf – 706-537-9940 – www.astroturf.com

3. FieldTurf – 404-556-8265 – www.fieldturf.com

4. Approved Equal

B. Synthetic turf system materials shall consist of the following:

1. Carpet made of a tufted, polyethylene, grass-like fabric coated with a secondary backing of high-grade polyurethane.

2. Infill: Controlled mixture of graded sand and crumb rubber that partially covers the carpet.

3. Glue, thread, seaming fabric and other materials used to install and mark the synthetic turf as recommended by the manufacturer.

C. The installed synthetic turf shall have the following minimum properties:

Minimum Synthetic Turf Properties

Property	Standard	Specification
Average Pile Yarn Weight	ASTM D 5848	39-43 oz/square yard
Average Total Weight	ASTM D 5848	60-70 oz/square yard
Secondary Backing Weight	ASTM D 5848	17-23 oz/square yard
Primary Backing	ASTM D 5848	7-9 oz/square yard
Average Tuft Length	ASTM D 5823	2”
Stitches Per Inch	ASTM D 5793	2.4
[1]Tufting Gauge	ASTM D 5793	1/2” maximum
Tuft Bind	ASTM D 1335	>10 lbs
Grab Tear (L/W)	ASTM D 5034	>200 lbs length >200 lbs width
Yarn Denier (primary fiber)	ASTM D 1577	7,200
Yarn Thickness	ASTM D 3218	300 Microns
Yarn Elongation	ASTM D 2256	>30%
Surface Flammability	ASTM D 2859	8 of 8 PASS
Permeability	ASTM F 1551	25” Per Hour
Infilltrometer	ASTM D 3885	>25
Melt Point	ASTM D 789	248 Degrees F
Gmax	ASTM F 355	<125 at installation <175 life of warranty
[1]Infill		
Crumb Rubber	ASTM F 3188	3.0 lbs/square foot
Sand		1.3 lbs/square foot
Rubber Granule Composition		All black SBR
Rubber Granule Shape		Spherical
Rubber Sieve Analysis	ASTM D 5644	0.85-2.0mm

Sand Granule Shape	ASTM D 442	Semi-round to rounded angularity
Sand Sieve Analysis	ASTM E 11	0.85-2.0mm

D. Carpet shall consist of a tufted, polyethylene, grass-like fabric coated with a secondary backing of high-grade polyurethane. Carpet Rolls shall be 15’ wide rolls. Rolls shall be long enough to go from field sideline to sideline.

E. The pile surface shall provide good traction in all types of weather with the use of conventional sneaker type shoes, composition mold sole athletic shoes, baseball spikes and screw-on football spikes.

F. The pile surface shall be suitable for both temporary and permanent line markings using acrylic paint, as per the manufacturer’s recommendations.

G. All adhesives used in bonding the seams shall be resistant to moisture, bacteria and fungus attacks, and resistant to ultraviolet radiation. The adhesive shall be made especially for the adhesion of synthetic turf seams.

H. The entire turf system may be protected with a factory-applied antimicrobial treatment.

I. Infill materials shall be approved by the manufacturer.

1. Infill shall consist of a resilient layered granular system, comprising selected and graded dust-free silica sand and recycled crumb rubber crumb free of belting fabric and/or wire.

2. The sand component of the infill shall represent 40% of the total infill, by volume. Sand must be clean, sub-angular silica sand passing a #20-#40 sieve.

3. The crumb rubber component shall be ambient SBR rubber passing a #10-#20 sieve.

J. Thread and/or glue for seaming of turf shall be as recommended by the synthetic turf manufacturer.

K. Glue and seaming fabric for inlaying lines and markings shall be as recommended by the synthetic turf manufacturer.

L. Perimeter edge details required for the system shall be as detailed and recommended by the manufacturer, and as approved by the manufacturer.

1.10 Fabric Surface

A. The pile surface shall resemble freshly mown natural grass in appearance, texture and color.

B. The pile surface shall be nominally uniform in length.

C. The pile fiber angle shall be 90 degrees ± 15 degrees, measured from the horizontal after installation of the infill material.

D. The entire system shall be resistant to weather, insects, rot, mildew and fungus growth and will be non-allergic and non-toxic.

E. The synthetic turf system shall have a minimum nominal fiber length of 2”

F. The entire system shall be constructed for porous standards as specified.

G. All markings shall be tufted in-place,. It is recommended that the maximum amount of markings be factory-prefabricated into the turf system prior to shipment to site.

1.11 Aggregate Base and Drainage Materials

A. Geotextile fabric shall be Mirafi 140N or approved equal.

B. Subsurface Collector Drainage Pipe shall be ADS N-12 ST IB (or approved equal) HDPE Solid Pipe with soil tight joints. Pipe must meet ASTM F477 material specifications. Lateral spacing and collection piping shall be as shown on the drawings.

C. Subsurface Drainage 12” wide Pipe shall be Hydraway Flat Drain rectangular drain pipe (or approved equal) HDPE perforated drain panels wrapped with geotextile fabric. Pipe must meet ASTM D3350 material specifications.

D. Subsurface drain trench shall include: 2 1/2” of clean #57 stone, 1” of #89 clean stone and 1” of #10 stone (1/4” to dust) on the surface. Install clean #57 stone surrounding the subsurface collector drainage pipe.

1.12 Quality Control in Manufacturing

A. The manufacturer shall own and operate its own manufacturing plant in North America where the product shall be produced. Both tufting of the field fibers into the backing materials and coating of the turf system must be done in-house by the turf manufacturer. Outsourcing of either is unacceptable.

B. The manufacturer shall have its own, in-house laboratory where samples of turf are retained and analyzed, based on standard industry tests, performed by full-time, in-house, certified inspectors.

C. Manufacturer shall provide third party certification confirming compliance with referenced standards.

1.13 Base Installation

A. Inspect subgrades to see that they generally conform to the standards called for

elsewhere in these specifications, particularly with regard to the approximate depths required for the work. After work is completed, inspect it to ensure that all finish grading complies with design requirements.

B. In preparing the field subgrade, the Contractor shall remove and dispose of the upper, highly organic topsoil layer, if in existence, which includes the vegetation root zone. the subgrade, including any new fill material, shall be proof-rolled with a 20 to 30 ton loaded truck or other pneumatic tired vehicle of similar size and weight to locate soft, weak, or excessively wet soils. Any unsuitable material observed during proof rolling shall be undercut and replaced with suitable clean fill and compacted.

Fill material shall be free of topsoil, organics, and rock fragments larger than 2 inches. Fill shall be placed in loose lifts of 6 to 8 inches.

C. Place finished grade stakes wherever necessary to bring the work accurately to the elevations required by the drawings.

D. Till the field(s) with a disc harrow 6" - 8" into the subsurface as necessary to facilitate laser grading.

E. Remove small loose rocks, stones, and debris, using a RockHound or equivalent as required, thereby causing the subsurface soil to be reasonably free of such miscellaneous matter.

F. Laser grade the subgrade to within +/- one-half inch (1/2") of the designated slopes and elevations. Automatic laser controlled systems and equipment, specifically a dual slope hydraulically actuated soil plane adjustable to 1/100 of a foot, shall be used for laser grading. Re-compact laser graded surface as necessary to meet compaction requirements for the subgrade.

