



**The Town of Summerville**  
200 S. Main Street  
Summerville, South Carolina 29483  
(P) 843-851-4225 (F) 843-832-8182  
[mbeltz@summervillesc.gov](mailto:mbeltz@summervillesc.gov)

**August 18, 2017**

<b>Bid Number:</b> N/A	<b>Bids will be received until:</b> September 28, 2017- 2:00 p.m.
<b>Bid Title:</b> West Second North Street Sidewalk Improvements	
<b>Mailing Date:</b>	<b>Direct Inquiries to:</b> Michelle Beltz, Purchasing Agent
<b>Vendor Name:</b>	<b>FEIN/SS#:</b>
<b>Vendor Address:</b>	<b>State Contractor #:</b>
<b>City – State – Zip:</b>	
<b>Telephone Number:</b>	<b>Fax Number:</b>
<b>Minority or Women Owned Business:</b> Are you a certified Minority or Women-Owned business in the State of South Carolina? <input type="checkbox"/> Yes <input type="checkbox"/> No If so, please provide a copy of your certificate with your response.	
<b>Authorized Signature:</b> _____	<b>Title:</b> _____
<b>Date:</b> _____	
I certify that this bid is made without prior understanding, agreement, or connection with any corporation, firm, or person submitting a bid for the same materials, supplies, or equipment, and is in all respects fair and without collusion or fraud. I agree to abide by all conditions of this bid and certify that I am authorized to sign this bid for the bidder. This signed page must be included with bid submission.	

## **Invitation to Bid**

### **West Second North Street Sidewalk Improvements**

The Town of Summerville (hereinafter referred to as “Town or “Owner”) is seeking sealed bids for the construction of concrete sidewalks on West Second North Street. Project work will also entail the installation of crosswalks, curb and gutter, drainage improvements and the upgrade of residential driveways.

Bid packages will be available beginning Monday, August 21, 2017 on the Town website ([www.summervillesc.gov](http://www.summervillesc.gov)) under the Formal Sealed Bids/Proposals/Quotes menu. Sealed bids are due by **2:00 p.m. on Thursday, September 28, 2017**, and will be opened and publicly read in the 2<sup>nd</sup> floor training room in the Summerville Town Hall Annex, located at 200 S. Main Street, Summerville, SC 29483. **Late bids will not be accepted, NO EXCEPTIONS.**

All inquiries and questions related to this project must be submitted in writing, via e-mail, to the Town Engineer ([rcornette@summervillesc.gov](mailto:rcornette@summervillesc.gov)) so that they can be addressed through a posted addendum. All registered bidders will receive an e-mail notification when project addendums are posted. The cut-off



date for questions is **Monday, September 18, 2017 at 12:00 p.m.** Any and all addendums issued will be posted to the Town's website, ([www.summerville.sc.us](http://www.summerville.sc.us)), under the Formal Sealed Bids/Proposals/Quotes menu and will become an official part of the bid package. **All addendums will need to be signed and included with the submitted bid package.** Any bid package submittals which do not include the signed addendum(s) will be disqualified- **NO EXCEPTIONS.**

The Town reserves the right to reject any and all bids, to waive all formalities and to award the contract as it appears to be in the best interest of the Town. The right is also reserved to hold any and all bids for a period not exceeding ninety (90) days from the opening thereof.

This solicitation does not commit the Town to award a bid or contract, to pay any cost incurred in the preparation of the response or to procure or contract for goods or services listed herein.

The Town reserves the right to reject any and all responses, to cancel this solicitation and to waive any technicality, if deemed to be in the best interest of the Town.



**BIDDER REGISTRATION FORM**  
**West Second North Street Sidewalk Improvements**

**Mail to:**                   **Michelle Beltz**  
                                  **200 South Main Street**  
                                  **Summerville, SC 29483**

**(or) E-mail to:**        [mbeltz@summervillesc.gov](mailto:mbeltz@summervillesc.gov)

Bidders are required to submit this form, via e-mail or fax, to become registered as a firm interested in this solicitation and to ensure receipt of any amendments to the solicitation referenced above. Please print clearly.

\_\_\_\_\_  
Company Name, as registered with the IRS

\_\_\_\_\_  
Authorized Signature

\_\_\_\_\_  
Correspondence Address

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

\_\_\_\_\_  
City, State, Zip

\_\_\_\_\_  
Title

\_\_\_\_\_  
Date

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

\_\_\_\_\_  
Federal Tax ID (FEIN)/SS Number

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

\_\_\_\_\_  
SC General Contractors License

\_\_\_\_\_  
Cell Number

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

TYPE OF BUSINESS ENTITY (*check one*):

\_\_\_\_ Individual/Sole Proprietor

\_\_\_\_ Partnership

\_\_\_\_ Corporation

\_\_\_\_ Limited Liability Company

\_\_\_\_ Other (*please specify:* \_\_\_\_\_)



## **Contractor Qualification and General Requirements**

1. Contractors shall be familiar and experienced with the type of work involved with this project including curb and gutter construction, sidewalk construction, asphalt patching and traffic control under SCDOT standards.
2. Contractors shall have the appropriate license(s) to perform the scope of work outlined in this bid solicitation. Necessary licenses must remain active and valid throughout the duration of the contract term. **A copy of each bidder's current contractor's license should be attached to his/her bid package submittal.**
3. Each proposal **must** be secured by a bid bond from an approved bonding or insurance company, authorized to do business in the State of South Carolina, in an amount not less than ten percent (10%) of the total bid amount.
4. Bidders must submit at least three (3) in-state references if they have not had contracted work with the Town during the past five (5) years. The reference information shall include a contact name and phone number, type of project completed, date project was completed and the contract amount.
5. Bidders may not be debarred from participating in Federal contracts and cannot have any claims filed against them, in any state, for not complying with requirements of the Davis Bacon Act and prevailing wage rates.
6. The Contractor shall be responsible for clean-up of all debris resulting from his/her work. Any debris removed from the jobsite, by the Contractor, shall be lawfully disposed of at an approved landfill site.
7. The Contractor shall provide protection of his/her work.
8. The Contractor's work shall be performed in accordance with the project schedule outlined in the Schedule of Events Section.
9. The Contractor shall provide evidence of Worker's Compensation, Commercial General Liability, Owners and Contractor's Protective Liability and Automobile Liability insurances, in compliance with the Town of Summerville's limits.

\_\_\_\_\_  
Initials

\_\_\_\_\_  
Date



## **Bid Process**

The Town will conduct the selection of a qualified contractor and issue a contract award in the following manner:

1. This document will be made available to all interested bidders on the Town's website, ([www.summervillesc.gov](http://www.summervillesc.gov)), under the Formal Sealed Bids/Proposals/Quotes menu.
2. Bid submittals will be received and evaluated as described in this solicitation package. The lowest qualified bidder may be awarded the contract for the outlined project work.
3. At the conclusion of the bid process, qualified bids will be presented to Town officials for final review and approval. After a formal contract is signed with the winning, approved bidder, a Notice to Proceed will be issued to the winning bidder.
4. A certified bid tabulation sheet will be posted to the Town's website after the bid evaluation process has been completed.

## **Schedule of Events**

The following chart outlines the schedule of events, in order of occurrence, for project milestones:

MILESTONE EVENT	DATE
1. Bid Package Issuance	August 21, 2017
2. Deadline Submittal for Questions	September 18, 2017- 12:00 p.m.
3. Bid Due Date	September 28, 2017- 2:00 p.m.
4. Bid Evaluation Completed	On or before October 4, 2017
5. Contract Award	October 12, 2017
6. Project Begins	Within 30 Days of Contract Award
7. Project Completion	90 Days from Notice to Proceed

The Town reserves the right to change the schedule of events, as it deems necessary. In the event of a major date change, the Town may notify known and registered participants. The Town also reserves the right to issue addenda to this "Sealed Bid" up to seven days before the bid opening date, as necessary, to clarify the Town's desire or to make corrections. The Bidder will acknowledge receipt of all addenda in their proposals, via submittal of signed addenda, with his/her bid package.



## **Bid Submittal Instructions**

Bidders must submit **one (1) original and two (2) copies** of their bid on or before 2:00 p.m. on Thursday, September 28, 2017 to:

Town of Summerville  
ATTN: Michelle Beltz  
Purchasing Agent  
200 South Main Street  
Summerville, SC 29483

Bidders may mail or hand-deliver their "Sealed Bid" to the Town's Purchasing Agent. The Town assumes no responsibility for unmarked or improperly marked envelopes. If directing any other correspondence, bidders should address envelopes to the Town Engineer and include the bid reference on the envelope. If a potential Bidder chooses not to respond to this solicitation after registering, it is recommended that he/she return the enclosed "No Bid Response Form" to the Town Engineer.

- It will be the sole responsibility of the bidder to have his/her bid delivered to the Purchasing Agent before the scheduled bid opening. Any bid received after the Purchasing Agent has declared that the time set for the bid opening has arrived shall be rejected, unless the bid has been delivered to the appropriate Town Hall office or the governmental bodies mail room prior to the bid opening [R.19-445.2070(H)].
- Bids having any erasures or corrections **must** be initialed **in ink** by the bidder.
- All bids must be valid for a period of ninety (90) days following the bid opening.
- Bids must address all requirements. Partial bids will be rejected.
- All costs incurred by the bidder in preparing this bid, or costs incurred in any other manner by the bidder in responding to this bid will be the sole responsibility of the bidder. All materials and documents submitted by the bidder, in response to this solicitation, become the property of the Town and will not be returned to the bidder.
- Any proprietary information contained in the proposal should be so indicated.
- Bids will be considered, as specified or attached hereto, under the terms and conditions of this solicitation.
- Bids must be made in the official name of the firm or individual under which business is conducted (showing official business address) and must be signed, in ink, by a person duly authorized to legally bind the person, partnership, company or corporation submitting the proposal.



- Bidders are to include all applicable requested information and any additional information that they wish to be considered. Bid submittals should utilize the bid sheet provided in this document.
- Any bid amendments or withdrawal requests must be received by the time advertised for bid opening in order to be timely filed. It is the Bidder's sole responsibility to ensure that amendment submissions or withdrawal requests are received by the Town Engineer prior to the scheduled bid opening. Any amendment requests received after the time of the scheduled bid opening will not be considered. Any withdrawal requests received after the time of the scheduled bid opening must have proper approval of the Town Engineer and other Town administration officials.
- Due to the possibility of negotiation with any bidder submitting a bid which appears to be eligible for contract award, pursuant to the selection criteria set forth in this bid, the Town reserves the right to select the bid that appears to be in its best interest and to negotiate with any of the prospective bidders.

**BIDS SUBMITTED VIA FACSIMILE MACHINE, OR E-MAIL WILL NOT BE ACCEPTED.**



## **GENERAL SPECIFICATIONS AND SPECIAL PROVISIONS**

1. All curb, gutter, sidewalk, drainage improvements and asphalt patching shall be completed in accordance with the South Carolina Department of Transportation Standard Specifications for Highway Construction, 2007 Edition.
2. The scope of the work for this project will take place within the Town on the north side of West Second North Street. Work will occur on West Second North Street (Co. Rd. S-18-330) beginning at Aulds Lane and terminating at North Walnut Street. All project work shall be performed in accordance with the approved plans available with this solicitation package.
3. The Contractor shall provide proof of liability insurance and Worker's Compensation Insurance with bid submittal.
4. Unless otherwise approved by the Town Engineer, all work shall be performed between 7:00 a.m. and 7:00 p.m.
5. Where necessary, the contractor shall erect and maintain traffic control devices (barricades, warning signs, traffic cones, etc.) in accordance with the Manual of Uniform Traffic Control Devices, latest edition.
6. The Contractor is responsible for locating all existing utilities within the limits of the project and shall be responsible for repairing any damaged utilities at no cost to the Town of Summerville. The Contractor will also be responsible for providing risers for all utilities to match new grade of resurfaced roads, such as manholes, and valve boxes.
7. Bids will be awarded on a lump sum basis. Bidders are highly encouraged to visit the job sites before submitting bids.
8. Unit sum bid amounts shall include all necessary materials, tools, equipment, personnel, and any other appurtenances required to perform the job with a high manner of workmanship.
9. All pavement markings and permanent raised pavement markers shall meet SCDOT Standard Specifications for Highway Construction, 2007 Edition, Sections 625, 627, and 630.
10. Any contractor who has not been contracted by the Town of Summerville within the past five years must submit at least three references. The reference information shall include a contact name and phone number, type of project completed, date project was completed, and the contract amount.
11. The Town reserves the right to waive minor inconsistencies in the bid packages and to reject any and all bids. The successful bidder shall be the contractor who, in the sole opinion of the Town of Summerville, will provide the highest quality project, in a timely manner. The successful bidder may or may not be the lowest bidder.



