Contract Documentations and Specifications

Desegregation Commemorative Garden

University of South Carolina Campus

Project #: CP00397055

February 3, 2014

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Project Number: CP00397055

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SE-311
Invitation for Minor Construction Quotes

SCBO NOTES 2, 4 and 5 APPLY TO THIS INVITATION FOR QUOTES

PROJECT NAME: DESEGREGATION GARDEN

PROJECT NUMBER: CP00397055 **PROJECT LOCATION:** COLUMBIA SC

BID SECURITY REQUIRED? Yes ☐ No ☑

PERFORMANCE BOND REQUIRED? Yes ☐ No ☑

PAYMENT BOND REQUIRED? Yes ☐ No ☑ **CONSTRUCTION COST RANGE:** $20K -$35K

DESCRIPTION OF PROJECT:
This project will renovate a small 4,500 square-foot garden space in the historic part of the USC campus. The project will include brick pavers, a brick seatwall with granite wall coping, , a granite monument with engraved text, planting and irrigation. Small & minority business participation is encourged. It is the bidder's responsibility to obtain all bidding documents from the purchasing website. http://purchasing.sc.edu (See Facilities Construction Solicitation's & Awards)

A/E NAME: UNIVERSITY OF SOUTH CAROLINA **A/E CONTACT:** EMILY JONES

ADDRESS: 743 GREENE STREET **PHONE:** 803.777.7593 **Fax:**

CITY: COLUMBIA **STATE:** sc **ZIP:** **E-MAIL:** efjones@fmc.sc.edu

PLANS ON FILE AT: **AGC:** **DODGE:** **OTHER:**

PLANS MAY BE OBTAINED FROM: http://purchasing.sc.edu

PLAN DEPOSIT AMOUNT: **IS DEPOSIT REFUNDABLE?** Yes ☐ No ☐

PRE-QUOTE CONFERENCE? ☑ Yes ☐ No **MANDATORY ATTENDANCE?** ☐ Yes ☑ No

DATE: 02/10/2014 **TIME:** 10am **PLACE:** 743 Greene St, Conf Rm 53, Columbia, SC

AGENCY: UNIVERSITY OF SOUTH CAROLINA

NAME AND TITLE OF AGENCY COORDINATOR: HATICE HIKMET

ADDRESS: 743 GREENE STREET **PHONE:** 803.777.9994 **Fax:** 803.777.7334

CITY: COLUMBIA **STATE:** sc **ZIP:** 29208 **E-MAIL:** hikmeth@mailbox.sc.edu

IFQ CLOSING DATE: 2/18/2014 **TIME:** 1pm **LOCATION:** 743 Greene Street,Columbia SC

IFQ DELIVERY ADDRESSES:

HAND-DELIVERY:
see mail

MAIL SERVICE:
Facilities Center (Attn: Hatice Hikmet)
743 Greene St
Columbia SC 29208

IS PROJECT WITHIN AGENCY CONSTRUCTION CERTIFICATION? *(Agency MUST check one)* ☑ YES ☐ NO

APPROVED BY: _____ _____
(State Engineer) *(Date)*

SE-331
Quote Form

2011 Edition

Quotes shall be submitted only on SE-331

QUOTE SUBMITTED BY: _____
(Offeror's Name)

QUOTE SUBMITTED TO: University of South Carolina
(Agency Name)

FOR PROJECT: CP00397055 *(Number)* Desegregation Commemorative Garden *(Name)*

OFFER

1. In response to the Form SE-311, *Request for Minor Construction Quotes*, and in compliance with the *Instructions to Bidders* for the above-named Project, the undersigned **OFFEROR** proposes and agrees, if this Quote is accepted, to enter into a Contract with the **AGENCY** in the form included in the Solicitation Documents, and to perform all Work as specified or indicated in the Solicitation Documents, for the prices and within the time frames indicated in the Solicitation and in accordance with the other terms and conditions stated.

2. Pursuant to Section 11-32-3030(1) of the SC Code of Laws, as amended, **OFFEROR** has submitted Bid Security as follows in the amount and form required by the Solicitation Documents:

☐ Bid Bond with Power of Attorney ☐ Electronic Bid Bond ☐ Cashier's Check
(OFFEROR check one, if Bid Security is required)

3. **OFFEROR** acknowledges the receipt of the following Addenda to the Solicitation documents and has incorporated the effects of said Addenda into its Quote:

ADDENDUM No: _____

4. **OFFEROR** agrees that this Quote, including all bid alternates, if any, may not be revoked or withdrawn after the opening of bids, and shall remain open for acceptance for a period of _____ Days following the Quote Date, or for such longer period of time that **OFFEROR** may agree to in writing upon request of the **AGENCY**.

5. **OFFEROR** agrees that from the compensation to be paid, the **AGENCY** shall retain as Liquidated Damages the amount of for each calendar day the actual construction time required to achieve Substantial Completion exceeds the specified or adjusted Contract Time for Substantial Completion, as provided in the Contract Documents.

6. **OFFEROR** herewith submits its offer to provide all labor, materials, equipment, tools of trades and labor, accessories, appliances, warranties and guarantees, and to pay all royalties, fee, permits, licenses and applicable taxes necessary to complete the following items of construction work:

6.1 BASE BID _____
(enter BASE BID in figures only)

6.2 ALTERNATE NO. 1 _____ **to be ADDED/DEDUCTED from BASE BID.**
(circle one)

6.3 ALTERNATE NO. 2 _____ **to be ADDED/DEDUCTED from BASE BID.**
(circle one)

FEIN/SSN: _____

SC Contractor's License Number: _____

Address: _____

_____

_____

Telephone/Fax _____

E-mail _____

This Quote is hereby submitted on behalf of the Offeror named above.

BY: _____
(Signature of Offeror's Representative)

_____
(Print or Type Name of Offeror's Rpresentative)

ITS: _____

USC SUPPLEMENTAL GENERAL CONDITIONS FOR CONSTRUCTION PROJECTS

1. Contractor's employees shall take all reasonable means not to interrupt the flow of student traffic in building corridors, lobbies and stairs. All necessary and reasonable safety precautions shall be taken to prevent injury to building occupants while transporting materials and equipment through the building to the work area. Providing safe, accessible, plywood pedestrian ways around construction may be required if a suitable alternative route is not available.

2. Fraternization between Contractor's employees and USC students, faculty or staff is strictly prohibited-zero tolerance!

3. USC will not tolerate rude, abusive or degrading behavior on the job site. Heckling and cat-calling directed toward students, faculty or staff or any other person on USC property is strictly prohibited. Any contractor whose employees violate this requirement will be assessed a fine of up to $500 per violation.

4. Contractor's employees must adhere to the University's policy of maintaining a drug-free and smoke-free/tobacco free workplace.

5. Contractor must sign a Contractor Key Receipt/Return form before any keys are issued. Keys must be returned immediately upon the completion of the work. The Contractor will bear the cost of any re-keying necessary due to the loss of or failure to return keys.

6. A welding permit must be issued by the University Fire Marshall before any welding can begin inside a building. Project Manager will coordinate.

7. Contractor must notify the University immediately upon the discovery of suspect material such as those potentially containing asbestos or other such hazardous materials. These materials **must not** be disturbed until approved by the USC Project Manager.

8. At the beginning of the project, the USC Project Manager will establish the Contractor=s lay-down area. This area will also be used for the Contractor=s work vehicles. No personal vehicles will be allowed in this area, or in any areas surrounding the construction site that are not regular or authorized parking lots. Personal vehicles must be parked in the perimeter parking lots. Parking permits can be obtained at the USC Parking Office located in the Pendleton Street parking garage. The lay down area will be clearly identified to the contractor by the PM, with a sketch or drawing provided to Parking. In turn, the contractor will mark off this area with a sign containing the project name, PM name, Contractor name and contact number, and end date. Where this area is subject to foot traffic, protective barriers will be provided as specified by the PM. The area will be maintained in a neat and orderly fashion. Vehicles parked in the lay down area (or designated parking areas) will be clearly marked or display a CPC furnished placard for identification.