G. Install the concrete field edge around the field in accordance with the drawings and the manufacturer’s recommendations *(Ooltewah HS Only)*.

H. Install subsurface drainage components as shown on the plans *(Ooltewah and Soddy-Daisy HS Only)*.

I. Install and compact in individual lifts the base #57 stone, #89 stone and #10 stone. Laser grade each lift to provide for uniform specified thickness and meet designated slopes and elevations. The #10 stone surface lift shall be laser graded to within 1/4” of specified slopes in all directions.

J. Compaction of the aggregate base shall be 95%, in accordance with ASTM D1557 (Modified Proctor procedure).

1.14 Examination

A. Examine substrates and conditions, with Installer present, for compliance with requirements for visual installation tolerances. Proceed with installation only after satisfactory conditions have been corrected.

B. Certification of prior work: The Contractor, synthetic turf manufacturer and/or installation contractor shall perform an inspection of the field base onto which the synthetic turf system is to be installed and to examine the finished surface for required compaction, and grade tolerances. The Contractor shall provide evidence of compliance (test reports and field survey) with compaction and slope/grade tolerances through the use of a geotechnical testing firm and a licensed surveyor. The Contractor shall pay for the services of the geotechnical testing and survey firms. After any discrepancies between the required materials, application and tolerance requirements noted have been corrected, submit a written certification of acceptance by the Contractor, turf installer and manufacturer approving the base for installation of the synthetic turf system.

C. Installation of all materials shall be performed in full compliance with approved project shop drawings. Only factory trained technicians skilled in the installation of athletic caliber synthetic turf systems, working under the direct supervision of the manufacturer's supervisors, shall undertake the placement of the turf system. The installer's designated supervisory personnel on the project must be certified, in writing by the turf manufacturer as competent in the installation of these materials, including proper seaming and proper installation of the infill mixture. The manufacturer shall certify the installation and warranty compliance.

D. Beginning of installation of the synthetic turf means acceptance of existing base conditions by the synthetic turf installer and manufacturer.

1.15 Preparation

A. Inspect delivered field surface fabric and components immediately prior to installation. Any damaged or defective items shall be rejected. Synthetic turf system components shall be inspected for, but not limited to, the following:

1. Uniformity of product and color

2. Surface bubbles

3. Field markings

4. Logos

5. Pile height of each roll shall be measured. Any material(s) that does not meet minimum height and thickness specifications shall be rejected. Pile height shall be measured in its finished positions

6. Field Edge installation

B. Environmental Conditions. No work under this section will proceed when:

1. Ambient temperatures are below 45 degrees F.

2. Material temperatures are below 45 degrees F.

3. Surfaces are wet or damp

4. Rain is imminent or falling.

5. Conditions exist or are imminent, which will be unsuitable to installation requirements of the systems specified herein.

6. Humidity levels will be inside the limits recommended by the adhesive manufacturer to obtain optimum bonding characteristics of the surfaces.

1.16 Installation - General

A. The installation shall be performed in full compliance with approved Shop Drawings.

B. Designs, markings, layouts, and materials shall conform to all currently applicable National Federation of High School Sports rules for football and soccer, and/or other rules or standards that may apply to this type of synthetic grass installation. Designs, markings and layouts shall first be approved by the Owner in the form of final shop drawings. All markings will be in full compliance with final shop drawings.

1.17 Installation

A. Install at location(s) indicated, to comply with final shop drawings and manufacturers'/installer's instructions.

B. The Contractor shall strictly adhere to specified procedures. Any variance from these requirements shall be provided in writing, by the manufacturer's representative, and submitted to Landscape Architect, verifying that the changes do not in any way affect the Warranty. Infill materials shall be approved by the manufacturer and installed in accordance with the manufacturer's standard procedures.

C. Carpet rolls shall be installed directly over the properly prepared aggregate base. Extreme care shall be taken to avoid disturbing the aggregate base, both in regard to compaction and planarity. Repair and properly compact any disturbed areas of the aggregate base as recommended by manufacturer

D. The full width rolls shall be laid out across the field. When all of the rolls of the playing surface have been installed, the sideline areas will be installed at right angles to the playing field turf. All work shall be such that the seams shall remain as required for the duration of the warranty period at a minimum. All seam widths are to be held to a minimum and shall be traverse to the field direction. Seams shall be flat, tight and permanent with no separation or fraying.

E. The perimeter of the field shall be firmly secured to the concrete edge anchors for the life of the warranty and in accordance to project details.

F. Resilient Infill.

1. The rubber infill material shall be spot inspected and tested for conformance to sieve specifications. Any metal found in the rubber shall be cause for rejection of the rubber sack and immediate inspection of all materials.

2. The sand and rubber shall be mixed prior to placement to ensure specified sand/rubber ratio of 40/60.

3. Infill materials shall be applied in numerous thin lifts. The turf shall be brushed as the mixture is applied. The infill material shall be installed to a depth determined by the manufacturer.

4. Infill materials shall be installed to fill the voids between the fibers and allow the fibers to remain vertical and non-directional.

5. Sand/rubber infill must be placed in such a way as to minimize fiber entrapment. The infill must be uniformly applied so as to ensure uniform, predictable surface.

6. The installer's supervisory personnel must take numerous on site measurements to confirm the uniformity of the infill.

G. Striping layouts shall be accurately surveyed by the Contractor before installation of inlaid field markings.

H. Install inlays only when the surface is completely dry. Adhere all inlays securely into place. Never loose -lay and sew an inlay into place.

I. Synthetic turf shall be attached to the perimeter edge detail in accordance with the manufacturer's standard procedures.

J. Upon completion of installation, the finished field shall be inspected by the installation crew and an installation supervisor.

1.18 Adjustment and Cleaning

A. Do not permit any traffic over unprotected surface.

B. Contractor shall provide the labor, supplies, and equipment as necessary for final cleaning of surfaces and installed items.

C. All usable remnants of new material shall become the property of the Owner.

D. The Contractor shall keep the area clean throughout the project and clear of debris.

E. Surfaces, recesses, enclosures, and related spaces shall be cleaned as necessary to leave the work area in a clean, immaculate condition ready for immediate occupancy and use by the Owner.

1.19 Final Acceptance

A. Prior to final acceptance, the Contractor shall submit to the Owner three (3) copies of Maintenance Manuals, which will include all necessary instructions for the proper care and preventative maintenance of the synthetic turf system, including painting and striping.

B. The finished playing surface shall appear as mowed grass with no irregularities and shall afford excellent traction for conventional athletic shoes of all types. The finished surface shall resist abrasion and cutting from normal use.

1.20 Cleaning

A. Contractor shall provide the labor, supplies and equipment as necessary for final cleaning of surfaces and installed items. All usable remnants of new material shall become the property of the Owner. The Contractor shall keep the area clean throughout the project and clear of debris. Surfaces, recesses, enclosures, etc. shall be cleaned, as necessary, to leave the work area in a clean, immaculate condition ready for immediate occupancy and use by the Owner.

END OF SECTION

Part I General

1.1 Scope

A. The synthetic surfacing contractor shall furnish all labor, materials, equipment, supervision, and services necessary for the proper completion of all Synthetic Track Surfaced events and related work indicated on the drawings and specified herein.