12. Both the Contractor that is awarded the contract and any utilized Subcontractors must submit for or have a current, active Town of Summerville business license before starting work.
13. The time allowed to complete the work is ninety (90) calendar days from the Notice to Proceed date. For each day with inclement weather, when paving cannot occur, one day will be credited to the Contractor.
14. The project work area shall be kept clean and free of debris. The area should be cleaned and secured at the end of each work day. Work must be coordinated with residents where driveway work will be completed to minimize disruption or resident access.

**NOTICE OF DISCLAIMER:**

This list of requirements is being provided to each bidder to aid in his ability to give a fair and competitive bid and should not be construed as a contract or any guarantee of the award of this bid. Instead, the listed provisions are only to assist the bidder in understanding what is expected and will be required of all Contractors bidding on this job.

\_\_\_\_\_  
Initials

\_\_\_\_\_  
Date



## **GENERAL PROVISIONS/INSTRUCTIONS TO BIDDERS**

1. Bids, amendments or withdrawal requests must be received by the time advertised for bid opening to be timely filed. It is the Bidder's sole responsibility to ensure that all required bid documents are received by the Town at the time indicated in this solicitation document. Any withdrawal request received after time of bid opening must have proper approval of the Town Engineer.
2. Bidders must clearly mark as "Confidential" each part of their bid which they consider to be proprietary information that could be exempt from disclosure under section 30-4-40, Code of Laws of South Carolina, 1976 (1986 Cum. Supp.) (Freedom of Information Act). If any part is designated as confidential, there must be attached to that part, an explanation of how this information fits within one or more categories listed in section 30-4-40. The Town reserves the right to determine whether this information should be exempt from disclosure and no legal action may be brought against the Town, or its agents, for its determination in this regard.
3. By submission of a bid, the Bidder guarantees that all goods and services meet the requirements of the solicitation during the contract period.
4. The Town reserves the right to award this solicitation by line item, by lot or by total using the award method that is in the best interest of the Town, unless stated otherwise elsewhere in this solicitation.
5. All amendments to and interpretations of this solicitation shall be in writing and issued by the Town Engineer. The Town shall not be legally bound by any amendment or interpretation that is not in writing.
6. All Addendum and Award Notices will be posted on the Town's website: [www.summervillesc.gov](http://www.summervillesc.gov), under the Formal Sealed Bids/Proposal/Quotes menu.
7. **Drug Free Workplace:** *(Note: This clause applies to any resultant contract of \$50,000.00 or more)*. The State of South Carolina has amended Title 44, Code of Laws of South Carolina, 1976, relating to health, by adding Chapter 107, so as to enact the Drug Free Workplace Act. (See Act. No. 593, 1990 Acts and Joint Resolutions). By submission of a signed solicitation, the Bidder certifies that he/she will comply with this act. (See Section 44-107-30).
8. This solicitation is intended to promote full and open competition. If any language, specifications, terms and conditions or any combination thereof restricts or limits the requirements in this solicitation to a single source, it shall be the responsibility of the interested Bidder to notify the Town, in writing, no later than five (5) business days prior to the scheduled due date and time.
9. The Town reserves the right to waive any Instruction to Bidders, General or Special Provisions, General or Special Conditions or specifications deviation if deemed to be in the best interest of the Town.



10. **Default:** In case of default by the Contractor, the Town reserves the right to purchase any or all items in default in the open market, charging the Contractor with any excessive costs. Should such charge be assessed, no subsequent response will be accepted from the defaulting Contractor until the assessed charge has been satisfied.
11. **Price Condition:** All prices shall be firm-fixed type, unless stated otherwise.
12. **Response Form:** All responses shall be printed in ink or typewritten. When required, additional pages may be attached. A "No Response" qualifies as a response; however, it is the responsibility of the Bidder to notify the Town if you receive solicitations that do not apply.
13. **Response Period:** All responses shall remain effective for a minimum period of ninety (90) calendar days.
14. **Response Withdrawal:** Any responses may be withdrawn prior to the established closing date and time, but not thereafter, without proper approval from the Town Engineer.
15. **Bidders' Qualifications:** The Town reserves the right to request satisfactory evidence of the Bidder's ability to furnish services in accordance with the terms and conditions listed herein. The Town further reserves the right to make the final determination as to the Bidder's ability to provide said services.
16. **Insurance Requirements:** The Contractor shall not commence work under this Bid until he/she has obtained all insurance listed within this section and the designated Town Official and Town Attorney have approved such insurance coverage. Insurance certificates are required from the General Contractor, service providers and all subcontractors performing work on the project.

**WORKER'S COMPENSATION INSURANCE:** During the life of this contract, the Contractor shall provide and maintain Statutory Workers Compensation Insurance of \$1,000,000, as required by all applicable Federal, State, Maritime or other laws, including Employer's Liability for all of his employees who will be engaged in work on the contracted project outlined herein. In the event any such project work is sublet, the Contractor shall similarly require all subcontractors to provide Statutory Worker's Compensation and Employer's Liability Insurance of \$1,000,000 for all of the latter's employees to be engaged in such work. The requirements for Worker's Compensation Insurance coverage **will not** be waived.

**LIABILITY INSURANCE:** During the life of this contract, the Contractor shall provide and maintain General Liability and Property Damage Insurances to protect himself, his agents and his employees from claims for damage and personal injury, including wrongful and accidental death and property damage which may arise from operations under this Contract, whether such operations be performed by himself or his employees. Required insurance amounts are as follows:

**GENERAL LIABILITY:** \$1,000,000 Per Person /\$1,000,000 Each Occurrence  
**PROPERTY DAMAGE:** \$1,000,000 each Occurrence  
**AGGREGATE:** \$2,000,000



**COMPREHENSIVE AUTOMOBILE LIABILITY:** During the life of this contract, the Contractor shall provide and maintain Comprehensive Automobile Liability Insurance, including protection for liability arising out of owned, non-owned and hired vehicles. The policy shall be extended to provide contractual coverage for the Hold Harmless Agreement, which is part of these Instructions to Bidders. The limits of liability shall be as follows:

**BODILY INJURY:** \$1,000,000 Per Person/\$1,000,000 Each Occurrence  
**PROPERTY DAMAGE:** \$1,000,000 each Occurrence

**EXCESS OR UMBRELLA LIABILITY** with a limit of not less than \$1,000,000 per occurrence and \$2,000,000 aggregate.

Said insurances shall be written by a company or companies approved to do business in the state of South Carolina and acceptable to the Town. Before commencing any work hereunder, certificates evidencing the maintenance of said insurance shall be furnished to the Town.

The Town, its officials, employees and volunteers are to be covered as additional insured's as respects: liability arising out of activities performed by or on behalf of the Contractor, including the insured's general supervision of the contract; products and completed operations of the Contractor; premises owned, occupied or used by the Contractor; or automobiles owned, leased, hired or borrowed by the Contractor. The coverage shall contain no special limitations on the scope of protection afforded to the Town, its officials, employees or volunteers and it shall be stated on the Insurance Certificate with the provision that this coverage is primary to all other coverage the Town may possess.

Each insurance required by the Town shall be endorsed to state that coverage shall not be suspended, voided, cancelled by either party or reduced in coverage or in limits except after thirty (30) days prior written notice has been given to the Town.

All certificates and endorsements must be received and approved by the Town within five (5) days after notification of the project award. It is required that the Town receives an original certificate of insurance. Faxed copies are not acceptable.

The Town shall withhold payments to the Contractor if the required certificates of insurance and endorsements are canceled or if the Contractor otherwise ceases to be insured, as required herein.

17. **Town Business License:** Prior to execution of the project contract, the successful Contractor and any subcontractors must obtain or possess an active Town of Summerville Business License. Such license must be maintained throughout the duration of the contract. Contact the Town's Business License Department at (843) 851-4215 to determine the exact amount for licensure or to ask other pertinent questions regarding doing business within the Town.
18. **Bid and Performance Bonds:** Each proposal must be secured by a bid bond from an approved bonding or insurance company, authorized to do business in the State of South Carolina, in an amount not less than ten percent (10%) of the total bid amount. The bid bond must be duly



executed by the Bidder, as principal, and issued by a surety authorized to conduct business in South Carolina. Upon award, the Town shall require from the Contractor a satisfactory bond or security for the proper performance of the contract in an amount equal to the total amount of the award.

19. **Bidders' Responsibility:** Each bidder shall fully acquaint himself with conditions relating to the scope and restrictions relevant to the execution of the work outlined in this bid solicitation. It is expected that this will sometimes require on-site observation. The failure or omission of a bidder to acquaint himself with existing conditions shall in no way relieve him of any obligation with respect to this bid or to the awarded contract.
20. **Exceptions and Deviations:** Any bid that does not meet the specifications and design criteria must be accompanied by documentation identifying and justifying all exceptions and deviations.
21. **Governing Laws:** The laws of South Carolina shall govern this Agreement. All litigation arising under said Agreement shall be litigated only in a Circuit court for the First Judicial Circuit of Dorchester County, St. George, South Carolina. The prevailing party shall be entitled to attorney's fees and the cost of said litigation.
22. **7 % S. C. Sales Tax:** Sales tax shall be added to the purchase order resulting from this solicitation. Bid responses shall include all applicable taxes as a separate line item.
23. **Prompt Payment Discount Terms:** Prompt payment discount terms will be calculated from the point of complete order acceptance for services and/or commodities ordered.
24. **"Or Approved Equal":** Certain processes, types of equipment or kinds of material may be described in bid specifications and/or on included drawings by means of trade/brand names and catalog numbers. In each instance where this occurs, it is understood and inferred that such description is followed by the words "or approved equal." Such method of description is intended merely as a means of establishing a standard of comparability. However, the Town reserves the right to select the items that, in its judgment, are best suited to the needs of the Town based on price, quality, service, availability and other relative factors. Bidders must indicate brand name, model, model number, size, type, weight, color, etc. of the item bid if not exactly the same as the item specified. Vendor's stock number or catalog number is not sufficient to meet this requirement.
25. **Contract Period (if applicable):** The initial term of the Agreement shall be for a period of ninety (90) days. The Town reserves the right to extend the Agreement if it determines an extension is in its best interest; said extension will be set by the Town for a period appropriate to complete remaining work.
26. **Award Process:** The Town shall select the most competitive response on the terms which are considered to be most advantageous for the Town. However, final approval may rest with members of the Town Council.
27. **Rejection:** The Town reserves the right to reject any bid that contains prices for individual items or services that are unreasonable when compared with the same or other bids, if such action is in the best interest of the Town.