Updated: July 15, 2011

9. Contractor will be responsible for providing its own temporary toilet facilities, unless prior arrangements are made with the USC Project Manager.

10. Use of USC communications facilities (telephones, computers, etc.) by the Contractor is prohibited, unless prior arrangements are made with the USC Project Manager.

11. For all projects over $100,000, including IDC's, an SE-395, Contractor Performance Evaluation, will be completed by the USC Project Manager and reviewed with the GC at the beginning of the project and a copy given to the GC. At the end of the project the form will be completed and a Construction Performance rating will be established.

12. Contractor is responsible for removal of all debris from the site, and is required to provide the necessary dumpsters which will be emptied at least _____ times per week. Construction waste must not be placed in University dumpsters. THE CONSTRUCTION SITE MUST BE THOROUGHLY CLEANED WITH ALL TRASH PICKED UP AND PROPERLY DISPOSED OF ON A DAILY BASIS AND THE SITE MUST BE LEFT IN A SAFE AND SANITARY CONDITION EACH DAY. THE UNIVERSITY WILL INSPECT JOB SITES REGULARLY AND WILL FINE ANY CONTRACTOR FOUND TO BE IN VIOLATION OF THIS REQUIREMENT AN AMOUNT OF UP TO $1,000 PER VIOLATION.

13. **Contractor must provide all O&M manuals, as-built drawings, and training of USC personnel on new equipment, controls, etc. prior to Substantial Completion. Final payment will not be made until this is completed.**

14. The contractor will comply with all regulations set forth by OSHA and SCDHEC. Contractor must also adhere to USC's internal policies and procedures (available by request). As requested, the contractor will submit all Safety Programs and Certificates of Insurance to the University for review.

15. Tree protection fencing is required to protect existing trees and other landscape features to be preserved within a construction area. The limits of this fence will be evaluated for each situation with the consultant, USC Arborist and USC Project Manager. The tree protection fence shall be 5' high chain link fence unless otherwise approved by USC Project Manager. No entry or materials storage will be allowed inside the tree protection zone. A 4" layer of mulch shall be placed over the tree protection area to maintain moisture in the root zone.

16. Where it is necessary to cross walks, tree root zones (i.e., under canopy) or lawns the following measures shall be taken: For single loads up to 9,000 lbs., a 3/4" minimum plywood base shall be placed over areas impacted. For single loads over 9,000 lbs., two layers of 3/4" plywood is required.

17. For projects requiring heavy loads to cross walks tree root zones or lawns. A construction entry road consisting of 10' X 16' oak logging mates on 12" coarse, chipped, hardwood base. Mulch and logging mats shall be supplemented throughout the project to keep

matting structurally functional.

18. Any damage to existing landscaping (including lawn areas) will be remediated before final payment is made.

19. Orange safety fence to be provided by the contractor. (USC Arborist, Kevin Curtis may be contacted at 777-0033 or 315-0319)

Campus Vehicle Expectations

1. All motorized vehicles on the University campus are expected to travel and park on roadways and/or in parking stalls.

2. All motorized vehicle traffic on USC walkways must first receive the Landscape Manager=s authorization. Violators may be subject to fines and penalties.

3. All motorized vehicles that leak or drip liquids are prohibited from traveling or parking on walks or landscaped areas.

4. Contractors, vendors, and delivery personnel are required to obtain prior parking authorization before parking in a designated space. Violators may be subject to fines and/or penalties. See Item 10 below.

5. Drivers of equipment or motor vehicles that damage university hardscape or landscape will be held personally responsible for damages and restoration expense.

6. Vehicle drivers who park on landscape or drives must be able to produce written evidence of need or emergency requiring parking on same.

7. All vehicles parked on landscape, hardscape, or in the process of service delivery, must display adequate safety devices, i.e. flashing lights, cones, signage, etc.

8. All drivers of equipment and vehicles will be respectful of University landscape, equipment, structures, fixtures and signage.

9. All incidents of property damage will be reported to Parking Services or the Work Management Center.

10. Parking on campus is restricted to spaces designated by Parking Services at the beginning of the project. Once the project manager and contractor agree on how many spaces are needed, the project manager will obtain a placard for each vehicle. This placard must be hung from the mirror of the vehicle, otherwise a ticket will be issued and these tickets cannot be "fixed". Parking spaces are restricted to work vehicles only; no personal vehicles.

Project Name: Desegregation Commemorative Garden

Project Number: CP00397055

University of South Carolina

CONTRACTOR'S ONE YEAR GUARANTEE

STATE OF _____

COUNTY OF _____

WE_____
as General Contractor on the above-named project, do hereby guarantee that all work executed under the requirements of the Contract Documents shall be free from defects due to faulty materials and /or workmanship for a period of one (1) year from date of acceptance of the work by the Owner and/or Architect/Engineer; and hereby agree to remedy defects due to faulty materials and/or workmanship, and pay for any damage resulting wherefrom, at no cost to the Owner, provided; however, that the following are excluded from this guarantee;

Defects or failures resulting from abuse by Owner.

Damage caused by fire, tornado, hail, hurricane, acts of God, wars, riots, or civil commotion.

_____
[Name of Contracting Firm]

*By_____

Title_____

*Must be executed by an office of the Contracting Firm.

SWORN TO before me this
_____ day of _____, 2____ (seal)

_____State

My commission expires _____

Desegregation Commemorative Garden

Alternates:

Add Alternate #1:
Install 4' wide brick pavement with brick soldier edging as shown in the drawings.

Add Alternate #2:
Remove approximately 55 linear feet of existing brick sidewalk; regrade area and install new brick pavement with brick soldier edging as shown on the drawings.

SECTION 03 30 00 CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

A. This Section includes furnishing of all labor, materials, equipment and related items required to complete all concrete work as shown or scheduled on the Drawings and specified herein. Items include, but are not necessarily restricted to the following:

1. Concrete footing.
2. Expansion joints.
3. Control joints.

1.2 QUALITY ASSURANCE:

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

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

PART 2 - PRODUCTS

2.1 FORM MATERIALS:

A. **Forms for Exposed Finish Concrete:** Unless otherwise indicated, construct form work for exposed concrete surfaces with plywood, metal, metal-framed plywood faced or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection.

B. **Reinforcing Materials:**

Reinforcing Bars: ASTM A 615, Grade 60, deformed.

C. **Supports for Reinforcement:** Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars. Use wire bar type supports complying with CRSI recommendations, unless otherwise acceptable.

2.2 CONCRETE MATERIALS:

A. **Portland Cement:** ASTM C 150, Type I, unless otherwise acceptable to Landscape Architect. Use one brand of cement throughout project, unless otherwise acceptable to Landscape Architect.

B. **Course Aggregates:** ASTM C 33, and as herein specified with maximum size No. 57. Provide aggregates from a single source for exposed concrete. Local aggregates not complying with ASTM C 33 but which have shown by special test or actual service to produce concrete of adequate strength and durability may be used when acceptable to the Landscape Architect.

C. **Fine Aggregate:** Clean, sharp, natural sand free from loam, clay, lumps or other deleterious substances. Dune sand, bank-run sand and manufactured sand are not acceptable.

D. **Water:** Potable.

E. **Air-Entraining Admixture:** ASTM C 260.

F. **Calcium Chloride:** will not be permitted in concrete.

G. **Chemical Curing Compound and Hardener:** Symons Corporation Cure and Hard.

2.3 JOINT MATERIAL:

A. **Expansion Joint Material:** shall be asphalt mastic strips (Pre-formed) composed of cane fiber of cellular nature, or other suitable and approved fiber impregnated with a durable asphaltic compound. Install where located on plans. Hold top edge 1/2" from surface. Thickness throughout to be 1/2".