B. The synthetic surfacing contractor shall refer to the drawings for the required locations of synthetic track surfacing to be installed. All quantities and dimensions shall be field verified by the synthetic surfacing contractor.

1.2 Specific Scope of Work

A Install a paved-in-place single compound polyurethane binder and SBR granules, finished with multiple sprays of 100% solids, pigment polyurethane and EPDM granules.

B. Layout and paint all track lines and event markings as required and specified by current NFSHSA and TSSAA rules.

1.3 Coordination

A. The synthetic surfacing contractor shall coordinate the work specified with the General Contractor so as to perform the work during a specified period of time and in a manner acceptable to the owner.

Part 2 Codes and Standards

2.1 Applicable Publications

A. Codes and standards follow the current guidelines set forth by the National Federation of State High School Associations (NFSHSA), the Tennessee Secondary School Athletic Association (TSSAA) and the International Amateur Athletic Federation (IAAF), along with the current material testing guidelines as published by the American Society of Testing and Materials (ASTM).

2.2 Performance Standards

The synthetic track surfacing system shall exhibit the following minimum performance standards (ASTM):

A.	Thickness:	(12-13mm) or as specified
B.	Force Reduction:	35-50%

C. Vertical Deformation: 0.6mm-2.5mm
D. Coefficient of Friction: ≥ 0.5 (47 TRRL Scale)
E. Tensile Strength: ≥ 0.5 Mpa
F. Elongation: ≥ 40%

2.3 Products/Materials

A. Basis of Design: BSS 100 Synthetic Track Surface System by Beynon (www.beynonsports.com) or Owner approved equal.

Part 3 Quality Assurance

3.1 Contractor and Manufacturer Qualifications

A. The CONTRACTOR shall be able to furnish evidence that they have been in business for a period of not less than 3 years, under the present name, and if required, furnish financial statements for each of the past 3 years.

B. The CONTRACTOR must have installed a minimum of 10 outdoor track facilities in the last 2 years using the exact, IAAF certified, synthetic track surfacing, as specified herein. with the contractor bidding this project.

C. CONTRACTOR is to provide a list of completed facilities, minimum of 10 which are certified to meet IAAF/TSSAA rules & regulations, utilizing the same product as specified.

D. The CONTRACTOR'S Supervisor must have a minimum of 5 years' experience in the installation of poured-in-place, two-component elastomeric polyurethane synthetic track surfacing.

E. The CONTRACTOR is required to provide documentation that shows the selected specified and installed product meets current IAAF Performance Standards for Synthetic Surfaced Athletics Tracks (Outdoor) and is certified in terms of the IAAF certification system as updated to present day.

F. The MANUFACTURER must have a minimum of 10 years of experience with compound two-part polyurethane for athletic surfaces.

G. The MANUFACTURER must offer a minimum of seven (7) IAAF Certified Track Systems.

H. All polyurethane components must be MANUFACTURED in the United States in an ISO 9001:2008 Certified facility to ensure the highest quality materials.

3.2 Submittals

The following submittals must be received with bid submittal:

A. Standard printed specifications of the synthetic track surfacing system to be installed on this project.

B. An affidavit attesting that the synthetic track surfacing material to be installed meets the requirements defined by the manufacturers currently published specifications and any modifications outlined in those technical specifications.

C. A synthetic track surfacing system sample, 12” x 12” in size, of the same synthetic track surfacing system to be installed on this project.

D. A list of completed facilities, including the installing supervisor, of the exact synthetic track surfacing system.

E. A current IAAF Certificate proving the product to be installed meets the current IAAF Performance Standards for Synthetic Surfaced Athletics Tracks (Outdoor).

Part 4 Materials

4.1 Primers

A. Primers must be polyurethane-based, specifically formulated to be compatible with the paved SBR base and track surfacing material.

4.2 Black SBR Granules

A. The rubber granules for the base mat shall be recycled SBR rubber, processed and chopped to 1-3mm size, containing less than 1% dust.

4.3 EPDM Granules

A. The rubber granules for the structural spray wearing coats shall be EPDM, synthetic rubber containing a minimum 20% EPDM resin, with a specific gravity of 1.5 +/- 0.1 g/cm3. The EPDM rubber shall be a red color within the manufacturer’s standard range of colors. Final color to be selected by the Owner.

4.4 Polyurethane Binder

A. Binder for the black mat shall be an MDI-based single-component, polyurethane binding agent. The binder shall not have a free TDI monomer level above 0.2% and must be solvent free. The binder must be specially

formulated for compatibility with SBR rubber crumb.

4.5 Structural Spray Coating

A. The spray coating shall be an MDI-based single-component, moisture cured, 100% solids, pigmented polyurethane, specifically formulated for compatibility with EPDM granules. The coating shall be shall be a red color within the manufacturers standard range of colors. Pigment intergraded in the field shall not be allowed. Final color to be selected by the Owner.

4.6 Line Marking Paint

A. All line and event markings shall be applied by experienced personnel the manufacturer's recommended pigmented paint compatible with the synthetic track surfacing.

Part 5 Installation

5.1 Subbase Requirements

A. Asphalt Compaction

1. The Synthetic Track Surfacing System shall be laid on an approved subbase. The General Contractor shall provide compaction test results of 92-96% for the installed subbase and asphalt surface. The asphalt cure time is 14 days for permeable surfaces and 28 days for impermeable or full pour surfaces.

2. The asphalt substrate surface shall not vary from planned cross slope by more than +/-2% with a maximum lateral slope outside to inside of 1% to 2% and a maximum slope of 0.1% in any running direction. The finished asphalt shall not vary under a 10' straight edge by more than 1/8".

3. It should be the responsibility of the asphalt-paving contractor to flood the surface immediately after the asphalt is capable of handling traffic. If, after 20 minutes of drying time, there are birdbaths evident, it shall be the responsibility of the A/E, in conjunction with the surfacing contractor, to determine the method of correction. No cold tar patching, skin patching or sand mix patching will be acceptable.

B. Asphalt Quality

1. No Recycled Asphalt Pavement (RAP) shall be used in the wear course of the asphalt mix design. The inclusion of RAP as an off-set to virgin asphalt binder results in a brittle hot-mix asphalt (HMA) with significantly lower tensile strength and fatigue resistance. The sports surfacing

contractor will not be held responsible for asphalt failures resulting from the inclusion RAP in the HMA mix design of the wear course.

2. Any oil spills (hydraulic, diesel, motor oil, etc.) must be completely removed, either by chipping out or removing and replacing with new, keyed in asphalt. The minimum depth of any asphalt replacement shall be one inch. The curing time for the asphalt base is 28 days. It shall be the responsibility of the surfacing contractor to determine if the asphalt substrate has cured sufficiently prior to the application of polyurethane surfacing system.

C. Responsibility of Others

1. It shall be the responsibility of the general contractor to determine if the asphalt substrate meets all design specifications, i.e. cross slopes, planarity and specific project criteria. After all the above conditions are met, the synthetic surfacing contractor must, in writing, accept the planarity of the asphalt receiving base, before work can commence.