28. **Correction of Errors on This Bid Form:** All prices and notations should be printed in ink or typewritten. Errors should be crossed out, corrections entered and initialed by the person signing the bid. Erasures or use of typewriter correction fluid may be cause for rejection. No bid shall be altered or amended after the specified time for bid opening.
29. **Non-Appropriation:** If Summerville Town Council fails to appropriate or authorize the expenditure of sufficient funds to provide the continuation of this contract or if a lawful order issued in, or for any fiscal year during the term of the contract, reduces the funds appropriated or authorized in such amounts as to preclude making the payments set out therein, the contract shall terminate on the date said funds are no longer available without any termination charges or other liability incurring to the Town.
30. **Force Majure:** The Contractor shall not be liable for any excess costs if the failure to perform the contract arises out of causes beyond the control and without fault or negligence of the Contractor. Such causes may include, but are not restricted to, acts of God or of the public enemy, acts of the Government in either its sovereign or contractual capacity, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and unusually severe weather; but, in every case, the failure to perform must be beyond the control and without the fault or negligence of the Contractor. If the failure to perform is caused by default of a Subcontractor, and if such default arises out of causes beyond the control of both the Contractor and Subcontractor and without excess costs for failure to perform, the Contractor shall not be liable unless the supplies or services to be furnished by the Subcontractor were obtainable from other sources in sufficient time to permit the Contractor to meet the required delivery schedule.
31. **Arbitration:** Under no circumstances and with no exception will the Town act as an Arbitrator between the Contractor and any Subcontractor.
32. **Indemnification:** The Town, its officials and its employees shall be held harmless from liability from any claims, damages and actions of any nature arising from the use of any materials furnished by the Contractor, provided that such liability is not attributable to negligence on the part of the Town or failure of the Town to use the materials in the manner outlined by the Contractor in descriptive literature or specifications submitted with the Contractor's bid.
33. **Guarantee:** The Vendor/Contractor shall state his normal warranty and any extended warranties where available.
34. **Save Harmless:** (This General Condition **Does Not** Apply to Solicitations for Service Requirements). The successful Bidder shall indemnify and save harmless the Town and its officials and employees from all suits or claims of any character brought by reason of infringing on any patent, trademark or copyright. The Bidder shall have no liability to the Town if such patent, trademark or copyright infringement or claim is based upon the Bidder's use of material furnished to the Bidder by the Town.
35. **Publicity Releases:** The Contractor agrees not to refer to award of this contract in commercial advertising in such a manner as to state or imply that the products or services provided are endorsed or preferred by the Town.



36. **Quality of Products:** (This General Condition **Does Not** Apply to Solicitations for Printing or Service Requirements). Unless otherwise indicated in this bid, it is understood and agreed that any item offered or shipped on this bid shall be new and in first class condition, that all containers shall be new and suitable for storage or shipment and that prices include standard commercial packaging.
37. **S.C. Law Clause:** Upon award of a contract under this bid, the person, partnership, association or corporation to whom the award is made must comply with the laws of South Carolina which require such person or entity to be authorized and/or licensed to do business in this state. Notwithstanding the fact that applicable statutes may exempt or exclude the successful bidder from requirements that it be authorized and/or licensed to do business in this state, by submission of this signed bid, the bidder agrees to subject himself to the jurisdiction and process of the courts of the State of South Carolina as to all matters and disputes arising or to arise under the contract and the performance thereof, including any questions as to the liability for taxes, licenses or fees levied by the State.
38. **Termination:** Subject to the provisions below, the Town may terminate the contract, for any reason, provided a thirty (30) day advance notice, in writing, is given to the Contractor.
- a. **Termination For Convenience:** In the event that this contract is terminated or cancelled upon request and for the convenience of the Town without the required thirty (30) day advance written notice, the Town may negotiate reasonable termination costs, if applicable.
- b. **Termination For Cause:** Termination of the contract by the Town for cause, default or negligence on the part of the Contractor shall be excluded from the foregoing provisions; termination costs, if any, shall not apply. The thirty (30) day advance notice requirement is waived and the default provision in this bid shall apply. (See General Provisions #1 - Default).
39. **Assignment:** No contract or its provisions may be assigned, sublet or transferred without the written consent of authorized Town officials or employees.
40. **Item Substitution:** (This General Condition **Does Not** Apply To Solicitations For Printing or Service Requirements). No substitutes will be allowed on an issued purchase order without permission from authorized Town officials or employees.
41. **Restriction/Limitations:** Prior to the official awarding of this contract, no purchases of any item(s) listed in this solicitation are authorized. Likewise, the purchase of any item(s) not listed in this solicitation are not authorized prior to contract award.
42. **Purchases From Other Sources:** (This General Condition **Does Not** Apply To Solicitations For Printing or Service Requirements). The Town reserves the right to bid separately any unusual requirements or large quantities of the items specified in this proposed contract.
43. **Gratuities and Kickbacks**



- a. **Gratuities:** It shall be unethical for any person to offer, give or agree to give any employee or former employee, or for any employee or former employee to solicit, demand, accept, or agree to accept from another person a gratuity or an offer of employment in connection with any decision, approval, disapproval, recommendation, preparation, or any part of a program requirement or a purchase request, influencing the content of any specification or procurement standard, rendering of advice, investigation, auditing, or in any other advisory capacity in any proceeding or application, request for ruling, determination, claim or controversy, or other particular matter pertaining to any program requirement of a contract or subcontract, or to any solicitation or bid proposal therefore.
- b. **Kickbacks:** It shall be unethical for any payment, gratuity or offer of employment to be made by or on behalf of a Subcontractor under a contract to the Prime Contractor, or to hire any Subcontractor, or person associated therewith, as an inducement for the award of a subcontract or order.



**NO BID RESPONSE FORM**

<b>Bid Number:</b>	N/A	<b>Bids will be received until:</b>	September 28, 2017 - 2:00 p.m.
<b>Bid Title:</b> West Second North Street Sidewalk Improvements			
<b>Mailing Date:</b>		<b>Direct Inquiries to:</b>	Michelle Beltz, Purchasing Agent
<b>Vendor Name:</b>		<b>FEIN/SS#:</b>	
<b>Vendor Address:</b>			
<b>City – State – Zip:</b>			
<b>Telephone Number:</b>		<b>Fax Number:</b>	
<b>Minority or Women Owned Business:</b> Are you a certified Minority or Women-Owned business in the State of South Carolina? <input type="checkbox"/> Yes <input type="checkbox"/> No If so, please provide a copy of your certificate with your response.			
<b>Authorized Signature:</b>	_____	<b>Title:</b>	_____
<b>Date:</b>	_____		

I certify that this bid is made without prior understanding, agreement, or connection with any corporation, firm, or person submitting a bid for the same materials, supplies, or equipment, and is in all respects fair and without collusion or fraud. I agree to abide by all conditions of this bid and certify that I am authorized to sign this bid for the bidder. **This signed page must be included with bid submission.**

To submit a “No Bid” response for this project, this form must be completed for your company to remain on our bidders list for commodities/services referenced. If you do not respond, your name may be removed from the bidders list.

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Please check statement(s) applicable to your “No Bid” response

- Specifications are restrictive; i.e. geared toward one brand or manufacturer only (explain below).
- Specifications are ambiguous (explain below).
- We are unable to meet specifications.
- Insufficient time to respond to the solicitation.
- Our schedule would not permit us to perform.
- We are unable to meet bond requirements.
- We are unable to meet insurance requirements.
- We do not offer this product or service.
- Remove us from your vendor list for this commodity/service.
- Other (specify below).

**Comments:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



**CERTIFICATE OF FAMILIARITY**

The undersigned, having fully familiarized him or herself with the information contained within this entire solicitation and applicable amendments, submits the attached bid, and other applicable information to the Town of Summerville, which I verify to be true and correct to the best of my knowledge. I further certify that this bid response is made without prior understanding, agreement or connection with any corporation, firm or person submitting a bid for the same materials, supplies or equipment, and is, in all respects, fair and without collusion or fraud. I agree to abide by all conditions of this solicitation and certify that I am authorized to sign this bid. *By submission of a signed bid, I certify, under penalty of perjury, that the company identified below complies with section 12-54-1020(B) for the SC Code of Law 1976, as amended, relating to payment of applicable taxes.* I further certify all prices submitted shall remain effective for a minimum period of ninety (90) days, unless otherwise stated.

\_\_\_\_\_  
Company Name, as registered with the IRS

\_\_\_\_\_  
Authorized Signature

\_\_\_\_\_  
Correspondence Address

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

\_\_\_\_\_  
City, State, Zip

\_\_\_\_\_  
Title

\_\_\_\_\_  
Date

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

\_\_\_\_\_  
Remittance Address

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

\_\_\_\_\_  
City, State, Zip

\_\_\_\_\_  
Cell Number

\_\_\_\_\_  
Federal Tax ID (FEIN)/SS Number

\_\_\_\_\_  
SC Sales Tax Number

\_\_\_\_\_  
SC General Contractors License

\_\_\_\_\_  
SC Sales Tax Number

**TYPE OF BUSINESS ENTITY** (check one):

\_\_\_\_ Individual/Sole Proprietor

\_\_\_\_ Partnership

\_\_\_\_ Corporation

\_\_\_\_ Limited Liability Company

\_\_\_\_ Other (please specify: \_\_\_\_\_)

**Note:** All information submitted in or in connection with a bid is submitted under penalty of perjury. The Town of Summerville shall have the right to terminate, at any time, any contract awarded pursuant to a bid that contains false information.



**BID FORM**

**To: Town of Summerville  
200 South Main St.  
Summerville, SC 29483**

**For: WEST SECOND NORTH ST. SIDEWALK IMPROVEMENTS**

**Proposal of \_\_\_\_\_ (Name)**

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

This proposal must be filled in by the bidder, printed in ink or typewritten, the unit prices in numbered figures in the blank space provided for each item when a quantity is given. The unit prices in numbered figures will be considered as being the prices bid. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

For complete information concerning the proposal requirements, see Instruction to Bidders.

Pursuant to the requirements of the Contract Documents, the undersigned submits this proposal and encloses herewith as a proposal guaranty, a check\* in the amount of \$ \_\_\_\_\_ drawn to the order of the Town of Summerville which, it is understood, will be retained by the Town of Summerville as liquidated damages if the undersigned bidder fails within ten (10) days after receipt of notice from the Town of Summerville of the award to qualify or execute the Contract Agreement and furnish the Contract bonds. Following qualification and execution, the proposal guaranty checks of the three (3) low bidders will be returned.

Having carefully examined the contract documents and the site of the work, the undersigned herein agrees to furnish all necessary labor, material, and equipment for the performance of the work required under said Contract.

**\*Bank cashier, bank treasurer, certified check, or bid bond**

**Bidder has examined and carefully studied the Bidding Documents, other related data identified in the Bidding Documents, and the following Addenda, receipt of which is hereby acknowledged:**

Addendum No.

Addendum Date

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

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



**WEST 2<sup>ND</sup> NORTH STREET SIDEWALK IMPROVEMENTS  
BASE BID - SCHEDULE OF PRICES**

Item Number	Description	EST. QUANT.	UNIT MEASURE	UNIT PRICE	TOTAL PRICE
1	Mobilization/Demobilization	100%	Lump Sum		
2	Stakes, Lines and Grades	100%	Lump Sum		
3	Maintenance and Protection of Traffic	100%	Lump Sum		
4	Clearing Site	100%	Lump Sum		
5	Erosion & Sedimentation Controls	100%	Lump Sum		
6	Concrete Sidewalk	960	SY		
7	Crosswalks	2	EA		
8	Bituminous Pavement Overlay, 1.5" Thick	380	TON		
9	Concrete Curb & Gutter	3790	LF		
10	Concrete Driveway Apron Repair	15	EA		
11	Type 16 Catch Basin	3	EA		
12	ADA Ramp and DWS	5	EA		
13	Pavement Repair Strip	3790	LF		

**Total amount of Base Bid: \$ \_\_\_\_\_**

**Total amount of Base Bid in Words:**

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1.01 Bidder certifies that:

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract.
  - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process;
  - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
  - 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
  - 4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

1.02 The following documents are submitted with and made a condition of this Bid:

- A. Required Bid security.
- B. Bidder Qualification Statement.
- C. Other forms listed in Attachment A.

1.03 This Bid is submitted by: \_\_\_\_\_  
Bidder's Business Address \_\_\_\_\_  
\_\_\_\_\_  
Phone No. \_\_\_\_\_ Fax No. \_\_\_\_\_  
E-mail \_\_\_\_\_

SUBMITTED on \_\_\_\_\_, 20\_\_\_\_.  
If Bidder is:

An Individual



Name (typed or printed): \_\_\_\_\_

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

(Individual's signature)

Doing business as: \_\_\_\_\_

A Partnership

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

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

(Signature of general partner -- attach evidence of authority to sign)

Name (typed or printed): \_\_\_\_\_

A Corporation

Corporation Name: \_\_\_\_\_ (SEAL)

State of Incorporation: \_\_\_\_\_

Type (General Business, Professional, Service, Limited Liability): \_\_\_\_\_

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

(Signature -- attach evidence of authority to sign)

Name (typed or printed): \_\_\_\_\_

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

(CORPORATE SEAL)

Attest \_\_\_\_\_

Date of Qualification to do business in [State where Project is located] is \_\_\_\_/\_\_\_\_/\_\_\_\_.