B. **Construction Joints:** Shall be tongue and groove. Provide removable screed cap to from 1/2" x 1/2" groove above joint material. (Caulk joint to within 1/8" of surface).

2.4 PROPORTIONING AND DESIGN OF MIXES:

A. **Admixtures:** Air entrainment agents conforming to ASTM C-260 shall be used in concrete exposed to weather, and may be used in all concrete on this project. Air entraining admixtures shall be used to produce 3% to 6% air by volume in the concrete.

2.5 CONCRETE STRENGTHS AND SLUMPS:

A. **Strength:** All cast-in-place concrete shall have a minimum strength at 28 days (ultimate strength) of 3000 PSI.

B. **Proportioning of the Concrete Mixture:**

1. The proportion of the aggregate to cement for any concrete shall be such as to produce a mixture which will work readily into the corners and angles of the forms and around reinforcement with the method of placing employed on the work, but without permitting the materials to segregate or excess free water to collect on the surface.

2. The materials used for the concrete shall be measured by weight. Maximum slump shall be 4".

2.6 CONCRETE MIXING:

A. **Ready-Mix Concrete:** Comply with requirements of ASTM C 94, and as herein specified. Delete references for allowing additional water to be added to batch for material with insufficient slump. Addition of water to the batch will not be permitted. During hot weather, or under conditions contributing to rapid setting concrete, a shorter mixing time than specified in ASTM C 94 may be required.

B. When air temperature is between 85° F (30° C) and 90° F (32° C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90° F (32° C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMS:

A. Design, erect, support, brace and maintain form work to support vertical and lateral loads that might be applied until such loads can be supported by concrete structure. Construct form work so concrete members and structures are of correct size, shape, alignment, elevation and position.

B. Design form work to be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials.

C. Construct forms complying with ACI 347, to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.

D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like to prevent swelling and for easy removal.

3.2 SUBGRADES FOR PAVING:

A. **Grading**: Do any necessary grading in addition to that performed under work of Section 02200 to bring subgrades for paving after final completion to the required grades and sections.

B. **Preparation of Subgrade:** Loosen exceptionally hard spots and recompact. Remove spongy and otherwise unsuitable material and replace with stable material. Fill and tamp traces of utility trenches.

C. **Compaction of Subgrade:** Compact the subgrade of all surface areas with appropriate compacting equipment or by other means to such degree as will insure against settlement of the superimposed work.

D. **Checking Subgrade:** Maintain all subgrades in satisfactory condition, protected against traffic and properly drained until the surface improvements are placed. Immediately in advance of concreting, check subgrade levels with templates riding the forms, correct irregularities and compact thoroughly any added fill material. On areas to receive concrete pavement, place grade stakes spaced sufficiently to afford facility for checking subgrade levels. Correct irregularities prior to concreting.

E. **Utility Structures:** Check for correct elevation and position all manhole covers, drainage castings, valve boxes and similar items located within areas to be paved and make or have any necessary adjustments.

3.3 PLACING REINFORCEMENT:

A. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and method of reinforcement placement and supports, and as herein specified.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.

C. Accurately position, support and secure reinforcement against displacement by form work, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.

D. Place reinforcement to obtain at least maximum coverages for concrete protection. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

3.4 JOINTS:

A. **Expansion Joints:** Shall be provided where shown and as detailed on the Drawings or specified and shall be at right angles to the slab and extend for the full depth of the pavement. Round all edges of pavement at expansion joints to a 1/8" radius by tooling uniformly with a sidewalk tool.

B. **Construction Joints:** Locate and install construction joints, which are not shown on drawings, so as not to impair strength and appearance of the structure, as acceptable to Landscape Architect.

C. Provide keyways at least 1-1/2" deep in construction joints in walls, slabs and between walls and footings; accepted bulkheads designed for this purpose may be used for slabs.

D. **Isolation Joints in Slabs-on-Ground:** Construction joints in slabs on ground at points of contact between slabs on ground and vertical surfaces, such as column pedestals, foundation walls, grade beams and elsewhere as indicated.

E. **Control Joints in Slabs-on-Ground:** Construct control joints in slabs on ground to form panels of patterns as shown. Joints to be 1" min depth.

3.5 PREPARATION OF FORM SURFACES:

A. Coat contact surfaces of forms with a form-coating compound before reinforcement is placed. Thin form-coating compounds only with thinning agent of type, and in amount, and under conditions of form-coating compound manufacturer's directions. Do not allow excess form-coating material to accumulate in forms or to come into contact with concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

B. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel form work is not acceptable.

3.6 CONCRETE PLACEMENT:

A. **Preplacement Inspection:** Before placing concrete, inspect and complete form work installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where coatings are not used.

B. Coordinate the installations of joint materials and moisture barriers with placement of forms and reinforcing steel.

C. **General:** Comply with ACI 304, and as herein specified.

D. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.

E. **Cold Weather Placing:** Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified. When air temperature has fallen to or is expected to fall below 40° F, uniformly heat water and aggregate before mixing to obtain a concrete mixture temperature of not less than 50° F, and not more than 80° F at point of placement.

F. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

G. Do not use calcium chloride, salt and other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in mix designs.

H. **Hot Weather Placing:** When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.

1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90° F (32° C). Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing.

2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.

3. Wet forms thoroughly before placing concrete.

4. Do not use retarding admixtures unless otherwise accepted in mix designs.

3.7 CONCRETE FINISH:

A. All exposed concrete surfaces to receive a light broom finish.

3.8 CONCRETE CURING, HARDENING AND PROTECTION:

A. General: Protect freshly placed concrete from premature drying and excessive hot or cold temperatures.

B. Method: Membrane cure-hardener applied to all slabs as follows:

1. Apply membrane cure-hardener to concrete surfaces by spray, brush or roller. Apply as soon as the concrete is dry to the touch or immediately after finish troweling. Keep slab free of traffic for 48 hours after application. Follow manufacturer's instructions.

3.9 CONCRETE SURFACE REPAIR:

A. Patching Defective Formed Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Landscape Architect.

B. Cut out honeycomb, rock pockets, voids over 1/4" in any dimension, and holes left by tie rods and bolts, down to solid concrete but, in no case to a depth of less than 1". Make edges of cuts perpendicular to the concrete surface. Before placing cement mortar or proprietary patching compound, thoroughly clean, dampen with water and brush-coat. They are to be patched with neat cement grout, or proprietary bonding agent.

C. Repair defective slab surfaces by removing and replacing with fresh concrete. Remove entire section between nearest scores. Finish and apply curing-hardener work. Re-joint scores.

3.10 QUALITY CONTROL TESTING DURING CONSTRUCTION:

A. The Owner will employ a testing laboratory to perform tests and to submit tests reports. Sampling and testing for quality control placement of concrete may include the following as directed by Landscape Architect.

B. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.

C. Slump: ASTM C 143; one test for each concrete load at point of discharge; and one test of each set of compressive strength test specimens.

D. Compression Test Specimen: ASTM C 31; one set of 6 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.

E. Compressive Strength Tests: ASTM C 39; one set for each 100 cu. yds. or fraction thereof, of each concrete class placed in any one day or for each 5,000 sq.ft. of surface area placed; 2 specimens tested at 7 days, 3 specimens tested at 28 days, and one specimen retained in reserve for later testing if required.

F. When frequency of testing will provide less than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used. When total quantity of a given class of concrete is less than 50 cu. yds. strength test may be waived by Landscape Architect if, in his judgment, adequate evidence of satisfactory strength is provided. When strength of field-cured cylinders is less than 85% of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.