5.2 Thickness

A. The thickness of the Synthetic Track Surfacing System shall be 13mm.

5.3 Equipment

A. The Synthetic Track Surfacing System components shall be processed and installed by specially designed machinery and equipment. A mechanically operated paver with variable regulated speed and thermostatically controlled screed shall be used in the installation of the base mat. The wearing course shall be installed using automatic electronic portioning, which provides continuous mixing and feeding for an accurate, quality-controlled installation.

B. No hand mixing is allowed.

5.4 Installation

A. Base Course –

1. The SBR granules shall be mixed together on site to regulate the ratio/quantity of SBR, not to exceed 82% by weight in the base mat portion of the system and shall be mixed with the SBR rubber so that a minimum of 20%, by weight, exists in the final mixture. This mixture is then mechanically installed using the paver.

B. Wearing Course

1. The 0.5 to 1.5mm EPDM granules shall be mixed with the single-

component structural spray coating. The structural spray shall be made in two uniform applications.

5.5 Site Conditions

A. Installation shall not take place if adjacent or concurrent construction generates excessive dust, abrasives or any other by-product that, in the opinion of the installer, would be harmful to the track material, until completion of such works.

B. Apply Synthetic Track Surfacing in dry weather when pavement and atmospheric temperatures are fifty (50) degrees Fahrenheit or above, and are anticipated to remain above fifty (50) degrees Fahrenheit for twenty-four (24) hours after completing application.

C. The maximum temperature cannot exceed 105 degrees at any point during a 24 - hour period.

D. Rain cannot be falling. If there is a threat of rain, work shall cease until dry conditions can be re-established on the track pavement. Work is to proceed only when adequate curing can be guaranteed by the manufacturer.

Part 6 Line Striping and Event Markings

6.1 Layout

A. Line striping and event markings shall be laid out in accordance with current IAAF and TSSAA rules.

6.2 Certification

A. Upon completion of the installation, the owner shall be supplied with all necessary computations and drawings as well as a letter of certification attesting to the accuracy of the markings.

Part 7 Guarantee

A. The Synthetic Track Surfacing System shall be fully guaranteed against faulty workmanship and material failure for a period of five (5) years from the date of acceptance.

B. Any Synthetic Track Surfacing material found to be defective as a result of faulty workmanship and/or material failure shall be replaced or repaired at no charge, upon written notification within the guarantee period.

END OF SECTION

Part 1 General

1.1 Section Includes

A. Seeding of disturbed areas.

B. Fertilizing and soil amendments, as necessary.

C. Maintenance.

1.2 References

A. U.S. Department of Agriculture (USDA)

1. AMS Seed Act - Federal Seed Act.

2. DOA SSIR 42 - Soil Survey Investigation Report No. 42, Soil Survey Laboratory Methods Manual, Version 3.0.

1.3 Definitions

A. Acceptable Stand of **Turf**: An area is considered acceptable if it is represented by a minimum of 100 seedlings per square foot of the permanent species of grass representative of the seed mixture.

1.4 Submittals

A. The following shall be submitted in accordance with Section 01 33 00 - Submittal Procedures:

1. Product Data:

a. Wood cellulose fiber mulch.

b. Fertilizer: Include physical characteristics, and recommendations.

2. Certificates:

a. Contractor shall furnish labels or certified laboratory reports from an accredited commercial seed laboratory or a state seed laboratory showing the analysis and germination of the seed to be furnished. Acceptance of the seed test reports shall not relieve the Contractor of any responsibility or liability for furnishing seed meeting the requirements of this section.

3. Test Results:

a. The Contractor shall obtain representative samples and furnish soil test certificates including textural, pH, and organic ignition analysis from the State University Agricultural Extension Service or other certified testing laboratory.

1.5 System Description

A. This work shall be performed in all disturbed areas not receiving such site improvements as paving, walks, sod, planting, etc., and shall include, but not necessarily be limited to, all seed bed preparation; the supplying and placing of soil additives, seed, and mulch wherever required by the Drawings or directed by the Landscape Architect; and maintenance.

B. Unless otherwise approved in writing by the Landscape Architect, seeding operations shall be limited to the following planting periods:

1. Spring - March 1 through May 30.

2. Late Summer/Early Fall - August 1 through October 1.

C. Seeding Requirements Table:

Area	Species	Seed Rate	Fertilizer	Limestone
Flat to Rolling Terrain with Slopes Less than 3:1	Sahara Bermudagrass	5 lbs/1000 SF	15 lbs/1000 SF	30 lbs/1000 SF

1. When seeding during March 1 through April 1 and October 1 through November 20, add an additional 3 pounds per 1,000 square feet of annual rye grass.

D. Refer to other sections for items affecting seeding. Coordinate this work with that specified by other sections for timely execution.

1.6 Delivery, Storage, and Handling

A. Delivery

1. Seed Protection: Protect from drying out and from contamination during delivery, on-site storage, and handling.

2. Fertilizer and Other Agricultural Chemicals Delivery: Deliver to the site in original, unopened containers bearing manufacturer's chemical analysis, name, trade name, trademark, and indication of conformance to state and federal laws. Instead of containers, **fertilizer** may be furnished in bulk with certificate indicating the above information.

B. Storage

1. Seed, Fertilizer Storage: Store in cool, dry locations away from contaminants.

2. Topsoil: Prior to stockpiling topsoil, treat growing vegetation with application of appropriate specified non-selective herbicide. Clear and grub existing vegetation three to four weeks prior to stockpiling topsoil.

C. Handling: Do not drop or dump materials from vehicles.

Part 2 Products

2.1 Topsoil

A. On-Site Topsoil: Use surface soil stripped and stockpiled on site and modified as necessary to meet the requirements specified for topsoil in paragraph entitled "Composition." When available, topsoil shall be existing surface soil stripped and stockpiled on-site in accordance with Section **31 20 00 - Earthwork**.

2.2 Grass Seed

A. Seed shall be delivered in new bags or bags that are sound and labeled in accordance with the U.S. Department of Agriculture Federal Seed Act.

B. All seed shall be from the last crop available at time of purchase and shall not be moldy, wet, or otherwise damaged in transit or storage.

C. Seed shall bear the growers analysis testing to 98% for purity and 90% for germination. At the discretion of the Engineer, samples of seed may be taken for check against the grower’s analysis.

D. Species, rate of seeding, fertilization, and other requirements are shown in the Seeding Requirements Table.

2.3 Fertilizer Materials

A. Fertilizer materials shall comply with applicable state, local, and federal laws concerned with their production and use.

B. Commercial fertilizer shall be a ready mixed material and shall be equivalent to the grade or grades specified in the Seeding Requirements Table. Container bags shall have the name and address of the manufacturer, the brand name, net weight, and chemical composition.

2.4 Mulch

A. Mulch shall be free from noxious weeds, mold, and other deleterious materials.

B. Straw: Stalks from oats, wheat, rye, barley, or rice. Furnish in air-dry condition and of proper consistency for placing with commercial mulch blowing equipment. Straw shall contain no fertile seed.

2.5 Mulch Binder

A. Mulch on slopes exceeding 3 to 1 ratio shall be held in place by the use of an approved mulch binder. The mulch binder shall be non-toxic to plant life and shall be acceptable to the Engineer.

2.6 Water

A. Water shall be clean, clear water free from any objectionable or harmful chemical qualities or organisms and shall be furnished by the Contractor.