A Joint Venture

Name of Joint Venture: \_\_\_\_\_

First Joint Venturer Name: \_\_\_\_\_ (SEAL)

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

(Signature of first joint venture partner -- attach evidence of authority to sign)



Name (typed or printed): \_\_\_\_\_

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

Second Joint Venturer Name: \_\_\_\_\_ (SEAL)

By: \_\_\_\_\_  
(Signature of second joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): \_\_\_\_\_

Title: \_\_\_\_\_  
(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)

**\*\*The above unit prices include all labor, materials, equipment, haulage, services, overhead, profit, insurance and other incidentals to cover the complete scope of work.\*\***

Submittal of bid indicates your compliance with the specifications or explanation of deviations, if applicable. These specifications are the minimum requirements for the outline scope of project work. Any and ALL exceptions to these specifications shall be noted. A full explanation of the deviation, as to what is proposed, shall be provided on a separate page entitled "Exceptions to Specifications".

Start date required after receipt of Notice to Proceed: \_\_\_\_\_

Will you offer a prompt payment discount? Yes [ ] or No [ ] (Net 30 days)

If Yes, the Payment Discount is \_\_\_\_\_% for payment within \_\_\_\_\_ calendar days, which will be computed from the date delivery is made and is accepted by the Town, or the date a proper invoice is received, whichever is later.

**PAYMENT DISCOUNTS SHALL BE CONSIDERED IN AWARDING THE CONTRACT AS SET FORTH IN THE "GENERAL PROVISIONS/INSTRUCTIONS TO BIDDERS, NUMBER 23."**



## **Bidder Checklist**

- [ ] Bidder Registration Form
- [ ] Completed Bid Schedule
- [ ] Bid Bond
- [ ] Contractor's License
- [ ] Certificate of Familiarity
- [ ] Signed Addendum(s) (if applicable)
- [ ] Proof of Liability/Worker's Compensation Insurances
- [ ] Reference Information (if required)

**TECHNICAL SPECIFICATIONS**

**(W. 2<sup>nd</sup> North Street Sidewalk Improvements)**

## **Table of Contents**

**015000 - Temporary Facilities and Controls**

**033000 - Cast-In-Place Concrete**

**311000 - Site Clearing and Restoration**

**312000 - Earth Moving**

**312317 - Trenching**

**321216 - Asphalt Paving**

**321313 - Concrete Paving**

**321723 - Pavement Markings**

**321726 - Tactile Warning Surfacing**

**329200 - Turf and Grasses**

## SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
  - 1. Section 031100 "Site Clearing and Restoration"

#### 1.2 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Construction Manager, testing agencies, and authorities having jurisdiction.

### PART 2 - PRODUCTS

#### 2.1 TEMPORARY FACILITIES

- A. Concrete Wash-Out: Temporary or portable and of sufficient size to accommodate concrete construction activities and properly contain concrete wash-out performed on-site.

#### 2.2 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

### PART 3 - EXECUTION

#### 3.1 TEMPORARY UTILITY INSTALLATION

- A. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- B. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from

adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

- C. **Ventilation and Humidity Control:** Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- D. **Electric Power Service:** Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
  - 1. Install electric power service overhead unless otherwise indicated.
- E. **Lighting:** Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
  - 1. Install and operate temporary lighting that fulfills Contractor's security and protection requirements without operating entire system.

### 3.2 SUPPORT FACILITIES INSTALLATION

- A. **Traffic Controls:** Comply with requirements of authorities having jurisdiction.
  - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
  - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- B. **Dewatering Facilities and Drains:** Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
  - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
  - 2. Remove snow and ice as required to minimize accumulations.
- C. **Concrete Washout Facilities:** Comply with requirements of authorities having jurisdiction. Maintain Project site free of concrete wash-out.
- D. **Waste Disposal Facilities:** Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction.
- E. **Lifts and Hoists:** Provide facilities necessary for hoisting materials and personnel.

### 3.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. **Protection of Existing Facilities:** Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

- B. **Environmental Protection:** Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- A. **Temporary Erosion and Sedimentation and Stormwater Control:** Comply with Contract Drawings and South Carolina DHEC requirements and requirements specified in Section 311000 "Site Clearing."
- B. **Barricades, Warning Signs, and Lights:** Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- C. **Tree and Plant Protection:** Comply with requirements specified in Section 015639 "Temporary Tree and Plant Protection."
- D. **Tree and Plant Protection:** Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

#### 3.4 OPERATION, TERMINATION, AND REMOVAL

- A. **Supervision:** Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. **Maintenance:** Maintain facilities in good operating condition until removal.
  - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. **Termination and Removal:** Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.

END OF SECTION 015000

West 2<sup>nd</sup> N. Street St. Sidewalk Improvements  
Town of Summerville  
JMT Job No.: 16-1371-001

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## SECTION 033000 - CAST-IN-PLACE CONCRETE

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. Related Requirements:
  - 1. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.
  - 2. Section 321313 "Concrete Paving" for concrete pavement and walks.

#### 1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
  - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
  2. Steel reinforcement and accessories.
  3. Bonding agents.
  4. Adhesives.
- B. Field quality-control reports.

#### 1.6 QUALITY ASSURANCE

- A. **Manufacturer Qualifications:** A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. **Testing Agency Qualifications:** An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. **Steel Reinforcement:** Deliver, store, and handle steel reinforcement to prevent bending and damage.

#### 1.8 FIELD CONDITIONS

- A. **Cold-Weather Placement:** Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
  2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
  3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. **Hot-Weather Placement:** Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

## PART 2 - PRODUCTS

### 2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301.
2. ACI 117.

### 2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
  1. Plywood, metal, or other approved panel materials.
  2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
    - a. High-density overlay, Class 1 or better.
    - b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
    - c. Structural 1, B-B or better; mill oiled and edge sealed.
    - d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
  3. Overlaid Finnish birch plywood.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
- D. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.
- E. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.
- F. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- G. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

H. **Form-Release Agent:** Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

I. **Form Ties:** Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.

## 2.3 STEEL REINFORCEMENT

A. **Low-Alloy-Steel Reinforcing Bars:** ASTM A 706/A 706M, deformed.

## 2.4 REINFORCEMENT ACCESSORIES

A. **Bar Supports:** Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

## 2.5 CONCRETE MATERIALS

A. **Source Limitations:** Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

B. **Cementitious Materials:**

1. **Portland Cement:** ASTM C 150/C 150M, Type I.
2. **Fly Ash:** ASTM C 618, Class F or C.
3. **Slag Cement:** ASTM C 989/C 989M, Grade 100 or 120.
4. **Silica Fume:** ASTM C 1240, amorphous silica.

C. **Normal-Weight Aggregates:** ASTM C 33/C 33M, coarse aggregate or better, graded. Provide aggregates from a single source.

1. **Maximum Coarse-Aggregate Size:** 1 inch nominal.
2. **Fine Aggregate:** Free of materials with deleterious reactivity to alkali in cement.

D. **Air-Entraining Admixture:** ASTM C 260/C 260M.

- E. **Chemical Admixtures:** Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
  - 1. **Water-Reducing Admixture:** ASTM C 494/C 494M, Type A.
  - 2. **Retarding Admixture:** ASTM C 494/C 494M, Type B.
  - 3. **Water-Reducing and Retarding Admixture:** ASTM C 494/C 494M, Type D.
  - 4. **High-Range, Water-Reducing Admixture:** ASTM C 494/C 494M, Type F.
  - 5. **High-Range, Water-Reducing and Retarding Admixture:** ASTM C 494/C 494M, Type G.
  - 6. **Plasticizing and Retarding Admixture:** ASTM C 1017/C 1017M, Type II.
- F. **Set-Accelerating Corrosion-Inhibiting Admixture:** Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494/C 494M, Type C.
- G. **Non-Set-Accelerating Corrosion-Inhibiting Admixture:** Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.
- H. **Water:** ASTM C 94/C 94M and potable.

## 2.6 CURING MATERIALS

- A. **Evaporation Retarder:** Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. **Absorptive Cover:** AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. **Moisture-Retaining Cover:** ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. **Water:** Potable.
- E. **Clear, Waterborne, Membrane-Forming Curing Compound:** ASTM C 309, Type 1, Class B, dissipating.
- F. **Clear, Waterborne, Membrane-Forming Curing Compound:** ASTM C 309, Type 1, Class B, nondissipating.
- G. **Clear, Waterborne, Membrane-Forming Curing Compound:** ASTM C 309, Type 1, Class B, 18 to 25 percent solids, nondissipating.
- H. **Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound:** ASTM C 1315, Type 1, Class A.
- I. **Clear, Waterborne, Membrane-Forming Curing and Sealing Compound:** ASTM C 1315, Type 1, Class A.

## 2.7 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751.
- B. Bonding Agent: ASTM C 1059/C 1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.
- C. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
  - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

## 2.8 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
  - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: **Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:**
  - 1. Fly Ash: 25 percent.
  - 2. Combined Fly Ash and Pozzolan: 25 percent.
  - 3. Slag Cement: 50 percent.
  - 4. Combined Fly Ash or Pozzolan and Slag Cement: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
  - 5. Silica Fume: 10 percent.
  - 6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
  - 7. Combined Fly Ash or Pozzolans, Slag Cement, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to [1.00] percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
  - 1. Use water-reducing admixture in concrete, as required, for placement and workability.
  - 2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
  - 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.
  - 4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

## 2.9 CONCRETE MIXTURES FOR STRUCTURAL ELEMENTS

### A. Normal-weight concrete.

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum W/C Ratio: 0.40.
3. Slump Limit: as indicated by approved mix design.
4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.

## 2.10 FABRICATING REINFORCEMENT

### A. Fabricate steel reinforcement according to CRST's "Manual of Standard Practice."

## 2.11 CONCRETE MIXING

### A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

## PART 3 - EXECUTION

### 3.1 FORMWORK INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Construct forms tight enough to prevent loss of concrete mortar.
- D. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
  1. Install keyways, reglets, recesses, and the like, for easy removal.
  2. Do not use rust-stained steel form-facing material.
- E. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

- F. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- G. Chamfer exterior corners and edges of permanently exposed concrete.
- H. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- I. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- J. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- K. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

### 3.2 EMBEDDED ITEM INSTALLATION

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
  - 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
  - 3. Install dovetail anchor slots in concrete structures as indicated.

### 3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.
  - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.

- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

### 3.4 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

### 3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
  - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
  - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
  - 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
  - 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
  - 5. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
  - 6. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

### 3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
  - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
  - 1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
  - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
  - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

### 3.7 FINISHING FORMED SURFACES

- A. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  - 1. Apply to concrete surfaces exposed to public view.
- B. Rubbed Finish: Apply the following to smooth-formed-finished as-cast concrete where indicated:
  - 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
  - 2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix 1 part portland cement to 1-1/2 parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces.

Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.

- C. **Related Unformed Surfaces:** At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

### 3.8 FINISHING FLOORS AND SLABS

- A. **General:** Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Match Concrete Paving Specification 321313.

### 3.9 MISCELLANEOUS CONCRETE ITEM INSTALLATION

- A. **Filling In:** Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

### 3.10 CONCRETE PROTECTING AND CURING

- A. **General:** Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. **Evaporation Retarder:** Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. **Formed Surfaces:** Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
- D. **Unformed Surfaces:** Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. **Cure concrete according to ACI 308.1, by one or a combination of the following methods:**
  - 1. **Moisture Curing:** Keep surfaces continuously moist for not less than seven days with the following materials:
    - a. Water.

- b. Continuous water-fog spray.
    - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
  2. **Moisture-Retaining-Cover Curing:** Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
    - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
  3. **Curing Compound:** Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
  4. **Curing and Sealing Compound:** Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

### 3.11 FIELD QUALITY CONTROL

- A. **Testing Agency:** The Contractor will engage a qualified independent testing agency to perform concrete tests. Tests shall be performed while a representative of the client is present.
- B. **Inspections:**
  1. Steel reinforcement placement.
  2. Steel reinforcement welding.
  3. Headed bolts and studs.
  4. Verification of use of required design mixture.
  5. Concrete placement, including conveying and depositing.
  6. Curing procedures and maintenance of curing temperature.
  7. Verification of concrete strength before removal of shores and forms from beams and slabs.
- C. **Concrete Tests:** Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:
  1. **Testing Frequency:** Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.