G. Test-results will be reported in writing to Landscape Architect and Contractor on same day that tests are made. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete placement, design compressive strength at 28 days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day tests and 28-day tests.

H. **Additional Tests:** The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained as directed by Landscape Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.

END OF SECTION 03 30 00

SECTION 04 20 00 UNIT MASONRY

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

A. This Section includes furnishing of all labor, materials, equipment and related items required to complete all concrete work as shown or scheduled on the Drawings and specified herein. Items include, but are not necessarily restricted to the following:

1. Brick masonry
2. Concrete block masonry

1.2 QUALITY ASSURANCE:

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

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

C. Single Source Responsibility for Masonry Units: Obtain brick of uniform quality from one manufacturer.

D. Single Source Responsibility for Mortar Materials: Obtain mortar materials of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious compenent and from one source for each aggregate.

E. Provide mock-up sample of brickwork; show representative mortar color, joints, and quality of workmanship to eb adhered to through project completion. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

F. Brick and mortar colors shall match existing site brick work at USC's Athletic Village.

PART 2 - PRODUCTS

2.1 BRICK:

A. Site Wall Brick: Cokesbury 540 Blend by Hanson is the basis of design. Provide matching brick by the following manufacturers:
   1. Boral
   2. Palmetto
   3. Pine Hall

2.2 MORTAR

A. Mortar: 'Savannah Ivory' by Argos.

B. Portland Cement: ASTM C150, Type I, except Type III may be used to reduce protection requirements specified for laying masonry in cold weather. Provide cold cement required to produce the required mortar color.

C. Masonry Cement: ASTM C71

D. Water: Clean and free of deleterious materials

E. Hydrated Lime: ASTM C207, Type S

F. Sand: ASTM C144 for mortar and C404 for grout. Verify color of sand will provided the required color for finished mortar joints.

PART 3 - EXECUTION

3.1 MORTAR:

A. All masonry mortar shall be thoroughly mixed in clean mortar boxes or an approve dtype of mechanical mixer with the dry materials being mixed to a uniform color before adding mixing water. The sand and cement shall be mixed in proportions to produce Type S mortar as recommended by the manufacturer of the cement used, but in no case shall the proportion of sand exceed three times the amount of cement used per batch.

3.2 MASONRY:

A. Masonry: All masonry work shall be lais by skilled masons, with all horizontal courses straight and level, and all corners square, and all vertical surfaces straight and plumb. All masonry shall be laid in full beds of mortar with the head joints well-filled.

B. The bond shall be running bond for concrete masonry units and brick pilasters, and Flemish bond for interim wall segments as shown in the Drawings.Joints shall be properly broken and bond maintained throughout the work. All masonry work shall be l;ais in a workmanlike manner.

C. Lay out bond in exposed work and adjust so that no course terminates at a corner or opening with less than ½ of a unit. Use masonry saw for cutting units where required. Use lapped sections for reinforcing at all wall intersections.

E. Cleaning Masonry Work: Clean all exposed masonry work after mortar has thoroughly set and cured. Directions of the manufacturer of the cleaning agent used shallbe strictly adhered to.

END OF SECTION 04 20 00

SECTION 04 40 00 STONE ASSEMBLIES

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

A. This Section includes furnishing of fully fabricated granite components required for the completion of all graite work indicated in the Drawings:

1. Granite coping for benches
2. Granite monument

1.2 QUALITY ASSURANCE:

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

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

C. All granite shall be obtained from quarries having adequate capacity and facilties to meet the specified requirements. Fabrication shall be by a firm equipped to process the material promptly in accordance with the specifications.

D. Granite finishing and text engraving shall be performed by skilled workmen with a minimum of 10 years of experience in monument and memorial work. Evidence to this effect shall be provided by the contractor if required by the Landscape Architect.

E. Defective Work: Any piece of granite showing manufacturing flaws upon receipt at the building site shall be referred to the Landscape Architect for determination as to whether it shall be rejected, patched, or redressed for use.

1.3 SUBMITTALS:

A. Samples: Samples of the proposed granite shall be submitted to show anticpated range of color, natural variations of grain structure, inclusions, and any other visual characteristics to be expected in the final installation

.

B. Shop Drawings: The supplier shall submit copies of required shop drawings to the Landscape Architect for approval. These drawings shall show all bedding, bonding, jointing and anchoring details, and the dimensions of each piece of granite. No final sizing or finishing shall be done until the shop drawings have been approved.

1.4 REFERENCES

A. ASTM A123-02: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM C 97-02 Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone
ASTM C 119-04 Terminology Relating to Dimension Stone
ASTM c170-09 (1999) Test Method for Compressive Strength of Dimension Stone
ASTM C615-03 Specifications for Granite Dimension Stone
ASTM C80-98 Test Method for Flexural Strength of Dimensional Stone

PART 2 - PRODUCTS

2.1 GRANITE:

A. Granite Standard: Granite shall comply with ASTM C 615, 'Standard Specification for Granite Dimensional Stone' for material characteristics, physical requirements, and sampling for selection of granite. All granite shall be of standard architectural grade, free from cracks, seems, or starts, which may impair its structural integrity or function. Color or other visual characteristics indigenous to the particular material and adequately demonstrated in the sample will be accepted provided they do not compromise the structural or durability capabilitites of the material. Texture and finish shall be within the range of samples approved by the Landscape Architect.

B. Granite: For bench coping and monument, 'Georgia Grey' from Elberton, GA; light sandblasted finish, with a honed panel at the monument face.

PART 3 - EXECUTION

3.1 DIMENSIONAL TOLERANCES:

A.

Panel Thickness greater than 1-5/8"	+/- ¼"
Panel Face Dimension	+/- 1/16"
Face Variation from Rectangular (Maximum out of Square) (Non-Cumulative)	+/- 1/16"
Heads/Calibrated Edges	+/-1/16"
Quirk Mitres (Width of Nose) up to ¼"	-0, + 25% of dim
Quirk Mitres (Width of Nose) over ¼"	-0, + 1/16"
Location of Back Anchors	+/- 1/8"
Depth of Back Anchors	-0, +1/16"
Anchor Slots – From Face to Centerline of Slot	+/- 1/16"
Anchor Slots – Lateral Placement	+/- ¼"
Anchor Slots – Width	+/- 1/16"
Anchor Holes – Depth at Maximum	+/- 1/8"
Anchor Holes – From Face to Centerline of Hole	+/- 1/16"
Anchor Holes - Lateral Placement	+/- 1/8"
Anchor Holes – Diameter	+/- 1/16"
Anchor Holes – Depth	+/- 1/8"
Anchor Sinkages – Depth	-0, +1/8"
Continuous Kerfs – From Face to Centerline of Kerf	+/- 1/16"
Continuous Kerfs – Maximum bow in 4'-0"	+/- 1/16"
Continuous Kerfs –Width	+/- 1/16"
Continuous Kerfs – Depth	-1/16", + 1/8"
Rebated Kerf Elevation of Bearing Surface	+/- 1/16"
Bearing Checks – Elevation of Bearing Surface	+/- 1/16"
Bearing/Clearance Checks – Lateral Location	+/- ½"
Bearing/Clearance Checks – Setback from Face	+/- 1/16"

3.2 FLATNESS TOLERANCE:

A. Variation from true plane, or flat surfaces, shall be determined by a 4' dimension in any direction on the surface. Such variations on polish, hone and fine-rubbed surfaces shall not exceed tolerances listed below or 1/3 of the specified joint width, whichever is greater. On surfaces having other finishes, the maximum variation from true plane shall not exceed the tolerance listed below or ½ of the specified joint width, whichever is greater.