Part 3 Execution

3.1 Preparation

A. Extent Of Work: Provide soil preparation (including soil conditioners as required), fertilizing, seeding, and surface topdressing of all newly graded finished earth surfaces, unless indicated otherwise, and at all areas inside or outside the limits of construction that are disturbed by the Contractor's operations.

B. Topsoil: Provide 4 inches of **on-site topsoil** to meet indicated finish grade. Over rock, provide minimum of **12** inches of topsoil. After areas have been brought to indicated finish grade, incorporate **fertilizer** into soil a minimum depth of **4** inches by disking, harrowing, tilling or other method approved by the Engineer. Remove debris and stones larger than 3/4 inch in any dimension remaining on the surface after finish grading. Correct irregularities in finish surfaces to eliminate depressions. Protect finished topsoil areas from damage by vehicular or pedestrian traffic.

C. Before beginning seeding operations in any area, complete the placing of topsoil and final grading, and have the work approved by the Owner’s Representative.

3.2 Seeding

A. Seed Application and Conditions

1. Immediately before seeding, restore soil to proper grade.

2. Do not seed when ground is muddy [frozen] [snow covered] or in an unsatisfactory condition for seeding.

3. Apply seed within twenty four hours after seedbed preparation.

4. Sow seed by approved sowing equipment. Sow one-half the seed in one direction, and sow remainder at right angles to the first sowing.

B. Seed of the specified group shall be sown as soon as preparation of the seedbed has been completed. No seed shall be sown during high winds, nor until the surface is suitable for working and is in a proper condition. Seeding shall be performed during the dates shown in the Seeding Requirements Table unless otherwise approved by the Engineer. Seed mixtures may be sown together provided they are kept in a

thoroughly mixed condition during the seeding operation. Copies of all weight tickets shall be furnished to the Engineer.

C. Seeds shall be uniformly sown by any approved mechanical method to suit the slope and size of the areas to be seeded, preferably with a broadcast type seeder, windmill hand seeder, or approved mechanical power drawn seed drills. Hydro-seeding and hydro-mulching may be used on steep embankments, provided full coverage is obtained. Care shall be taken to adjust the seeder for seeding at the proper rate before seeding operations are started and to maintain their adjustment during seeding. Seed in hoppers shall be agitated to prevent segregation of the various seeds in a seeding mixture.

D. Immediately after sowing, the seeds shall be covered and compacted to a depth of 1/8 to 3/8 inch by a cultipacker or suitable roller.

E. Leguminous seeds shall be inoculated prior to seeding with an approved and compatible nitrogen-fixing inoculated in accordance with the manufacturer's mixing instructions.

3.3 Mulching

A. All seeded areas shall be uniformly mulched in a continuous blanket immediately after seeding. The mulch shall be applied so as to permit some sunlight to penetrate and the air to circulate and at the same time shade the ground, reduce erosion, and conserve soil moisture. Approximately 25 percent of the ground shall be visible through the mulch blanket.

B. One of the following mulches shall be spread evenly over the seeded areas at the following application rates:

1.	Wood Cellulose Fiber	1,400 lbs./acre
2.	Stalks	4,000 lbs./acre
3.	Straw	4,000 lbs./acre

These rates may be adjusted at the discretion of the Engineer at no additional cost to the Owner, depending on the texture and condition of the mulch material and the characteristics of the seeded area.

C. Mulch on slopes greater than 3 to 1 ratio shall be held in place by the use of an approved mulch binder. Binder shall be thoroughly mixed and applied with the mulch. Emulsified asphalt or cutback asphalt shall be applied at the approximate rate of 5 gallons per 1,000 square feet as required to hold the mulch in place.

D. The Contractor shall cover structures, poles, fence, and appurtenances if the mulch binder is applied in such a way that it would come in contact with or discolor the structures.

E. Mulch and binder shall be applied by suitable blowing equipment at closely controlled application rates.

3.4 Watering

A. Contractor shall be responsible for maintaining the proper moisture content of the soil to ensure adequate plant growth until a satisfactory stand is obtained. If necessary, watering shall be performed to maintain adequate water content in the soil.

B. Watering shall be accomplished by hoses, tank trucks, or sprinklers in such a way to prevent erosion, excessive runoff, and overwatered spots.

3.5 Maintenance

A. Upon completion of seeding operations, the Contractor shall clear the area of all equipment, debris, and excess material and the premises shall be left in a neat and orderly condition.

B. No equipment, material storage, construction traffic, etc., will be permitted on newly seeded ground.

C. The Contractor shall maintain all seeded areas without additional payment until final acceptance of the work by the Owner. Seeding work shall be repeated on defective areas until a satisfactory uniform stand is accomplished. Damage resulting from erosion, gullies, washouts, or other causes shall be repaired by filling with topsoil, compacting, and repeating the seeding work at contractor's expense.

3.6 Field Quality Control

A. The Owner’s Representative shall inspect the seeding within 60 days after planting and determine if an acceptable stand of grass has been produced.

B. If an acceptable growth is not obtained on the first planting, reseeding and remulching will be required.

C. If the planting is less than 50 percent successful, rework the ground, refertilize, reseed, and remulch.

END OF SECTION

Part 1 General

1.1 Section Includes

A. Furnish and install storm drainage facilities including drain piping, fittings, accessories and bedding; catch basins; manholes and other facilities.

1.2 Related Sections

A. Section 31 20 00 – Earthwork

B. Section 31 23 33 – Trenching and Backfilling

1.3 Submittals

A. Submit the following in accordance with Section 01 33 00 - Submittal Procedures:

B. Action Submittals:

1. Shop Drawings: Indicate openings in inlets and junction boxes, inverts and sizes. Indicate grating type and installation.

2. Product data: Provide product data for precast structures, pipe, and pipe accessories.

C. Informational Submittals:

1. Product Data Placing Pipe: Submit printed copies of the manufacturer's recommendations for installation procedures of the material being placed, prior to installation.

2. Manufacturer’s Certificate: Certify that products meet or exceed applicable state DOT requirements.

1.4 Delivery, Storage, and Handling

A. Delivery and Storage

1. Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling.

2. Materials shall not be stored directly on the ground.

3. The inside of pipes and fittings shall be kept free of dirt and debris.

4. Before, during, and after installation, plastic pipe and fittings shall be protected from any environment that would result in damage or deterioration to the material.

5. Keep a copy of the manufacturer's instructions available at the construction site at all times and follow these instructions unless directed otherwise by the Engineer.

6. Solvents, solvent compounds, lubricants, elastomeric gaskets, and any similar materials required to install plastic pipe shall be stored in accordance with the manufacturer's recommendations and shall be discarded if the storage period exceeds the recommended shelf life. Solvents in use shall be discarded when the recommended pot life is exceeded.

B. Handling

1. Materials shall be handled in a manner that ensures delivery to the trench in sound, undamaged condition.

2. Pipe shall be carried to the trench, not dragged.

Part 2 Products

2.1 Pipe for Culverts and Storm Drains

A. Pipe for culverts and storm drains shall be of the sizes indicated and shall conform to the requirements specified.

2.2 Perforated Piping

A. Polyvinyl Chloride (PVC) Pipe: ASTM D2729.

2.3 PVC Pipe

A. Submit the pipe manufacturer's resin certification, indicating the cell classification of PVC used to manufacture the pipe, prior to installation of the pipe.