- a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31/C 31M.
  - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
  - a. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
7. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
8. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
9. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
10. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
12. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

END OF SECTION 033000

## SECTION 311000 - SITE CLEARING AND RESTORATION

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Clearing and grubbing.
2. Stripping and removal / stockpiling topsoil.
3. Removing above- and below-grade site improvements.
4. Temporary erosion and sedimentation control measures.
5. Site restoration and seeding.

##### B. Related Sections:

1. Division 1 Section "Temporary Facilities and Controls"
2. Division 32 Section "Turf and Grasses" for seeding and landscape restoration.

#### 1.2 DEFINITIONS

- A. **Subsoil:** All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- B. **Surface Soil:** Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- C. **Topsoil:** Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.
- D. **Plant-Protection Zone:** Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.
- E. **Tree-Protection Zone:** Area surrounding individual trees or groups of trees to be protected during construction as indicated on Drawings and as indicated according to requirements in Section 015639 "Temporary Tree and Plant Protection."
- F. **Vegetation:** Trees, shrubs, groundcovers, grass, and other plants.

### 1.3 MATERIAL OWNERSHIP

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

### 1.4 INFORMATION SUBMITTALS

- A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
  - 1. Use sufficiently detailed photographs or video recordings.
  - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designated to remain.
- B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

### 1.5 PROJECT CONDITIONS

- A. Utility Locator Service: Notify PUPS (Palmetto Utility Protection Service) for area where Project is located before site clearing.
- B. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
  - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- C. Do not commence site clearing operations until temporary erosion- and sedimentation-control measures are in place.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Division 31 Section "Earth Moving."
  - 1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

## 2.2 SEED

- A. Seed mix for temporary and permanent seeding shall be as shown on the Drawings and as specified in section "Turf and Grasses" or approved equal.

## 2.3 TOPSOIL

- A. ASTM D5268 topsoil, with pH range of 6.0 to 7.0; free of stones 1/2 inch or larger in any dimension and other extraneous materials harmful to plant growth.
- B. Topsoil shall not contain any subsoil. Topsoil shall be free from plants, plant parts, Bermuda grass, Quack grass, Johnsongrass, Nutsedge, poison ivy, Canada thistle and other plant material. It shall not contain slag, cinders, lumps, sticks, roots, trash, glass, rocks, gravel, stones, woodchips, sawdust or any other extraneous material.
- C. Organic content shall be 1.5 to 5.0 percent, by weight.
- D. Gradation as follows:

100% passing the No.4 sieve  
80% passing the No. 10 sieve\*

\*material passing the No. 10 sieve shall be as follows:

Sand	20% to 35%
Silt	25% to 50%
Clay	10% to 25%

## 2.4 MULCH

- A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

## 2.5 FERTILIZERS

- A. As shown on the Drawings or approved equal.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.

- B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed.
- C. Protect existing site improvements to remain from damage during construction.
  - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

### 3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion and sedimentation control measures and notes on the Drawings.
- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

### 3.3 EXISTING UTILITIES

- A. Locate, identify, and disconnect utilities indicated to be abandoned in place.
- B. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
  - 1. Notify Engineer not less than 2 days in advance of proposed utility interruptions.
  - 2. Do not proceed with utility interruptions without Engineer's written permission.
- C. Excavate for and remove underground utilities indicated to be removed.

### 3.4 TREE AND PLANT PROTECTION

- A. Protect trees and plants remaining on-site.
- B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations.

### 3.5 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
  2. Grind down stumps and remove roots larger than 2 inches in diameter, obstructions, and debris to a depth of 18 inches below exposed subgrade.
  3. Use only hand methods or air spade for grubbing within protection zones.
  4. Chip removed tree branches and dispose of off-site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
- C. Place fill material in horizontal layers not exceeding a loose depth of 8 inches and compact each layer to a density equal to adjacent original ground.

### 3.6 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil in a manner to prevent intermingling with underlying subsoil or other waste materials.
1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects more than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
1. Limit height of topsoil stockpiles to 35 feet.
  2. Do not stockpile topsoil within protection zones.
  3. Stockpile surplus topsoil to allow for respreading deeper topsoil.
  4. Do not compact or stockpile topsoil in a wet or frozen condition.

### 3.7 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
1. Unless existing full-depth joints coincide with line of demolition, sawcut and straight along line of existing pavement to remain before removing adjacent existing pavement. Sawcut faces vertically.

### 3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

- B. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.
- C. All demolition waste and construction debris shall be removed by the contractor and disposed of in a state approved waste site and in accordance with all local and state codes and permit requirements.

END OF SECTION 311000

**West 2<sup>nd</sup> N. Street St. Sidewalk Improvements**  
**Town of Summerville**  
**JMT Job No.: 16-1371-001**

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## SECTION 312000 - EARTH MOVING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract apply to this section.

#### 1.2 SUMMARY

##### A. Section Includes:

1. Excavating and filling for rough grading the Site.
2. Preparing subgrades.
3. Base courses for pavements.
4. Excavation and backfilling for buildings and structures.

##### B. Related Sections:

1. Division 01 Section "Temporary Facilities and Controls" for temporary controls, utilities, and support facilities.
2. Division 31 Section "Site Clearing and Restoration" for grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities, and seeding restoration.
3. Division 32 Section "Turf and Grasses" for finish grading in turf and grass areas, including preparing and placing planting soil for turf areas.

#### 1.3 SUBMITTALS

- A. Documentation of disposal of asphalt pavement at a landfill.

#### 1.4 DEFINITIONS

- A. **Backfill:** Soil material or controlled low-strength material used to fill an excavation.
  1. **Initial Backfill:** Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
  2. **Final Backfill:** Backfill placed over initial backfill to fill a trench.
- B. **Base Course:** Aggregate layer placed between the subbase course and hot-mix asphalt paving.
- C. **Bedding Course:** Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
- D. **Borrow Soil:** Satisfactory soil imported from off-site for use as fill or backfill.

- E. **Drainage Course:** Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- F. **Excavation:** Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
- G. **Fill:** Soil materials used to raise existing grades. Requires FP-001 certification from off-site sources.
- H. **Structures:** Buildings, footings, foundations, slabs, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- I. **Subbase Course:** Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- J. **Subgrade:** Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- K. **Utilities:** On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

## **PART 2 - PRODUCTS**

### **2.1 SOIL MATERIALS**

- A. **General:** Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. **Satisfactory Soils:** Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487 or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. **Unsatisfactory Soils:** Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D2487, or a combination of these groups.
  - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. **Subbase Material:** Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- E. **Base Course:** Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 294/D 2940M 0; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

- F. **Engineered Fill:** Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- G. **Sand:** ASTM C 33/C 33M; fine aggregate.
- H. **Topsoil:** Friable clay loam surface soil. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stone and other objects over one inch in diameter, and without weeds, roots and other objectionable material.
  - 1. Topsoil shall contain not less than 2% or more than 10% organic matter, as determined by AASHTO Designation T-164.
  - 2. On-site topsoil shall not be used.
  - 3. Obtain topsoil from a source where the soil has proven ability to grow crops.
  - 4. Furnished topsoil shall meet the following grade analysis:

<u>Sieve</u>	<u>Minimum Percent Passing</u>
1"	100
No. 4	75
No. 10	60

- 5. All materials unsuitable for use as topsoil shall become the property of the Contractor and shall be expeditiously removed from the site.

## 2.2 GEOTEXTILE

- A. For Rip Rap lining and Slope matting – SC DOT Class 1 Type B

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth moving operations.

### 3.2 UNDERCUTTING AND BACKFILLING FOR STRUCTURES:

- A. When decomposed rock is encountered at footing subgrades, the decomposed rock shall be undercut a minimum of 2 feet and replaced with compacted structural fill.

### 3.3 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
  - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

### 3.4 EXPLOSIVES

- A. Explosives: Do not use explosives.

### 3.5 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
  - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials, replace with satisfactory soil materials.
- B. All asphalt pavement to be removed as part of this Work must be removed and disposed of at a landfill. Because the asphalt has been subjected to the release of petroleum products, it cannot be used as clean fill on this or any other site.

### 3.6 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
  - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

### 3.7 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

### 3.8 EXCAVATION FOR TRENCHES

- A. Excavate trenches to uniform widths to provide the following clearance shown on the Drawings on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.
- B. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

### 3.9 SUBGRADE INSPECTION

- A. If Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- B. Proof-roll subgrade with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
  - 1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
  - 2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Engineer, and replace with compacted backfill or fill as directed.

### 3.10 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under other construction, pipe, or conduit as directed by Engineer.

### 3.11 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

### 3.12 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
  - 1. Surveying locations of underground utilities for Record Documents.
  - 2. Testing and inspecting underground utilities.
  - 3. Removing concrete formwork.
  - 4. Removing trash and debris.
  - 5. Removing temporary shoring, bracing, and sheeting.

- B. Place backfill on subgrades free of mud, frost, snow, or ice.

### 3.13 TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact final backfill using satisfactory material (see DIV 33 sections) to final subgrade elevation.

### 3.14 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material under grass and planted areas to required elevations.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

### 3.15 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
  - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
  - 2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

### 3.16 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight:
  - 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
  - 2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 95 percent.
  - 3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material 90 percent.
  - 4. For utility trenches, compact each layer of initial and final backfill soil material at 95 percent.

### 3.17 GRADING

- A. **General:** Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
  - 1. Provide a smooth transition between adjacent existing grades and new grades.
  - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. **Site Rough Grading:** Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
  - 1. Turf or Unpaved Areas: Plus or minus 1 inch.
  - 2. Walks: Plus or minus 1 inch.
  - 3. Pavements: Plus or minus 1/2 inch.

### 3.18 BASE COURSES UNDER PAVEMENTS

- A. On prepared subgrade, place base course under pavements and walks as follows:
  - 1. Place base course material over subbase course under hot-mix asphalt pavement.
  - 2. Shape base course to required crown elevations and cross-slope grades.
  - 3. Place base course 6 inches or less in compacted thickness in a single layer.
  - 4. Compact base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight.

### 3.19 PROTECTION

- A. **Protecting Graded Areas:** Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. **Repair and reestablish grades to specified tolerances** where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
  - 1. Scarify or remove and replace soil material to depth as directed by Engineer; reshape and recompact.
- C. **Where settling occurs before Project correction period elapses,** remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
  - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

### 3.21 FIELD QUALITY CONTROL

- A. Engage a qualified inspector to perform the following inspections:

1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
  2. Determine that fill material and maximum lift thickness comply with requirements.
  3. Determine, at the required frequency, that in-place density of compacted fill complies with requirements.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed by a qualified geotechnical engineering testing agency to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Engineer.
- D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
1. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet or less of wall length, but no fewer than two tests.
- E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; re-compact and retest until specified compaction is obtained.

### 3.22 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.
- B. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Engineer.
  1. Remove waste materials, including unsatisfactory soil, asphalt pavement, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

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## SECTION 312317 - TRENCHING

### PART 1 GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Compacted fill from top of utility bedding to subgrade elevations.
2. Backfilling and compaction of utility trenches.

##### B. Related Sections:

1. Section 312000 – Earth Moving.
2. Section 334113 - Storm Drainage Piping.

#### 1.2 REFERENCES

##### A. ASTM International:

1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
2. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
4. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
5. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

#### 1.3 SUBMITTALS

- ##### A. Qualifications of the Testing agency for compaction testing.

### PART 2 PRODUCTS

- #### 2.1 GENERAL – Refer to section for drainage piping for bedding and backfill materials specific to the pipe and structures for each use.

#### 2.2 EXECUTION

#### 2.3 LINES AND GRADES

- ##### A. Lay pipes to lines and grades indicated on Drawings.

1. Engineer reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.

## 2.4 PREPARATION

- A. Call Local Utility Line Information service not less than 3 business days before performing Work.
  1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum locations.
- C. Protect plant life, lawns, and other features remaining as portion of final landscaping.
- D. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- E. Maintain and protect above and below grade utilities indicated to remain.
- F. Establish temporary traffic control when trenching is performed in public right-of-way. Relocate controls as required during progress of Work.