Polished, honed , or fine-rubbed surfaces	1/16"
Sawn, 4-cut, 6-cut, and 8-cut finishes	1/8"

Thermal and coarse stippled finishes	3/16"
Pointed or other rough cut finishes	1"

3.2 BEDS AND JOINTS:

A. Pieces shall be bedded and jointed as shown on the approved shop drawings, and bed and joint surfaces shall be cut as follows:

1. Bed and joint surfaces shall be sawn through the full thickness of the granite piece. Bed and joint surfaces shall be within +/- 3 degrees of 90 degrees to the face of the piece unless otherwise specified.
2. For pieces more than 4" in thickness, beds and joints shall be sawn or cut full swuare 2" back from the face and from that point may fall under square not more than 1" in 12". Both beds and joints shall be reasonably free of large depressions.

3.3 FABRICATION:

A. Mouldings, washes and drips shall be consistent in profile throughout their length, in strict conformity with details shown on approved shop drawings.

B. Dress joints straight and set at 90 degree angle to face. Shape beds to fit supports.

C. Anchor Provision: Cut and drill sink provisions and holes in stone for anchors, fasteners, supports, and lifting devices as indicated or needed to set stone in place.

D. Allow room for expansion of the anchoring devices where necessary.

E. Where liners are required on the backs of panels, secure by means of mechanical anchors. Comply with referenced standards.

F. Finish exposed faces and edges of stone, except sawed reveals, to comply with requirements indicated for finish and to match final samples and mock-ups.

G. Joint width: Cut stone to produce uniform joints 3/8" or as shown in the Drawings.

H. Provide chases, reveals, reglets, openings, and similar features as required to accommodate adjacent work.

I. Grade and mark stone to achive uniform appearance when installed. Inspect finished stone units at fabrication site. Replace defective units.

3.4 SHIPPING AND HANDLING:

A. Packing and Loading: Finished granite shall be carefully packed and loaded for shipment using all reasonable and customary precautions against damage in transit. No material which may cause staining or discoloration shall be used for blocking or packing.

3.5 SITE STORAGE:

A. Upon receipt at the building site or storage yeard, the granite shall be stacked on timber or platforms at least 3" above the ground, and extreme care shall be taken to prevent staining during storage. If storage is to be for a prolonged period, polyethylene or other suitable plastic film shall be placed between any wood and finished surfaces, and shall be used also as an overall protective covering. All holes shall be plugged during freezing weather to prevent the accumulation of water. Salt shall not be used for melting of ice formed in Lewis holes or on pieces, or for any purpose involving its contact with the granite.

3.6 INSTALLATION

A. Proceed with the installation of the stonework in accordance with the drawings and using skilled mechics capable of proper handling of the setting of the stone and able to field cut where necessary with sharp

angles and true edges.

B. Set stone with joints uniform in appearance and stone edges and faces aligned to tolerances indicated.

C. Clean surfaces that are dirty or stained. Scrub with fiber brushes and then rinse with clear water.

D. Provide expansion, control and pressure-relieving joints of widths and at locations shown on the Drawings.

3.7 CLEANING AND PROTECTION

A. Cleaning: Granite shall be shop-cleaned at the time of final fabrication. After installation and pointing or caulking are completed, the contractor shall carefully clean the granite, removing all dirt, excess mortar, weld splatter, stains, and/or other site incident defacements.

B. Stainless steel brushes or wool may be used, but the use of other wire brushes or of acid or other solutions which may cause discoloration is expressly prohibited. Fabricator should be contacted before cleaners other than detergent are used.

C. All granite work in progress shall be protected at all times during construction by use of a suitable strong impervious film or fabric securely held in place.

D. After the granite work is installed, the granite shall be properly and adequately protected from damage. Boxing or other suitable protection shall be provided wherever required, but no lumber which may stain or deface the granite shall be used. All nails used shall be non-corrosive. Proceed with the installation of the stonework in accordance with the drawings and using skilled mechics capable of proper handling of the setting of the stone and able to field cut where necessary with sharp angles and true edges. Set stone with joints uniform in sppearance and stone edges and faces aligned to tolerances indicated. Clean surfaces that are dirty or stained. Scrub with fiber brushes and then rinse with clear water. Provide expansion, control and pressure-relieving joints of widths and at locations shown on the Drawings.

END OF SECTION 04 40 00

SECTION 32 14 16 BRICK UNIT PAVERS
GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Brick pavers set in aggregate setting bed.

B. Related Sections include the following:
1

1.3 SUBMITTALS

A. **Product Data:** For the following:

1. Brick pavers.
2. Mortar and grout materials.

B. **Samples for Verification:** Full-size units of each type of unit paver indicated; in sets for each color, texture, and pattern specified, showing the full range of variations expected in these characteristics.

C. **Qualification Data:** For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.4 QUALITY ASSURANCE

A. **Installer Qualifications:** An experienced installer who has completed unit paver installations similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. **Mockups:** Before installing unit pavers, build mockups for each form and pattern of unit pavers required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work, including same base construction, special features for expansion joints, and contiguous work as indicated:

1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Landscape Architect.
2. Notify Landscape Architect seven days in advance of dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Landscape Architect's approval of mockups before starting unit paver installation.
5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

6. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect unit pavers and aggregate during storage and construction against soiling or contamination from earth and other materials.

1. Cover pavers with plastic or use other packaging materials that will prevent rust marks from steel strapping.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store liquids in tightly closed containers protected from freezing.

1.6 PROJECT CONDITIONS

A. **Cold-Weather Protection:** Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.

B. **Weather Limitations for Mortar and Grout:** Comply with the following requirements:

1. Cold-Weather Requirements: Protect unit paver work against freezing when atmospheric temperature is 40 deg F (4 deg C) and falling. Heat materials to provide mortar and grout temperatures between 40 and 120 deg F (4 and 49 deg C). Provide the following protection for completed portions of work for 24 hours after installation when the mean daily air temperature is as indicated: below 40 deg F (4 deg C), cover with weather-resistant membrane; below 25 deg F (minus 4 deg C), cover with insulating blankets; below 20 deg F (minus 7 deg C), provide enclosure and temporary heat to maintain temperature above 32 deg F (0 deg C).
2. Hot-Weather Requirements: Protect unit paver work when temperature and humidity conditions produce excessive evaporation of setting beds and grout. Provide artificial shade and windbreaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F (38 deg C) and higher. When ambient temperature exceeds 90 deg F (32 deg C) with a wind velocity greater than 8 mph (13 km/h), set pavers within 1 minute of spreading setting-bed mortar.

PART2 - PRODUCTS

2.1 MANUFACTURERS

A. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following or approved equal:

1. Brick Pavers:
   a. Pine Hall Brick Co. (Winston-Salem, NC)
   b. Boral Brick (Columbia, SC)
   c. Lee Brick and Tile (Sanford, NC)

2. Latex-Portland Cement Mortars and Grouts:
   a. American Olean Tile Co.

b. Boiardi Products Corp.
c. Bonsal: W. R. Bonsal Company.
d. Bostik.
e. C-Cure Corporation.
f. Custom Building Products.
g. Dal-Tile Corporation.
h. DAP Inc.
i. Laticrete International, Inc.
j. Mapei Corp.
k. Southern Grouts & Mortars, Inc.
l. Summitville Tiles, Inc.
m. TEC Incorporated.

2.2 COLORS AND TEXTURES

A. **Colors and Textures:** Colors and textures shall match the following

1. Paver #1 shall match Pine Hall 'Pathway Red paver brick
2. Paver #2 shall match Pine Hall 'Pathway Full Range' paver brick
3. Paver #3 shall match Pine Hall 'Cocoa' paver brick

2.3 UNIT PAVERS

A. **Brick Pavers:** Light-traffic paving brick; ASTM C 902, Class SX, Type II, Application PS. Provide brick without frogs or cores in surfaces exposed to view in the completed Work.