B. Type PSM PVC Pipe: ASTM D3034, Type PSM, maximum SDR 35, produced from PVC certified by the compounder as meeting the requirements of ASTM D1784, minimum cell class 12454-B.

C. Corrugated PVC Pipe: ASTM F949 produced from PVC certified by the compounder as meeting the requirements of ASTM D1784, minimum cell class 12454-B.

D. Joints shall be solvent cement or elastomeric gasket type in accordance with the specification for the pipe and as recommended by the pipe manufacturer.

2.4 Polyethylene (PE) Pipe

A. Submit the pipe manufacturer's resin certification, indicating the cell classification of PE used to manufacture the pipe, prior to installation of the pipe. The minimum cell classification for polyethylene plastic shall apply to each of the seven primary properties of the cell classification limits in accordance with ASTM D3350.

B. Corrugated PE Pipe

1. AASHTO M 294, Type S. For slow crack growth resistance, acceptance of resins shall be determined by using the notched constant ligament-stress (NCLS) test meeting the requirements of AASHTO M 294. Pipe walls shall have the following properties:

Nominal Size (inch)	Minimum Wall Area (square in/ft)	Minimum Moment of Inertia of Wall Section (in. to the 4th/in.)
12	1.5	0.024
15	1.91	0.053
18	2.34	0.062
24	3.14	0.116
30	3.92	0.163
36	4.50	0.222
42	4.69	0.543
48	5.15	0.543
54	5.67	0.800
60	6.45	0.800

C. Pipe joints shall be water tight and shall conform to the requirements in AASHTO M 294. Water tight joints shall be made using a PE coupling and rubber gaskets as recommended by the pipe manufacturer. Rubber gaskets shall conform to ASTM F477.

2.5 Drainage Structures

A. Flared End Sections: Sections shall be of a standard design fabricated from zinc coated steel sheets meeting requirements of ASTM A929/A929M.

B. Precast Reinforced Concrete Box: Manufactured in accordance with and conforming to ASTM C1433.

2.6 Miscellaneous Materials

A. Concrete

1. Unless otherwise specified, concrete and reinforced concrete shall conform to the requirements for 3,000 psi concrete under Section 03 30 00 - Cast-In-Place Concrete. The concrete mixture shall have air content by volume of

concrete, based on measurements made immediately after discharge from the mixer, of 5 to 7 percent when maximum size of coarse aggregate exceeds 1-1/2 inches. Air content shall be determined in accordance with ASTM C231. The concrete covering over steel reinforcing shall not be less than 1 inch thick for covers and not less than 1-1/2 inches thick for walls and flooring. Concrete covering deposited directly against the ground shall have a thickness of at least 3 inches between steel and ground.

2. Expansion-joint filler material shall conform to ASTM D1751, or ASTM D1752, or shall be resin-impregnated fiberboard conforming to the physical requirements of ASTM D1752.

B. Mortar: Mortar for connections to other drainage structures, and brick or block construction shall conform to ASTM C270, Type M, except that the maximum placement time shall be 1 hour. The quantity of water in the mixture shall be sufficient to produce a stiff workable mortar. Water shall be clean and free of harmful acids, alkalis, and organic impurities. The mortar shall be used within 30 minutes after the ingredients are mixed with water. The inside of the joint shall be wiped clean and finished smooth. The mortar head on the outside shall be protected from air and sun with a proper covering until satisfactorily cured.

C. Brick: Brick shall conform to ASTM C62, Grade SW; ASTM C55, Grade S-I or S-II; or ASTM C32, Grade MS. Mortar for jointing and plastering shall consist of one part portland cement and two parts fine sand. Lime may be added to the mortar in a quantity not more than 25 percent of the volume of cement. The joints shall be filled completely and shall be smooth and free from surplus mortar on the inside of the structure. Brick structures shall be plastered with 13 mm 1/2 inch of mortar over the entire outside surface of the walls. For square or rectangular structures, brick shall be laid in stretcher courses with a header course every sixth course. For round structures, brick shall be laid radially with every sixth course a stretcher course.

D. Precast Reinforced Concrete Manholes

1. Conform to ASTM C478. Joints between precast concrete risers and tops shall be made with flexible watertight, rubber-type gaskets.

E. Frame and Cover for Gratings

1. Submit certification on the ability of frame and cover or gratings to carry the imposed live load.

2. Frame and cover for gratings shall be cast gray iron, AASHTO M105, Class A; or cast ductile iron, ASTM A536, Grade 65-45-12. Weight, shape, size, and waterway openings for grates and curb inlets shall be as indicated on the plans. The word "Storm Sewer" shall be stamped or cast into covers so that it is plainly visible.

F. Flap Gates: Flap Gates shall be medium or heavy-duty with circular opening and double-hinged. Top pivot points shall be adjustable. The seat shall be one-piece cast iron with a raised section around the perimeter of the waterway opening to provide the seating face. The seating face of the seat shall be cast iron. The cover

shall be one-piece cast iron with necessary reinforcing rib, lifting eye for manual operation, and bosses to provide a pivot point connection with the links. The seating face of the cover shall be cast iron. Links or hinge arms shall be cast or ductile iron. Holes of pivot points shall be bronze bushed. All fasteners shall be either galvanized steel, bronze or stainless steel.

2.7 Steel Ladder

A. Steel ladder shall be provided where the depth of the storm drainage structure exceeds 12 feet. These ladders shall be not less than 16 inches in width, with 3/4 inch diameter rungs spaced 12 inches apart. The two stringers shall be a minimum 3/8 inch thick and 2-1/2 inches wide. Ladders and inserts shall be galvanized after fabrication in conformance with ASTM A123.

2.8 Downspout Boots

A. Boots used to connect exterior downspouts to the storm-drainage system shall be of gray cast iron conforming to ASTM A48, Class 30B or 35B. Shape and size shall be as indicated.

2.9 Resilient Connectors

A. Flexible, watertight connectors used for connecting pipe to manholes and inlets shall conform to ASTM C923.

2.10 Hydrostatic Test On Watertight Joints

A. Concrete, PVC, and PE Pipe: A hydrostatic test shall be made on the watertight joint types as proposed. Only one sample joint of each type needs testing; however, if the sample joint fails because of faulty design or workmanship, an additional sample joint may be tested. During the test period, gaskets or other jointing material shall be protected from extreme temperatures which might adversely affect the performance of such materials. Performance requirements for joints in reinforced and non-reinforced concrete pipe shall conform to ASTM C990 or ASTM C443. Test requirements for joints in PVC and PE plastic pipe shall conform to ASTM D3212.

B. Corrugated Steel and Aluminum Pipe

1. A hydrostatic test shall be made on the watertight joint system or coupling band type proposed. The moment strength required of the joint is expressed as 15 percent of the calculated moment capacity of the pipe on a transverse section remote from the joint by the AASHTO HB-17 (Division II, Section 26).

    a. The pipe shall be supported for the hydrostatic test with the joint located at the point which develops 15 percent of the moment capacity of the pipe based on the allowable span in feet for the pipe flowing full or 40,000 foot-pounds, whichever is less.

    b. Performance requirements shall be met at an internal hydrostatic

pressure of 10 psi, for a 10 minute period for both annular corrugated metal pipe and helical corrugated metal pipe with factory reformed ends.