## 2.5 TRENCHING

- A. Remove lumped subsoil, boulders, and rock up of 1/3 cubic yard, measured by volume.
- B. Do not advance open trench more than 60 feet ahead of installed pipe.
- C. Excavate trenches to uniform widths to provide the following clearance shown on the Drawings on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe unless otherwise indicated.
- D. Trench Bottoms: Excavate trenches to depth indicated and 4 inches deeper than bottom of pipe. Shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
  1. For pipes and conduit less than 6 inches in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
  2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom and 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.
  3. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade.
  4. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

- E. When subsurface materials at bottom of trench are loose or soft, notify Engineer, and request instructions. Cut out soft areas of subgrade not capable of compaction in place as directed. Backfill with material as directed by the Engineer and compact to density equal to or greater than requirements for subsequent backfill material.
- F. Correct areas over excavated areas with compacted backfill as specified for authorized excavation or replace with fill concrete as directed by the Engineer.
- G. Trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.
- H. Remove water or materials that interfere with Work.
- I. Do not interfere with 45 degree bearing splay of foundations.
- J. When Project conditions permit, slope side walls of excavation starting 2 feet above top of pipe. When side walls can not be sloped, provide sheeting and shoring to protect excavation as specified in this section.
- K. Remove excess subsoil not intended for reuse, from site. Stockpile excavated material in area designated on site.
- L. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Refer to sections for sanitary sewerage piping, storm drainage piping and water service connections for bedding materials specific to the pipe and structures for each use.

## 2.6 SHEETING AND SHORING

- A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.
- B. Support trenches more than 5 deep excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.
- C. Design sheeting and shoring to be removed at completion of excavation work.
- D. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.
- E. Repair damage to new and existing Work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.

## 2.7 BACKFILLING

- A. Backfill trenches to contours and elevations with unfrozen fill materials.
- B. Backfill voids with satisfactory soil while removing shoring and bracing.

- C. Place and compact initial backfill to a height of 12 inches over the pipe or conduit. Refer to sections for sanitary sewerage piping, storm drainage piping and water service connections for bedding and backfill materials specific to the pipe and structures for each use.
- D. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.
- E. Place material in continuous layers not to exceed 8" for heavy compaction equipment and not more than 4" for hand-operated tampers.
- F. Employ placement method that does not disturb or damage the utilities in trench.
- G. Maintain optimum moisture content of fill materials to attain required compaction density.
- H. Do not leave more than 20 feet of trench open at end of working day.
- I. Protect open trench to prevent danger to Owner, the public and workers.

## 2.8 FIELD QUALITY CONTROL

- A. Perform laboratory material tests in accordance with ASTM D1557 or ASTM D698.
- B. Perform in place compaction tests in accordance with the following:
  - 1. Density Tests: ASTM D2922.
  - 2. Moisture Tests: ASTM D3017.
- C. When tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest.
- D. Frequency of Tests: every 200 LF of trench, no fewer than 2 tests per trench.

## 2.9 PROTECTION OF FINISHED WORK

- A. Reshape and re-compact fills subjected to vehicular traffic during construction.

END OF SECTION 312317

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## SECTION 321216 - ASPHALT PAVING

### PART 1 - GENERAL

#### 1.1 SUMMARY

**A. Section Includes:**

1. Hot-mix asphalt paving.
2. Hot-mix asphalt patching.

**B. Related Sections:**

1. Division 31 Section "Earth Moving" for aggregate subbase and base courses.

#### 1.2 DEFINITION

- A. Hot-Mix Asphalt Paving Terminology:** Refer to ASTM D 8 for definitions of terms.

#### 1.3 SUBMITTALS

- A. Product Data:** For each type of product indicated. Include technical data and tested physical and performance properties.

1. **Job-Mix Designs:** Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.

- B. Material Certificates:** For each paving material, from manufacturer.

#### 1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications:** Hot Mix Asphalt: Asphalt paving-mix manufacturer registered with and approved by SCDOT.

- B. Comply with materials, workmanship, and other applicable requirements of SCDOT Standards Specifications for Highway Construction, Division 400 for flexible pavement work.**

1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

#### 1.5 PROJECT CONDITIONS

- A. Environmental Limitations:** Client Representative to authorize the release of material from the plant. Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is

imminent or expected before time required for adequate cure, or if the following conditions are not met:

1. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
2. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.
3. Prime Coat: Minimum surface temperature of 60 deg F.
4. Tack Coat: Minimum surface temperature of 60 deg F.
5. Slurry Coat: Comply with weather limitations in ASTM D 3910.

## PART 2 - PRODUCTS

### 2.1 AGGREGATES

- A. General: Use materials and gradations that have performed satisfactorily in previous installations and as approved by SCDOT. Refer to SCDOT Standards Specifications for Highway Construction, Section 401.2.2

### 2.2 ASPHALT MATERIALS

- A. Use materials that meet applicable requirements of the SCDOT Standards Specifications for Highway Construction, Section 401.2 and SC-M-402.
- B. Water: Potable.

### 2.3 MIXES

- A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes approved by SCDOT complying with the mix designations indicated on the drawings and the following requirements:
  1. Shoulder Repair Strip: HMA Surface Course, Type C (in accordance with SC-M-402)
  2. Provide mixes with a history of satisfactory performance in geographical area where Project is located.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Client Representative to verify that subgrade is dry and in suitable condition to begin paving.
  1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.

2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 10 tons.
  3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Project Manager, and replace with compacted backfill or fill as directed.
- B. Proceed with paving only after unsatisfactory conditions have been corrected.

### 3.2 TRENCH REPAIRS / MILLING / WORK ADJACENT TO EXISTING PAVEMENT

- A. Hot-Mix Asphalt Pavement: Full depth saw cut and excavate existing pavement section.
1. Saw cut milled and excavation faces vertically, neat and square.
  2. Remove milled and excavated material. Repair trenches with indicated pavement section and tack all joints prior to paving.
- B. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving in accordance with SCDOT.
1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
  2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
- C. Prime Coat: Apply uniformly to aggregate subbase surfaces prior to binder course placement, in accordance with SCDOT.

### 3.3 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving. Surface preparation to be in accordance with SCDOT Standards Specifications for Highway Construction, Section 401 and other applicable sections.
- B. Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course in accordance with SCDOT Standards Specifications for Highway Construction, Section 401.4.18 and other applicable sections.
- C. Tack Coat: Apply uniformly to surfaces of existing pavement in accordance with SCDOT Standards Specifications for Highway Construction, Section 401.4.18 and other applicable sections.

### 3.4 HOT-MIX ASPHALT PLACING

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.

2. Place hot-mix asphalt surface course in single lift.
  3. Spread mix at minimum temperature of 250 deg F.
  4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
  5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving.
- B. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.
- C. Place HMA in accordance with SCDOT Standards Specifications for Highway Construction, Section 401.4.19 and other applicable sections.

### 3.5 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course. Joints to be in accordance with SCDOT Standards Specifications for Highway Construction, Section 401.4.23 and other applicable sections.
1. Clean contact surfaces and apply tack coat to joints.
  2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
  3. Offset transverse joints, in successive courses, a minimum of 24 inches.
  4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AIMS-22, for both "Ending a Lane" and "Resumption of Paving Operations."
  5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
  6. Compact asphalt at joints to a density within 2 percent of specified course density.

### 3.6 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers. Compaction to be in accordance with SCDOT Standards Specifications for Highway Construction, Section 401.4.20 and other applicable sections.
1. Complete compaction before mix temperature cools to 175 deg F.
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

- C. **Intermediate Rolling:** Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
  - 1. **Average Density:** 96 percent of reference laboratory density according to AASHTO T 245, but not less than 94 percent nor greater than 100 percent.
- D. **Finish Rolling:** Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. **Edge Shaping:** While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. **Repairs:** Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. **Protection:** After final rolling, do not allow vehicular traffic or loads on newly compacted courses for 24 hours or until the course uniformly cools to a temperature of 140 F or less.
- H. **Erect barricades** to protect paving from traffic until mixture has cooled enough not to become marked.

### 3.7 INSTALLATION TOLERANCES

- A. **Pavement Thickness:** Compact each course to produce the thickness indicated within the following tolerances:
  - 1. **Intermediate Course:** Plus or minus 1/4 inch.
  - 2. **Surface Course:** Plus 1/8 inch no minus.
- B. **Pavement Surface Smoothness:** Compact each course to produce a smooth surface

### 3.8 FIELD QUALITY CONTROL

- A. **Project Manager** to be notified prior to paving.

### 3.9 DISPOSAL

- A. **Except for material** indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

END OF SECTION 321216

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## SECTION 321313 - CONCRETE PAVING

### PART 1 - GENERAL

#### 1.1 SUMMARY

**A. Section Includes:**

1. Driveways.
2. Sidewalks.

**B. Related Sections:**

2. Division 31 Section "Earth Moving" for preparation of base course for pavements.
3. Section 321726 "Tactile Warning Surfacing" for detectable warning mats.

#### 1.2 DEFINITIONS

- A. Cementitious Materials:** Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.
- B. W/C Ratio:** The ratio by weight of water to cementitious materials.

#### 1.3 SUBMITTALS

- A. Design Mixtures:** For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- B. Qualification Data:** For qualified ready-mix concrete manufacturer and independent testing agency.
- C. Material Certificates:** For the following, from manufacturer:
1. Cementitious materials.
  2. Admixtures
  3. Curing compounds.
  4. Joint fillers.
  5. Applied finish materials
- D. Field quality-control reports.**

#### 1.4 QUALITY ASSURANCE

- A. **Ready-Mix-Concrete Manufacturer Qualifications:** A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- B. **Testing Agency Qualifications:** Qualified according to ASTM C1077 and ASTM E329 for testing indicated.
  - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- C. **ACI Publications:** Comply with ACI 301 unless otherwise indicated.
- D. **Preinstallation Conference:** Conduct conference at Project site.
  - 1. Review methods and procedures related to concrete paving, including but not limited to, the following:
    - a. Concrete mixture design.
    - b. Quality control of concrete materials and concrete paving construction practices.
    - c. Joint layout.

#### 1.5 PROJECT CONDITIONS

- A. **Traffic Control:** Maintain access for vehicular and pedestrian traffic as required for other construction activities.
- B. **Pavement-Marking:** Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F and not exceeding 95 deg F.
- C. **Cold-Weather Placement:** Unless otherwise permitted in writing, discontinue concreting operations when the descending air temperature, away from artificial heat, falls to 40F. Do not resume operations until the air temperature, away from artificial heat, rises above 40F. Do not let water with a temperature above 90F to come in direct contact with the cement, until the cement has been mixed with the aggregates. Place concrete when the concrete temperature is between 50F and 90F. Do not use materials containing frost, lumps, or crusts of hardened materials. Do not place concrete on frozen base, subbase, or subgrade.
- D. **Hot Weather Placement:** When the air temperature in the immediate vicinity of concrete operations rises to 85F, take thermometer readings of the plastic concrete, at 1/2-hour intervals and at the conclusion of the mixing cycles. Discontinue concrete operations if the plastic concrete temperature exceeds 90F after mixing. When the plastic concrete temperature rises to 90F, cool the mixing water or aggregates to maintain a plastic concrete temperature within 50F to 90F at the time of placing.

## PART 2 - PRODUCTS

### 2.1 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

### 2.2 CONCRETE MATERIALS

- A. All aggregate, water, and admixtures shall be in accordance with SCDOT Standards Specifications for Highway Construction, Division 500 for required design mix of concrete.

### 2.3 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

### 2.4 RELATED MATERIALS

- A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber in preformed strips.
- B. Joint Sealant: SCDOT Standards Specifications for Highway Construction, Section 501.2.

### 2.5 CONCRETE MIXTURES

- A. For sidewalk and driveways: Class 2500 (Non Structural), in accordance with SCDOT Standards Specifications for Highway Construction, Section 701.2.12.2.