2.4 ACCESSORIES

A. **Cork Joint Filler:** Preformed strips complying with ASTM D 1752, Type II.

B. **Compressible Foam Filler:** Preformed strips complying with ASTM D 1056, Grade 2A1.

2.5 AGGREGATE SETTING-BED MATERIALS

A. **Graded Aggregate for Subbase:** Sound crushed stone or gravel complying with ASTM D 448 for Size No. 57.

B. **Stone Screenings for Leveling Course:** Sound stone screenings complying with ASTM D 448 for Size No. 10.

C. **Sand for Joints:** Fine, sharp, washed, natural sand or crushed stone with 100 percent passing No. 16 (1.18-mm) sieve and no more than 10 percent passing No. 200 (0.075-mm) sieve.

D. Provide sand of color needed to produce required joint color.

2.6 PORTLAND CEMENT MORTAR SETTING-BED MATERIALS

A. **Portland Cement:** ASTM C 150, Type I or II.

B. **Hydrated Lime:** ASTM C 207, Type S.

C. **Aggregate:** ASTM C 144.

D. **Latex Additive:** Acrylic-resin water emulsion serving as replacement for part or all of gaging water, of type specifically recommended by manufacturer for use with job-mixed portland cement and aggregate, and not containing a retarder.

E. **Water:** Potable.

2.7 GROUT MATERIALS

A. **Latex-Portland Cement Grout:** ANSI A118.6, composition as follows:

1. Packaged, dry grout mix consisting of portland cement, graded aggregate, and ethylene vinyl acetate in the form of a reemulsifiable powder to which only water is added at Project site.
2. Dry grout mixture indicated below combined at Project site with acrylic-resin water emulsion serving as replacement for part or all of gaging water.

    a. Dry Grout Mixture: Factory-mixed, sanded grout complying with ANSI A118.6 and recommended by latex-additive manufacturer; in color indicated. Use latex additive without retarder with dry-set grout.
    b. Dry Grout Mixture: Factory-mixed or job-mixed sanded grout consisting of the following:
        1) Portland Cement: ASTM C 150, Type I or II, of natural color or white as required to produce color indicated.
        2) Aggregate: ASTM C 144, graded to comply with latex-additive manufacturer's requirements.
            a) White Aggregate: Natural white sand or ground white stone.
            b) Colored Aggregate: Ground marble, granite, or other sound stone; selected to produce required grout color.
3. Colored Mortar Pigments for Grout: Natural and synthetic iron and chromium oxides, compounded for use in mortar and grout mixes. Use only pigments that have proved through testing and experience to be satisfactory for use in portland cement grout.

B. **Water:** Potable.

2.8 MORTAR AND GROUT MIXES

A. **General:** Comply with referenced standards and with manufacturers' written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing times, and other procedures needed to produce setting-bed and joint materials of uniform quality and with optimum performance characteristics. Discard mortars and grout when they have reached their initial set.

B. **Cement-Paste Bond Coat:** Mix bond coat to a consistency similar to that of thick cream and consisting of either neat cement and water or cement, sand, and water.
1. For latex-modified portland cement setting-bed mortar, substitute latex admixture for part or all of water per directions of latex-additive manufacturer.

C. **Portland Cement-Lime Setting-Bed Mortar:** Type M complying with ASTM C 270, Proportion Specification.

D. **Latex-Modified Portland Cement Setting-Bed Mortar:** Proportion and mix portland cement, aggregate, and latex additive for setting bed to comply with directions of latex-additive

manufacturer and as necessary to produce stiff mixture with a moist surface when bed is ready to receive pavers.

E. **Latex-Modified Portland Cement Slurry Bond Coat:** Proportion and mix portland cement, aggregate, and latex additive for slurry bond coat to comply with directions of latex-additive manufacturer.

F. **Latex-Modified Portland Cement Grout:** Add latex additive to dry grout mix in proportion and concentration recommended by latex-additive manufacturer. Proportion cement and aggregate to comply with directions of latex-additive manufacturer.
   1. Job-Mixed, Pigmented Grout: Select and proportion pigments with other ingredients to produce color required. Do not exceed pigment-to-cement ratio of 1 to 10, by weight.
   2. Job-Mixed, Colored-Aggregate Grout: Produce color required by combining colored aggregates with portland cement of selected color.

PART3 - EXECUTION

3.1 EXAMINATION

A. Examine areas indicated to receive paving, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Proof-roll prepared subgrade surface to check for unstable areas and areas requiring additional compaction. Proceed with unit paver installation only after deficient subgrades have been corrected and are ready to receive subbase for unit pavers.

3.3 INSTALLATION, GENERAL

A. Do not use unit pavers with chips, cracks, voids, discolorations, and other defects that might be visible or cause staining in finished work.

B. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.

C. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.

D. **Joint Pattern:** As indicated.

E. **Tolerances:** Do not exceed 1/16-inch (1.6-mm) unit-to-unit offset from flush (lippage) nor 1/8 inch in 24 inches (3 mm in 600 mm) and 1/4 inch in 10 feet (6 mm in 3 m) from level, or indicated slope, for finished surface of paving.

F. **Expansion and Control Joints:** Provide joint filler at locations and of widths indicated. Install joint filler before setting pavers. Make top of joint filler flush with top of pavers.

3.4 AGGREGATE SETTING-BED PAVER APPLICATIONS

A. Compact soil subgrade uniformly to at least 95 percent of ASTM D 1557 laboratory density.

B. Place aggregate base in thickness indicated. Place aggregate base over compacted subgrade. Compact by tamping with plate vibrator and screed to depth required to allow setting of pavers. Provide compacted thickness indicated. Compact base to 100 percent of ASTM D 1557 maximum laboratory density and screed to depth required to allow setting of pavers.

C. Place geotextile over compacted base course, overlapping ends and edges at least 12 inches (300 mm).

D. Place leveling course and screed to a thickness of 1 to 1-1/2 inches (25 to 38 mm), taking care that moisture content remains constant and density is loose and constant until pavers are set and compacted.

E. Treat leveling base with soil sterilizer to inhibit growth of grass and weeds.

F. Set pavers with a minimum joint width of 1/16 inch (1.6 mm) and a maximum of 1/8 inch (3 mm), being careful not to disturb leveling base. If pavers have spacer bars, place pavers hand tight against spacer bars. Use string lines to keep straight lines. Fill gaps between units that exceed 3/8 inch (10 mm) with pieces cut to fit from full-size unit pavers.

1. When installation is performed with mechanical equipment, use only unit pavers with spacer bars on sides of each unit.

G. Vibrate pavers into leveling course with a low-amplitude plate vibrator capable of a 3500- to 5000-lbf (16- to 22-kN) compaction force at 80 to 90 Hz. Perform at least three passes across paving with vibrator. Vibrate under the following conditions:

1. After edge pavers are installed and there is a completed surface or before surface is exposed to rain.
2. Before ending each day's work, fully compact installed concrete pavers to within 36 inches (900 mm) of the laying face. Cover open layers with nonstaining plastic sheets overlapped 48 inches (1200 mm) on each side of the laying face to protect it from rain.

H. Spread dry sand and fill joints immediately after vibrating pavers into leveling course. Vibrate pavers and add sand until joints are completely filled, then remove excess sand. Leave a slight surplus of sand on the surface for joint filling.

I. Do not allow traffic on installed pavers until sand has been vibrated into joints.

J. Repeat joint-filling process 30 days later.

3.5 MORTAR SETTING-BED APPLICATIONS

A. Saturate concrete subbase with clean water several hours before placing setting bed. Remove surface water about one hour before placing setting bed.