2.11 Erosion Control Riprap

A. Provide nonerodible rock not exceeding 15 inches in its greatest dimension and choked with sufficient small rocks to provide a dense mass with a minimum thickness of as indicated.

Part 3 Execution

3.1 Excavation for Pipe Culverts, Storm Drains, and Drainage Structures

A. Excavation of trenches, and for appurtenances and backfilling for culverts and storm drains, shall be in accordance with the applicable portions of Section 31 20 00 - Earthwork and the requirements specified below.

B. Trenching

1. The width of trenches at any point below the top of the pipe shall be not greater than the outside diameter of the pipe plus 12 inches to permit satisfactory jointing and thorough tamping of the bedding material under and around the pipe. Sheeting and bracing, where required, shall be placed within the trench width as specified, without any overexcavation.

2. Where trench widths are exceeded, redesign with a resultant increase in cost of stronger pipe or special installation procedures will be necessary. Cost of this redesign and increased cost of pipe or installation shall be borne by the Contractor without additional cost to the Owner.

C. Removal of Rock

1. Rock in either ledge or boulder formation shall be replaced with suitable materials to provide a compacted earth cushion having a thickness between unremoved rock and the pipe of at least 8 inches or 1/2 inch for each foot of fill over the top of the pipe, whichever is greater, but not more than three-fourths the nominal diameter of the pipe.

2. Where bell-and-spigot pipe is used, the cushion shall be maintained under the bell as well as under the straight portion of the pipe.

3. Rock excavation shall be as specified and defined in Section 31 20 00 - Earthwork.

D. Removal of Unstable Material

1. Where wet or otherwise unstable soil incapable of properly supporting the pipe, as determined by the Engineer, is unexpectedly encountered in the bottom of a trench, such material shall be removed to the depth required and

replaced to the proper grade with select granular material, compacted as provided in paragraph BACKFILLING.

2. When removal of unstable material is due to the fault or neglect of the Contractor while performing shoring and sheeting, water removal, or other specified requirements, such removal and replacement shall be performed at no additional cost to the Owner.

3.2 Bedding

A. The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe.

B. Concrete Pipe Requirements

1. When no bedding class is specified or detailed on the drawings, concrete pipe shall be bedded in granular material minimum 4 inch in depth in trenches with soil foundation. Depth of granular bedding in trenches with rock foundation shall be 1/2 inch in depth per foot of depth of fill, minimum depth of bedding shall be 8 inch up to maximum depth of 24 inches.

2. The middle third of the granular bedding shall be loosely placed.

3. Bell holes and depressions for joints shall be removed and formed so entire barrel of pipe is uniformly supported. The bell hole and depressions for the joints shall be not more than the length, depth, and width required for properly making the particular type of joint.

C. Corrugated Metal Pipe

1. Bedding for corrugated metal pipe and pipe arch shall be in accordance with ASTM A798. It is not required to shape the bedding to the pipe geometry. However, for pipe arches, either shape the bedding to the relatively flat bottom arc or fine grade the foundation to a shallow v-shape. Bedding for corrugated structural plate pipe shall meet requirements of ASTM A807.

D. Plastic Pipe: Bedding for PVC and PE pipe shall meet the requirements of ASTM D2321. Use Class IB or II material for bedding, haunching, and initial backfill.

3.3 Placing Pipe

A. Each pipe shall be thoroughly examined before being laid; defective or damaged pipe shall not be used. Plastic pipe shall be protected from exposure to direct sunlight prior to laying, if necessary to maintain adequate pipe stiffness and meet installation deflection requirements.

B. Pipelines shall be laid to the grades and alignment indicated.

C. Proper facilities shall be provided for lowering sections of pipe into trenches. Lifting lugs in vertically elongated metal pipe shall be placed in the same vertical plane as the major axis of the pipe.

D. Pipe shall not be laid in water, and pipe shall not be laid when trench conditions or weather are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary.

E. Deflection of installed flexible pipe shall not exceed the following limits:

TYPE OF PIPE	MAXIMUM ALLOWABLE DEFLECTION (percent)
Corrugated Steel and Aluminum Alloy	5
Concrete-Lined Corrugated Steel	3
Plastic (PVC, HDPE)	5

F. Note post installation requirements of paragraph DEFLECTION TESTING in PART 3 of this specification for all pipe products including deflection testing requirements for flexible pipe.

G. Concrete and PVC Pipe: Laying shall proceed upgrade with spigot ends of bell-and-spigot pipe and tongue ends of tongue-and-groove pipe pointing in the direction of the flow.

H. PE Pipe: Laying shall be with the separate sections joined firmly on a bed shaped to line and grade and shall follow manufacturer's guidelines.

I. Multiple Culverts

1. Where multiple lines of pipe are installed, adjacent sides of pipe shall be at least half the nominal pipe diameter or 1 meter 3 feet apart, whichever is less.

J. Jacking Pipe Through Fills: Methods of operation and installation for jacking pipe through fills shall conform to requirements specified in Volume 1, Chapter 1, Part 4 of AREMA Eng Man.

3.4 Jointing

A. Concrete Pipe

1. Flexible Watertight Joints: Gaskets and jointing materials shall be as recommended by the particular manufacturer in regard to use of lubricants, cements, adhesives, and other special installation requirements. Surfaces to receive lubricants, cements, or adhesives shall be clean and dry. Gaskets and jointing materials shall be affixed to the pipe not more than 24 hours prior to the installation of the pipe, and shall be protected from the sun, blowing dust, and other deleterious agents at all times. Gaskets and jointing materials shall be inspected before installing the pipe; any loose or improperly affixed gaskets and jointing materials shall be removed and replaced. The pipe shall be aligned with the previously installed pipe, and the joint pushed home. If, while the joint is being made the gasket becomes visibly dislocated the pipe shall be removed and the joint remade.

2. External Sealing Band Joint for Noncircular Pipe: Surfaces to receive sealing bands shall be dry and clean. Bands shall be installed in accordance with manufacturer's recommendations.

B. Corrugated Metal Pipe

1. Flexible Watertight, Gasketed Joints: Installation shall be as recommended by the gasket manufacturer for use of lubricants and cements and other special installation requirements. The gasket shall be placed over one end of a section of pipe for half the width of the gasket. The other half shall be doubled over the end of the same pipe. When the adjoining section of pipe is in place, the doubled-over half of the gasket shall then be rolled over the adjoining section. Any unevenness in overlap shall be corrected so that the gasket covers the end of pipe sections equally.

2. Connecting bands shall be centered over adjoining sections of pipe, and rods or bolts placed in position and nuts tightened.

3. Band Tightening: The band shall be tightened evenly, even tension being kept on the rods or bolts, and the gasket; the gasket shall seat properly in the corrugations.

4. Watertight joints shall remain uncovered for a period of time designated, and before being covered, tightness of the nuts shall be measured with a torque wrench. If the nut has tended to loosen its grip on the bolts or rods, the nut shall be retightened with a torque wrench and remain uncovered until a tight, permanent joint is assured.