## 2.6 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M.
  - 1. Furnish batch certificates for each batch discharged and used in the Work.
  - 2. When air temperature is between 85 and 90 deg F reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.
  - 1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.
  - 2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 10 tons.
  - 3. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch according to requirements in Division 31 Section "Earth Moving."
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

### 3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

### 3.4 JOINTS

- A. **Isolation Joints:** Form isolation joints of preformed joint-filler strips abutting catch basins, manholes, inlets, structures, other fixed objects, and where indicated.
1. Extend joint fillers full width and depth of joint.
  2. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
  3. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
  4. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
  5. Seal joints. Clean joints of all scale, dirt, curing compound, and other foreign material with a mechanized wire brush.
  6. Do not place poured joint-sealing material if the air temperature is less than 40 deg. F, unless permitted. Use heating equipment of an indirect heating type, constructed as a double boiler. Provide positive temperature control and mechanical agitation. Obtain the safe heating temperature and recommended pouring temperature from the manufacturer's shipping container. Place the material within this temperature range, but as close as possible to the recommended pouring temperature. Maintain a safe heating temperature. Maintain a single material batch at the pouring temperature for no more than 4 hours. Heat the material only once.
  7. Fill the joint reservoir, created by the cleaning operation, with sealing material to a depth 1/8 inch below the top of concrete. Do not allow sealing material to spread over concrete surfaces.
- B. **Contraction Joints:** Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Joints shall be straight and continuous, not staggered.
1. **Sawed Joints:** Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
  2. **Spacing:** 20 feet maximum.
  3. If using early-entry saw, make saw cuts within 1 to 4 hours, at 1" depth.
  4. If using conventional wet-cut or dry-cut saw, wait until concrete achieves 500 psi strength (4-12 hours depending on temperature and humidity) and cut to a depth of 1/4" per 1" of pavement thickness.
- C. **Edging:** After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes.
- D. **Sidewalk:** Form transverse dummy joints at score interval shown on drawings, approximately 1/8 inch wide, and at least 1 inch deep.

### 3.5 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation and items to be embedded or cast-in.
- B. Remove snow, ice, or frost from subbase surface before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
  - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating dowels and joint devices.
- H. Screed paving surface with a straightedge and strike off.
- I. Commence initial floating using bull floats to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- J. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
  - 1. When air temperature has fallen to or is expected to fall below 40 deg F uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
  - 2. Do not use frozen materials or materials containing ice or snow.
  - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
- K. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
  - 1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature,

provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

**L. Repair Adjacent Pavements:**

1. Repair maximum 2 foot wide Hot Mix Asphalt (HMA) pavement as required to provide a neat and square sealed edge along new concrete and existing HMA pavement.
2. Seal all joints and tack coat all vertical surfaces with AC-20 or PG64-22 asphalt cement.
3. HMA pavement to be as shown and in accordance SCDOT Standards Specifications for Highway Construction, Division 400.

**3.6 FLOAT FINISHING**

- A. General:** Do not add water to concrete surfaces during finishing operations.
- B. Float Finish:** Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
1. **Burlap Finish:** Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
  2. **Medium-to-Fine-Textured Broom Finish:** Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

**3.7 CONCRETE PROTECTION AND CURING**

- A. General:** Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.**
- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.**
- D. Curing Methods:** Cure concrete by any one or a combination of these as follows:
1. **Moisture Curing:** Keep surfaces continuously moist for not less than seven days with the following materials:
    - a. Water.
    - b. Continuous water-fog spray.
    - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. **Moisture-Retaining-Cover Curing:** Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period using cover material and waterproof tape.
  3. **Curing Compound:** Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas that have been subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period. Sealing compound to be applied in accordance with manufacturer recommendations.
- E. Protect concrete from rain before its initial set. If rain is imminent, stop paving and cover the concrete surface with protective material in accordance with SCDOT approved methods.

### 3.8 DETECTABLE WARNING INSTALLATION

- A. **Cast-in-Place Detectable Warning Tiles:** Form blockouts in concrete for installation of tiles specified in Section 321726 "Tactile Warning Surfacing." Screed surface of concrete where tiles are to be installed to elevation, so that edges of installed tiles will be flush with surrounding concrete paving. Embed tiles in fresh concrete to comply with Section 321726 "Tactile Warning Surfacing" immediately after screeding concrete surface.

### 3.9 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:
1. Elevation: 3/4 inch.
  2. Thickness: Plus 3/8 inch, minus 1/4 inch.
  3. Surface: Gap below 10-foot- long, unlevelled straightedge not to exceed 1/2 inch.
  4. Lateral Alignment and Spacing of Dowels: 1 inch
  5. Vertical Alignment of Dowels: 1/4 inch.
  6. Joint Spacing: 3 inches.
  7. Contraction Joint Depth: Plus 1/4 inch, no minus.
  8. Joint Width: Plus 1/8 inch, no minus.

### 3.10 FIELD QUALITY CONTROL

- A. **Testing Agency:** The Contractor will engage a qualified independent testing agency to perform concrete tests. Tests shall be performed while a representative of the client is present.
- B. **Testing Services:** Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. **Testing Frequency:** Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day. Provide a minimum of 4 samples.

2. **Slump:** ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
  3. **Air Content:** ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  4. **Concrete Temperature:** ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.
  5. **Compression Test Specimens:** ASTM C 31/C 31M; cast and laboratory cure one set of four (4) standard cylinder specimens for each composite sample.
  6. **Compressive-Strength Tests:** ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days. Hold one in reserve.
    - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.
- C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- D. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- E. **Additional Tests:** Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer.
- F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- G. Submit test and inspection reports to the Engineer within 24 hours of each test.

### 3.11 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Engineer.
- B. Drill test cores, where directed by Engineer, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.

- C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

### 3.12 SITE RESTORATION

- A. If necessary, repair adjacent bituminous pavement for smooth transition to the new concrete pavement and repair areas of bituminous pavement damaged during construction. Full depth bituminous repairs will match the existing pavement type and thickness.

END OF SECTION 321313

## SECTION 321723 – PAVEMENT MARKINGS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes painted markings applied to asphalt and concrete pavement.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- 1. Include technical data and tested physical and performance properties.

- B. Shop Drawings: For pavement markings.

- 1. Indicate pavement markings, colors, lane separations, defined parking spaces, and dimensions to adjacent work.
- 2. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.

#### 1.3 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of SCDOT for pavement-marking work.

#### 1.4 FIELD CONDITIONS

- A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature in accordance with the manufacturer's recommendations, and not exceeding 95 deg F.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design".

## 2.2 PAVEMENT MARKINGS

- A. For symbols, Crosswalks, Stop Bars or as noted on the plans: Hot Thermoplastic – materials per AASHTO M 249
  - 1. Color: White (or as noted) – satisfies the chromaticity coordinates list in Section 627 of the SCDOT Standards Specifications for Highway Construction.
- B. For roadway marking: Epoxy Pavement Markings in accordance with Section 626 of the SCDOT Standards Specifications for Highway Construction.
- C. Reflective Glass Beads: SCDOT Standards Specifications for Highway Construction, Section 627.2.3.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that pavement is dry and in suitable condition to begin pavement marking according to manufacturer's written instructions.
- B. Proceed with pavement marking only after unsatisfactory conditions have been corrected.

### 3.2 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with the Engineer.
- B. Allow concrete paving to age for a minimum of 30 days before starting pavement marking.
- C. Allow HMA paving to cure for a minimum of 96 hours before starting pavement marking. Apply markings prior to opening pavement for use.
- D. Sweep and clean surface to eliminate loose material and dust.
- E. For proper adhesion of thermoplastic, perform surface preparation of the road surface and provide the pretreatment recommended by the manufacturer. Clean the pavement surface where the hot thermoplastic pavement markings will be applied. Remove any contaminants that would hinder adhesion. Clear any loose dirt and other debris from the application area.
- F. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.
  - 1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to pavement. Mask an extended area beyond edges of each stencil to prevent paint application beyond stencil. Apply paint so that it cannot run beneath stencil.

2. Broadcast glass beads uniformly into wet markings at a rate of 6 lb/gal.

### 3.3 PROTECTING AND CLEANING

- A. Protect pavement markings from damage and wear during remainder of construction period.
- B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 321723

## SECTION 321726 - TACTILE WARNING SURFACING

### PART 1 - GENERAL

#### 1.1 SUMMARY

**A. Section Includes:**

1. Cast-in-place detectable warning tiles.

**B. Related Requirements:**

1. Section 321313 "Concrete Paving" for concrete walkways serving as substrates for tactile warning surfacing.

#### 1.2 ACTION SUBMITTALS

**A. Product Data:** For each type of product.

**B. Samples for Initial Selection:** For each type of exposed finish requiring color selection.

**C. Samples for Verification:** For each type of tactile warning surface, in manufacturer's standard sizes unless otherwise indicated, showing edge condition, truncated-dome pattern, texture, color, and cross section; with fasteners and anchors.

#### 1.3 CLOSEOUT SUBMITTALS

**A. Maintenance Data:** For tactile warning surfacing, to include in maintenance manuals.

#### 1.4 PROJECT CONDITIONS

**A. Weather Limitations for Mortar and Grout:**

1. **Cold-Weather Requirements:** Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
2. **Hot-Weather Requirements:** Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602. Provide artificial shade and windbreaks, and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F and higher.
3. When ambient temperature exceeds 100 deg F, or when wind velocity exceeds 8 mph and ambient temperature exceeds 90 deg F, set unit pavers within 1 minute of spreading setting-bed mortar.

## 1.5 WARRANTY

- A. **Special Warranty: Manufacturer agrees to repair or replace components of tactile warning surfaces that fail in materials or workmanship within specified warranty period.**
  - 1. **Failures include, but are not limited to, the following:**
    - a. **Deterioration of finishes beyond normal weathering and wear.**
    - b. **Separation or delamination of materials and components.**
  - 2. **Warranty Period: Five years from date of Substantial Completion.**

## PART 2 - PRODUCTS

### 2.1 TACTILE WARNING SURFACING, GENERAL

- A. **Accessibility Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities ICC A117.1 for tactile warning surfaces.**
  - 1. **For tactile warning surfaces composed of multiple units, provide units that when installed provide consistent side-to-side and end-to-end dome spacing that complies with requirements.**
- B. **Recycled Content of Detectable Warning Tiles: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.**

### 2.2 DETECTABLE WARNING TILES

- A. **Cast-in-Place Detectable Warning Tiles: Accessible truncated-dome detectable warning tiles with replaceable surface configured for setting flush in new concrete walkway surfaces, with slip-resistant surface treatment on domes and field of tile.**
  - 1. **Material: Cast-fiber-reinforced polymer concrete tile or Molded glass- and carbon-fiber-reinforced polyester.**
  - 2. **Color: Safety yellow.**
  - 3. **Shapes and Sizes:**
    - a. **Rectangular panel, 24 inches deep, spanning the entire length of the depressed curb.**
    - b. **Radius panel, nominal 24 inches deep, spanning the entire length of the depressed curb. Radius to match curb radius.**
  - 4. **Dome Spacing and Configuration to be ADA compliant.**
  - 5. **Mounting:**
    - a. **Permanently embedded detectable warning tile wet-set into freshly poured concrete. Tile/surfacing to span the entire length of the depressed curb / walkway.**

- b. Detectable warning tile set into formed recess in concrete and adhered with mortar.
- c. Replaceable detectable warning tile wet-set into freshly poured concrete and surface-fastened to permanently embedded anchors.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify that pavement is in suitable condition to begin installation according to manufacturer's written instructions. Verify that installation of tactile warning surfacing will comply with accessibility requirements upon completion.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 INSTALLATION OF TACTILE WARNING SURFACING**

- A. General: Prepare substrate and install tactile warning surfacing according to manufacturer's written instructions unless otherwise indicated.
- B. Place tactile warning surfacing units in dimensions and orientation indicated. Comply with location requirements of AASHTO MP 12.

#### **3.3 INSTALLATION OF DETECTABLE WARNING TILES**

##### **A. Cast-in-Place Detectable Warning Tiles:**

- 1. Concrete Paving Installation: Comply with installation requirements in Section 321313 "Concrete Paving." Mix, place, and finish concrete to conditions complying with detectable warning tile manufacturer's written requirements for satisfactory embedment of tile.
- 2. Set each detectable warning tile accurately and firmly in place and completely seat tile back and embedments in wet concrete by tamping or vibrating. If necessary, temporarily apply weight to tiles to ensure full contact with concrete.
- 3. Set surface of tile flush with surrounding concrete and adjacent tiles, with variations between tiles and between concrete and tiles not exceeding plus or minus 1/8 inch from flush.
- 4. Protect exposed surfaces of installed tiles from contact with wet concrete. Complete finishing of concrete paving surrounding tiles. Remove concrete from tile surfaces.
- 5. Clean tiles using methods recommended in writing by manufacturer.