B. Apply cement-paste bond coat over surface of concrete subbase about 15 minutes before placing setting bed. Limit area of bond coat to avoid its drying out before placing setting bed. Do not exceed 1/16-inch (1.6-mm) thickness for bond coat.

C. Apply mortar bed over bond coat immediately after applying bond coat. Spread and screed setting bed to uniform thickness at subgrade elevations required for accurate setting of pavers to finished grades indicated.

D. Mix and place only that amount of mortar bed that can be covered with pavers before initial set. Cut back, bevel edge, remove, and discard setting-bed material that has reached initial set before placing pavers.

E. Wet brick pavers before laying if the initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at the time of laying.

F. Place pavers before initial set of cement occurs. Immediately before placing pavers on setting bed, apply uniform 1/16-inch- (1.5-mm-) thick, slurry bond coat to bed or to back of each paver with a flat trowel.

G. Tamp or beat pavers with a wooden block or rubber mallet to obtain full contact with setting bed and to bring finished surfaces within indicated tolerances. Set each paver in a single operation before initial set of mortar; do not return to areas already set and disturb pavers for purposes of realigning finished surfaces or adjusting joints.

H. **Spaced Joint Widths:** Provide 3/8 inch (10 mm) nominal joint width with variations not exceeding plus or minus 1/16 inch (1.6 mm).

I. Grout joints as soon as possible after initial set of setting bed. Force grout into joints, taking care not to smear grout on adjoining pavers and other surfaces. After initial set of grout, finish joints by tooling to produce a slightly concave polished joint, free from drying cracks.

J. Cure grout by maintaining in a damp condition for seven days, unless otherwise recommended by latex-additive manufacturer.

3.6 REPAIR, POINTING, CLEANING, AND PROTECTION

A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units as intended. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

B. **Pointing:** During tooling of joints, enlarge voids or holes and completely fill with mortar or grout. Point up joints at sealant joints to provide a neat, uniform appearance, properly prepared for sealant application.

C. **Cleaning:** Remove excess grout from exposed paver surfaces; wash and scrub clean.

1. Remove protective coating as recommended by protective coating manufacturer and acceptable to unit paver and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

END OF SECTION 02780

SECTION 32 80 00 - UNDERGROUND IRRIGATION SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. The work covered by this Section consists of furnishing all labor, equipment and materials and performing all operations necessary for installing an automatic irrigation system as shown on the Drawing and/or described by these Specifications. The work includes: preparation and excavation of trenches, installation of irrigation system (including: plastic pipe, fittings and connectors, sprinkler heads, automatic control valves and valve boxes, drip accessories,
electric control cable, wiring to controller and required submittals).

1.2 QUALITY ASSURANCE:

A. Subcontract work to a single firm specializing in irrigation systems.

B. Manufacturer Qualifications. Provide underground sprinkler system as a complete unit produced by a single acceptable manufacturer including heads, valves, piping circuits, controls and accessories.

1.3 SUBMITTALS

A. Product Data: Submit three (3) copies (neatly stapled into sets) of manufacturer's catalog cuts, equipment data sheets, or shop drawings for the following products:

1. Sprinkler heads
2. Swing Joints
3. Valves: electric and manual
4. Controller and controller accessories
5. Valve boxes
6. Pipe and pipe fittings
7. Control wire and splice connectors
8. Drip components
9. Solvent, primer and Teflon tape

B. Submit a written proposal including a breakdown of components to be used in the system and a complete description of the scope of work. Include all information of plumbing and/or electrical permits and fees. Also include with the written proposal:

1. A letter(s) from the manufacturer(s) of all major components of the system (sprinklers, electric valves, controllers, and drip components) that a local authorized service center exists as described in Section 1.4, C. The name and address of that service center shall be included in the letter. The same letter(s) shall also include the name of the local authorized manufacturer's representative.

PART 2 - PRODUCTS

2.1 SPRINKLER SYSTEM:

A. Manufacturer. Irrigation system products shall be by the following manufacturers:

- Rainbird Sprinkler Mfg. Corp. 1-800-247-3782 www.rainbird.com
- Walla Walla Sprinkler Co. 1-509-525-7907 www.mprotator.com
- The Toro Company 1-800-664-4740 www.toro.com

2.2 GRAVEL:

A. Material for gravel sump shall be pea gravel or approved equal.

2.3 PLASTIC PIPE AND FITTINGS:

A. The plastic pipe shall be rigid unplasticized PVC class 200 or class 160 (SDR 26), unless otherwise noted on drawings, extruded from virgin parent material. The pipe shall be homogeneous throughout and free from visible cracks, holes, foreign materials, blisters, deleterious wrinkles and dents.

B. All plastic pipe fittings shall be schedule 40 PVC and shall be manufactured by the same manufacturer as the plastic pipe.

2.4 SHRUB AND LAWN SPRINKLER HEADS:

A. All full and part circle sprinklers shall be of the fixed spray variety as is specified on the Drawing. These sprinklers shall be of the pop-up type with spring retraction. The body of the sprinkler shall be constructed of Cycolac Material and the sprinkler shall be easily serviced from the Manufacturer's specifications with regard to the diameter of throw and gallonage at a given pressure. Spacing of heads shall not exceed the manufacturer's maximum recommendation.

B. Matched precipitation will be required on all full and part circle sprinklers operation on the same zone.

2.5 PVC SLEEVING:

A. Schedule 40 PVC pipe shall be as noted on the drawings. These sleeves are to be used for proposed irrigation lines. Irrigation sub-contractor shall coordinate installation with General Contractor.

2.6 AUTOMATIC CONTROL VALVES:

A. The remote control valve shall be a normally closed 24 volt A.C. 50/60 cycle solenoid type. Valve pressure rating shall not be less than 150 PSI.

B. The valve body and bonnet shall be constructed of heavy duty glass-filled nylon, diaphragm shall be on nylon reinforced nitrile rubber. Solenoid coil shall be encapsulated in molded epoxy.

C. The valve body shall be activated by a low power, 2.0 watt 24 volt A.C. solenoid. The solenoid plunger shall have a filter to insure positive valve operation.

D. The valve shall have a flow control stem with wheel handle for regulation or shutting off the flow of water and a bleed screw for manual operation without electrically energizing the solenoid coil.

E. The valve construction shall be such as to provide for all internal parts to be removable

from the top of the valve without disturbing the valve installation.

2.7 VALVE BOXES:

A. All control valves shall be installed in a valve box in accordance with manufacturer's specifications.

2.8 CONTROL VALVE CABLE:

A. All wiring to be used for connecting the automatic remote control valve to the automatic controllers shall be Type "UF", 14-1 stranded or solid copper, single conduction wire with PVC insulation and bear UL approval for direct underground burial feeder cable. Wire connections to remote control electric valves and splices of wire in the field shall use Pen-Tite wire connectors or approved equal and scaling cement.

2.9 BACKFLOW PREVENTER:

A. Install size as indicated on drawings and as per local codes.

2.10 DRIP IRRIGATION ACCESSORIES:

A. Filter. Provide filter at valve to each drip zone. Provide screen having equivalent of 140-mesh filtration capacity.

B. Pressure Regulator. Incorporate regulator into each drip system if supply pressure exceeds 40 PSI.

C. Closure Caps. Provide in accordance with manufacturer's recommendations.

2.11 AUTOMATIC RAIN SENSOR

A. The rain sensor shall be a micro electronic solid-state type, capable of interrupting the power from the irrigation controller to the valves when rainfall exceeds a preselected setting of 1/8" to 3/4". Device shall be made of corrosion resistant plastic casing.

2.12 AUTOMATIC CONTROLLER:

A. The controller shall be capable of operating 24 V.A.C. electric remote control valves. The controller shall have an active day light with timing accurate to 1 minute per month. (See plan for more specific information).