3.5 Drainage Structures

A. Manholes and Inlets

1. Construction shall be of reinforced concrete or precast reinforced concrete, complete with frames and covers or gratings; and with fixed galvanized steel ladders where indicated.

2. Pipe connections to concrete manholes and inlets shall be made with flexible, watertight connectors.

B. Walls and Headwalls: Construction shall be as indicated.

3.6 Steel Ladder Installation

A. Ladder shall be adequately anchored to the wall by means of steel inserts spaced not more than 6 feet vertically, and shall be installed to provide at least 6 inches of space between the wall and the rungs. The wall along the line of the ladder shall be vertical for its entire length.

3.7 Backfilling

A. Backfilling Pipe in Trenches

1. After the pipe has been properly bedded, selected material from excavation or borrow, at a moisture content that will facilitate compaction, shall be placed along both sides of pipe in layers not exceeding 6 inches in compacted depth.

2. The backfill shall be brought up evenly on both sides of pipe for the full length of pipe. The fill shall be thoroughly compacted under the haunches of the pipe.

3. Each layer shall be thoroughly compacted with mechanical tampers or rammers. This method of filling and compacting shall continue until the fill has reached an elevation equal to the midpoint (spring line) of RCP or has reached an elevation of at least 12 inches above the top of the pipe for flexible pipe.

4. The remainder of the trench shall be backfilled and compacted by spreading and rolling or compacted by mechanical rammers or tampers in layers not exceeding 12 inches.

5. Tests for density shall be made as necessary to ensure conformance to the compaction requirements specified below. Where it is necessary, in the opinion of the Engineer, that sheeting or portions of bracing used be left in place, the contract will be adjusted accordingly.

    a. Untreated sheeting shall not be left in place beneath structures or pavements.

B. Backfilling Pipe in Fill Sections

1. For pipe placed in fill sections, backfill material and the placement and compaction procedures shall be as specified below.

2. The fill material shall be uniformly spread in layers longitudinally on both sides of the pipe, not exceeding 6 inches in compacted depth, and shall be compacted by rolling parallel with pipe or by mechanical tamping or ramming.

3. Prior to commencing normal filling operations, the crown width of the fill at a height of 12 inches above the top of the pipe shall extend a distance of not less than twice the outside pipe diameter on each side of the pipe or 12 feet, whichever is less.

4. After the backfill has reached at least 12 inches above the top of the pipe, the remainder of the fill shall be placed and thoroughly compacted in layers not exceeding 12 inches. Use select granular material for this entire region of backfill for flexible pipe installations.

C. Movement of Construction Machinery: When compacting by rolling or operating heavy equipment parallel with the pipe, displacement of or injury to the pipe shall be

avoided. Movement of construction machinery over a culvert or storm drain at any stage of construction shall be at the Contractor's risk. Any damaged pipe shall be repaired or replaced.

D. Compaction

1. Minimum Density

a. Backfill over and around the pipe and backfill around and adjacent to drainage structures shall be compacted at the approved moisture content to the following applicable minimum density, which will be determined as specified below.

b. Under paved roads, streets, parking areas, and similar-use pavements including adjacent shoulder areas, the density shall be not less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material, up to the elevation where requirements for pavement subgrade materials and compaction shall control.

c. Under unpaved or turfed traffic areas, density shall not be less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material.

d. Under nontraffic areas, density shall be not less than that of the surrounding material.

2. Determination of Density:

a. Testing is the responsibility of the Contractor and performed at no additional cost to the Owner. Testing shall be performed by an approved commercial testing laboratory.

b. Tests shall be performed in sufficient number to ensure that specified density is being obtained.

c. Laboratory tests for moisture-density relations shall be made in accordance with ASTM D1557 except that mechanical tampers may be used provided the results are correlated with those obtained with the specified hand tamper.

d. Field density tests shall be determined in accordance with ASTM D2167 or ASTM D6938. When ASTM D6938 is used, the calibration curves shall be checked and adjusted, if necessary, using the sand cone method as described in paragraph Calibration of the referenced publications. ASTM D6938 results in a wet unit weight of soil and ASTM D6938 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall be checked along with density calibration checks as described in ASTM D6938.

e. Test results shall be furnished the Engineer. The calibration checks of

both the density and moisture gauges shall be made at the beginning of a job on each different type of material encountered and at intervals as directed.

3.8 Pipeline Testing

A. Leakage Tests

1. Lines shall be tested for leakage by low pressure air or water testing or exfiltration tests, as appropriate.

    a. Low pressure air testing for concrete pipes shall conform to ASTM C969.

    b. Low pressure air testing for plastic pipe shall conform to ASTM F1417.

    c. Low pressure air testing procedures for other pipe materials shall use the pressures and testing times prescribed in ASTM C828 or ASTM C969, after consultation with the pipe manufacturer.

2. Testing of individual joints for leakage by low pressure air or water shall conform to ASTM C1103. Prior to exfiltration tests, the trench shall be backfilled up to at least the lower half of the pipe. If required, sufficient additional backfill shall be placed to prevent pipe movement during testing, leaving the joints uncovered to permit inspection.

3. Visible leaks encountered shall be corrected regardless of leakage test results.

4. When the water table is 2 feet or more above the top of the pipe at the upper end of the pipeline section to be tested, infiltration shall be measured using a suitable weir or other device acceptable to the Engineer.

5. An exfiltration test shall be made by filling the line to be tested with water so that a head of at least 2 feet is provided above both the water table and the top of the pipe at the upper end of the pipeline to be tested.

    a. The filled line shall be allowed to stand until the pipe has reached its maximum absorption, but not less than 4 hours. After absorption, the head shall be reestablished.

    b. The amount of water required to maintain this water level during a 2-hour test period shall be measured.

    c. Leakage as measured by the exfiltration test shall not exceed 250 gallons per inch in diameter per mile of pipeline per day. When leakage exceeds the maximum amount specified, satisfactory correction shall be made and retesting accomplished.

B. Post-Installation Inspection

1. Check each reinforced concrete pipe installation for joint separations, soil migration through the joint, cracks greater than 0.01 inches, settlement and alignment.

2. Check each flexible pipe (HDPE, PVC, CMP, PP) for rips, tears, joint separations, soil migration through the joint, cracks, localized bucking, bulges, settlement and alignment.

3. Replace pipes having cracks greater than 0.1 inches in width or deflection greater than 5 percent deflection.

4. An engineer shall evaluate all pipes with cracks greater than 0.01 inches but less than 0.10 inches to determine if any remediation or repair is required.

5. Repair or replace any pipe with crack exhibiting displacement across the crack, exhibiting bulges, creases, tears, spalls, or delamination.

6. Reports: The final post installation inspection report shall include: a copy of all video taken, pipe location identification, equipment used for inspection, inspector name, deviation from design, grade, deviation from line, deflection and deformation of flexible pipe systems, inspector notes, condition of joints, condition of pipe wall (e.g. distress, cracking, wall damage dents, bulges, creases, tears, holes, etc.).

3.9 Field Painting

A. After installation, clean cast-iron frames, covers, gratings, and steps not buried in masonry or concrete to bare metal of mortar, rust, grease, dirt, and other deleterious materials and apply a coat of bituminous paint.

END OF SECTION