##### **B. Removable Cast-in-Place Detectable Warning Tiles:**

- 1. Concrete Paving Installation: Comply with installation requirements in Section 321313 "Concrete Paving." Mix, place, and finish concrete to conditions complying with detectable warning tile manufacturer's written requirements for satisfactory embedment of removable tile.

2. Set each detectable warning tile accurately and firmly in place with embedding anchors and fasteners attached, and firmly seat tile back in wet concrete by tamping or vibrating. If necessary, temporarily apply weight to tiles to ensure full contact with concrete.
3. Set surface of tile flush with surrounding concrete and adjacent tiles, with variations between tiles and between concrete and tiles not exceeding plus or minus 1/8 inch from flush.
4. Protect exposed surfaces of installed tiles from contact with wet concrete. Complete finishing of concrete paving surrounding tiles. Remove concrete from tile surfaces.
5. Clean tiles using methods recommended in writing by manufacturer.

### 3.4 CLEANING AND PROTECTION

- A. Remove and replace tactile warning surfacing that is broken or damaged or does not comply with requirements in this Section. Remove in complete sections from joint to joint unless otherwise approved by Architect. Replace using tactile warning surfacing installation methods acceptable to Architect.
- B. Protect tactile warning surfacing from damage and maintain free of stains, discoloration, dirt, and other foreign material.

END OF SECTION 321726

## SECTION 329200 - TURF AND GRASSES

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. SECTION INCLUDES

1. Soil preparation to include tilling, incorporation of soil supplements.
2. Obtain and place additional topsoil required to develop seedbed.
3. Preparation of seedbed
4. Furnishing and application of grass seed mix on lawn areas.
5. Mulching of all seeded areas.
6. Repair of erosion areas and maintenance until seeded areas are accepted.
7. Maintenance of lawns.

##### B. RELATED SECTIONS

1. Section 312000 – “Earth Moving”

#### 1.2 SUBMITTALS

- A. The materials in these specifications shall be obtained from a dealer or manufacturer whose product is shown by analysis to fulfill the guarantee claimed by the producer. Provide samples of materials. Upon approval of samples, delivery of materials may begin. Approved samples shall be stored on site and protected until furnishing of materials is completed.

#### 1.3 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are familiar with the specified requirements and the method needed for proper performance of the work of this section.
- B. Use equipment adequate in size, capacity, and numbers to accomplish the work of this section in a timely manner.
- C. **Planting Restrictions:** Plant during one of the following periods.
1. **Permanent and Temporary Vegetation Seeding Schedule:** As indicated on the drawings and in accordance with SCDOT Standards Specifications for Highway Construction, Section 810.2.3.
- D. **Weather Limitations:** Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

- E. Packaged products shall indicate the manufacturers guaranteed analysis on each package and arrive on site as originally packaged and unopened.
- F. The materials and performance of the work of this Section shall comply with the requirements of those industry standards hereinafter mentioned and the applicable provisions of the SCDOT Standards Specifications for Highway Construction, except as may be amended herein.
- G. Obtain adequate representative soil samples from the site, submit samples to an experienced laboratory and obtain test results and recommendations for soil nutrient amendments for permanent seeding.

#### 1.4 PROJECT CONDITIONS

- A. All project conditions in Section 329200 - Earthwork apply.
- B. Proceed with and complete seeding work as rapidly as portions of the site become available, working within the seasonal limitations for each kind of seeding work required.
- C. Perform seeding after planting, fine grading and all other work affecting the ground surfaces in the work areas have been completed satisfactorily.
- D. Cooperate with other Contractors and trades working in and adjacent to seeding location. Examine drawings and specifications for the entire site and become familiar with the scope of other work required.
- E. Provide lawn seed as specified. Substitutions not permitted, unless approved in writing by the Owner's Representative.
- F. Water for seed maintenance will be the responsibility of the Contractor; no water is available at the site. The Contractor shall provide all hoses, sprinklers, and water equipment.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.
- B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from breakage and drying.
- C. Bulk Materials:
  - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.

2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk materials with appropriate certificates.

## PART 2 - PRODUCTS

### 2.1 TOPSOIL

- A. Topsoil for the purposes of developing proper seedbed shall be from on-site sources. If quantity of stockpiled topsoil is insufficient, provide additional topsoil as required to complete the seeding work. Additional topsoil shall be as specified in Division 31 Section Earth Moving.

### 2.2 PULVERIZED LIMESTONE

- A. Pulverized limestone shall be for agricultural use and shall contain not less than eight-five percent (85%) of calcium carbonate or calcium carbonate equivalent. Ninety-eight percent (98%) shall pass a 20-mesh sieve, 55% a 60-mesh sieve, and 40% a 100-mesh sieve. Deliver limestone in original unopened containers with identifying mark and analysis meeting specification requirements.
- B. Pulverized limestone shall meet the requirements of the SCDOT Standards Specifications for Highway Construction, Section 810.2.6.

### 2.3 COMMERCIAL FERTILIZER

- A. Starter and basic fertilizer shall be a complete commercial fertilizer, a portion of which are derived from organic sources and shall contain in available form a minimum N-P-K as established from soil testing recommendations. Chemical analysis shall be guaranteed and clearly shown on each bag.

### 2.4 SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Rules for Testing Seeds" for purity and germination tolerances.
- B. The percentage of pure seed present shall represent the freedom of such agricultural seeds from inert matter and from other seeds distinguishable by their appearance. The percentage of germination shown shall be actual sprouts and shall not include "hard seeds" unless specifically permitted. No seed shall be accepted with a date of test of more than six months prior to the date of sowing and shall be of the most recent crop.
- C. Provide temporary seed mix as noted on the drawings and in accordance with SCDOT Standards Specifications for Highway Construction, Section 810.2.3.3.

- D. All permanent seeds shall be furnished to the project site in mix prepared by the seed processor. The mix shall have a certification tag or receipt which shall be presented to the Owner's Representative. Seed mixture shall be as noted on the drawings and SCDOT Standards Specifications for Highway Construction, Section 810.2.3.1.

#### MULCH

- E. Mulch material shall conform to SCDOT Standards Specifications for Highway Construction, Section 810.2.

#### 2.5 MULCH BINDERS

- A. Mulch binders shall conform to SCDOT Standards Specifications for Highway Construction, Section 810.2.

#### 2.6 PESTICIDES

- A. **General:** Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
- B. **Pre-Emergent Herbicide (Selective and Nonselective):** Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
- C. **Post-Emergent Herbicide (Selective and Nonselective):** Effective for controlling weed growth that has already germinated.

#### 2.7 EROSION-CONTROL MATERIALS

- A. **Erosion-Control Blankets:** Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.
- B. **Erosion-Control Fiber Mesh:** Biodegradable burlap or spun-coir mesh, a minimum of 0.92 lb/sq. yd., with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches long.

### PART 3 - EXECUTION

#### 3.1 SOIL PREPARATION AND FINE GRADING:

- A. Place topsoil and spread over the prepared subgrade to obtain the required depth and grade elevation. Cultivate and conditioned to a depth of four to six inches with lime added at the rate determined by soil testing. Final compacted thickness of topsoil not less than four (4") inches.

Exercise extreme care to prevent damage to items of construction. All work shall be done by hand immediately adjacent to these installations.

- B. Do not place topsoil when the subgrade is frozen, excessively wet, or extremely dry, do not handle topsoil when frozen or excessively wet.
- C. Immediately after cultivating, uniformly spread the basic fertilizer and work in deeply (four to six inches), at the rate determined by soil testing. The areas shall then be carefully dragged and brought to an even, smooth grade, ready for seeding.
- D. Remove stones one-inch (1") or larger in any dimension, vegetation, or debris brought to the surface during these operations from the site. The final grade shall be even, smooth and free of lumps or water-collecting pockets.
- E. Apply starter fertilizer immediately before seeding by broadcasting and raking into a depth of one-inch (1") at the rate determined by soil testing.
- F. Provide smooth finish grades with uniform flow without depressions or arises, with gradual and uniform transition at slopes and embankments. Maximum allowable tolerance in finish grades shall be not more than one inch (1") in ten feet (10') or three inches (3") in one hundred feet (100') when measured.
- G. Place topsoil adjacent to all paved surfaces to meet finish grade of pavement and provide a smooth transition to surrounding finish grade.

### 3.2 SEEDING OF GRASS

- A. The prepared areas shall then be seeded with the specified seed by means of a mechanical hopper type seeder at the following rate recommended by seed supplier
- B. The seed shall be sown evenly in two directions, with 1/2 of the seed being sown in a direction at right angles to the other half. Seeding shall be done on a day when there is no wind.
- C. After sowing the seed, the area shall be lightly raked to cover seed to an average depth of one-fourth inch (1/4") and rolled with a 200-pound roller. The completed areas shall present a smooth and finished appearance. The seeding and compacting of the large areas may be accomplished by the use of a "Gill Seeder" or other mechanical seeder.

### 3.3 MULCHING

- A. Mulch shall be placed over lawn areas within forty-eight (48) hours after raking and seeding or planting has been performed. The material shall be applied at an average minimum depth of two inches (2") loose measurement. Care shall be taken when placing the mulch so as not to disturb the seeded surfaces.
- B. During the life of the Contract, properly care for all areas and mulches, performing such mulching as necessary to provide protection for established growth on the treated areas.

### 3.4 HYDROSEEDING

- A. **Hydroseeding:** Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.
  - 1. Mix slurry with nonasphaltic fiber-mulch manufacturer's recommended tackifier.
  - 2. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than 1500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate.

### 3.5 TURF RENOVATION

- A. Renovate existing turf.
- B. Renovate existing turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.
  - 1. Reestablish turf where settlement or washouts occur or where minor re-grading is required.
  - 2. Install new planting soil as required.
- C. Remove sod and vegetation from diseased or unsatisfactory seeded areas; do not bury in soil.
- D. Remove topsoil containing foreign materials such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new topsoil.
- E. Mow, dethatch, core aerate, and rake existing turf.
- F. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.
- G. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.
- H. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.
- I. Apply soil amendments and initial fertilizers required for establishing new turf and mix thoroughly into top 4 inches of existing soil. Install new topsoil to fill low spots and meet finish grades.
- J. Apply seed and protect with straw mulch as required for new turf.
- K. Water newly planted areas and keep moist until new turf is established.

### 3.6 TURF MAINTENANCE

- A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
  - 1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
  - 2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
  - 3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.
  
- B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.
  - 1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
  - 2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.
  
- C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Revise timing of fertilizer application in "Turf Postfertilization" Paragraph below if a slow-release fertilizer is initially applied.

### 3.7 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Landscape Architect:
  - 1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches within any 10 sq. ft. area.
  - 2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.
  
- B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

### 3.8 MEADOW

- A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph.
  - 1. Before sowing, mix seed with seed carrier at a ratio of not less than two parts seed carrier to one part seed.
  - 2. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
  - 3. Do not use wet seed or seed that is moldy or otherwise damaged.
- B. Sow seed at total rate specified in section 2.4
- C. Brush seed into top 1/16 inch of soil, roll lightly, and water with fine spray.
- D. Protect seeded areas from hot, dry weather or drying winds by applying mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch, and roll surface smooth.
- E. Water newly planted areas and keep moist until meadow is established.

### 3.9 MEADOW MAINTENANCE

- A. Maintain and establish meadow by watering, weeding, mowing, trimming, replanting, and performing other operations as required to establish a healthy, viable meadow. Roll, regrade, and replant bare or eroded areas and remulch. Provide materials and installation the same as those used in the original installation.
  - 1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and meadow damaged or lost in areas of subsidence.
  - 2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
  - 3. Apply treatments as required to keep meadow and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.
- B. Watering: Install and maintain temporary piping, hoses, and meadow-watering equipment to convey water from sources and to keep meadow uniformly moist.
  - 1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
  - 2. Water meadow with fine spray at a minimum rate of 1/2 inch per week for eight weeks after planting unless rainfall precipitation is adequate.

**3.10 CLEANUP AND PROTECTION**

- A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.
- C. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.
- D. Remove non-degradable erosion-control measures as indicated on E&S Drawings.

END OF SECTION 329200