B. The wall mount type controller cabinet shall be of injection molded high impact plastic which shall resist corrosion and provide for an attractive appearance. The door shall be mated with the other cabinet parts and be made of the same material. The controller shall be wall mounted as shown on the irrigation plan. The controller shall have adequate lightning protection.

PART 3 - EXECUTION

3.1 LAYOUT OF LINES:

A. The water lines will be laid at the locations shown on the plans. The Landscape Contractor shall stake out the location of each run of pipe and all sprinkler heads or valve locations for approval by Landscape Architect prior to digging trench.

B. The lawn irrigation system shall be installed so that it will drain at all points.

C. Install PVC pipe in dry weather when temperature is above 40° F in strict accordance with manufacturer's instructions. Allow joints to cure at least 24 hours at temperature above 40° F (4°C) before testing unless otherwise recommended by manufacturer.

3.2 EXCAVATION AND BACKFILL:

A. Trenches for PVC pipe main lines shall be excavated to sufficient depth of 12" minimum and an unspecified width to permit proper handling and installation of pipe and fittings. Trenches for PVC pipe lateral sprinkler lines shall be excavated to sufficient depth of 12" minimum and an unspecified width to permit proper handling and installation of pipe and fittings.

B. On sodded areas the Landscape Contractor will remove and replace the sod where possible from the trench area to the necessary width and depth required to facilitate his installation.

C. The backfill shall be thoroughly compacted and brought to finish grade, with proper allowance for topsoil. Selected dirt or sand shall be used if soil conditions are rocky. In rocky areas the trenching depth shall be two inches (2") below normal trench depth to allow for this bedding. The pea gravel fill shall be usedin filling the top 4" above the pipe. The remainder of the backfill shall contain no lumps or rocks larger than three inches (3"). The top six inches (6")
of backfill shall be free of rocks over one inch (1") diameter, subsoil or trash.

3.3 PLASTIC PIPE AND FITTINGS:

A. All pipe fittings and valves, etc. shall be installed and joined in accordance with the manufacturer's recommendations. Interior of pipes shall be kept free from dirt and debris and when pipe laying is not in progress, open ends of pipe shall be closed by approved means.

B. Pipe shall be firmly supported throughout its entire length. Extreme care shall be exercised to prevent low points except at drains so that every section of pipe is placed with positive gravity drainage flow towards a drain valve.

C. Sharp changes in alignment and grade shall be made with appropriate fittings. All elbows, tees and fittings shall be installed with a reaction block bearing against undisturbed soil to prevent breakage or separation of the joint.

3.4 AUTOMATIC CONTROL VALVES:

A. Automatic control valves shall be installed in accordance with the manufacturer's specifications.

3.5 VALVE BOXES:

A. Valve boxes shall be installed on a suitable base of gravel for proper foundation box and easy leveling of box to proper grade and also to provide proper drainage of the box. All valve boxes shall be provided with the proper size extensions, wherever required, to bring the valve boxes level with the finished grade.

3.6 ELECTRICAL INSTALLATION:

A. The Contractor will be required to make connections to the building electrical system as is required for the proper operation of the automatic control system. The entire installation shall fully comply with all local and state laws and ordinances and with all the established codes applicable thereto.

B. All control circuitry, whether electrical or hydraulic, passing through the wall of the building or beneath a sidewalk, road or drive shall be installed in a suitable sleeve; whereas in all other locations they shall be installed in the pipe trench and protected by the pipe whenever possible.

C. The joining of all underground wires shall be by the use of wire nuts covered with Scotch Lok per installation instructions provided by manufacturer.

3.7 CONTROL VALVE CABLE:

A. All control valve cables shall be installed by direct burial at a minimum depth of 12". Where practical the wire shall be installed in same trench as mainline pipe.

B. Extreme care shall be exercised during backfilling of trench to avoid damage and displacement of mainline pipe.

C. Control valve cable shall be fed through conduit from inside the building.

D. Each control valve shall be connected to one station of the controller by a control wire. All of the valves shall be connected to a common ground.

3.8 SPRINKLER HEADS:

A. Sprinkler heads shall be installed as shown on the drawings and in accordance with manufacturer's specifications. The height of each sprinkler head in relation to the finish grade shall be approved by the Landscape Architect.

3.9 INSTALLATION OF DRIP IRRIGATION SYSTEM:

A. Install main lines and valves. Before installing emitter laterals, perform pressure test then flush out sand, plastic shaving and other foreign matter.

B. Emitter Hose. Bury emitter laterals under 3 inches of mulch. Solvent weld each connection in accordance with manufacturer's recommendation to standard weight Schedule 40 PVC fittings and bushings. Install hose in a serpentine manner. When cutting hose, use a shearing tool such as a pipe cutter, knife or shears. Use only manufacturer's recommended tool and procedure when punching hose for emitters.

C. Emitter Heads. Connect emitter on a rigid PVC nipple to PVC drip lateral with a tee or elbow. Attach tubing to barbed fitting and daylight distribution tubing at rootball secured with stake. Add bug cap at end of secured distribution tubing. If necessary after installing emitters and before operating system, open end of drip lateral and flush lines clean. The number of emitters on a line shall not exceed manufacturer's recommendations for that hose or distribution tubing size and length.

3.10 BACKFLOW PREVENTERS: METERS

A. Install backflow preventer in new connection between connection and control valves, as per local codes.

B. Irrigation meter- Contractor shall pay for and install a separate irrigation meter to be utilized for this system. Location as shown on plan.

3.11 FLUSHING:

A. After all new sprinkler piping and risers are in place and connected for a given section, and all necessary work has been completed and prior to installation of sprinkler heads, all control valves shall be opened and a full head of water shall be flushed through the system to remove any foreign material.

3.12 TESTING:

A. Tests shall be made on portions of the line as completed. Final testing, however, shall be made on the entire system. Trenches shall be partially backfilled to prevent displacement of pipes.

B. Pressure test shall be performed to a maximum hydrostatic pressure of 200 PSI based on the elevation of the lowest point in the system and corrected to the elevation of the test gauge. Duration of the pressure test shall be at least one hour.

C. Leakage test shall be performed after satisfactory completion of the pressure test. The leakage test shall be conducted at a hydrostatic pressure of 130 PSI without showing a leakage in excess 7.5 gallons per hour. Extend the leakage test for a period of time necessary to allow inspection, but in no case shall the duration be less than two hours.

D. Remove and replace any defective materials of installations discovered in testing and repeat the test until satisfactory to the Landscape Architect. This work shall be performed at the Landscape Contractor's expense.

E. The tests shall be witnessed by the Landscape Architect.

3.13 INSTRUCTIONS:

A. After completion and testing of the system, the Landscape Contractor will instruct the Owner's personnel and provide a maintenance and operations manual in the proper operation and maintenance of the system.

3.14 MAINTENANCE AND OPERATING INSTRUCTIONS:

A. Provide four (4) hours of instruction for Owner's Representative's personnel upon completion of check/test/start-up/adjust operations. Owner's Representative shall be notified at least one (1) week in advance of check/test/start-up/adjust operations.

B. Upon completion of the irrigation system and in conjunction with application for final payment, submit one Maintenance and Operation Manual. Each Manual shall be a 3-ring binder with:

1. One (1) blueline copy of the "RECORD" drawing of the irrigation system, and
2. One (1) complete set of the "APPROVED" Submittals required in paragraph 1.06 above.
3. One (1) copy of the suggested "SYSTEM OPERATING SCHEDULE" which shall call out the controller program required in order to provide 1.0" of water per week to each

planted zone area and 1.5" of water per week to each turf zone area.

4. A typewritten description of the procedures to be followed for proper winterization of the entire system.

C. Contractor shall be responsible for the first year's winterization and subsequent spring start-up procedures and shall perform these operations in the presence of the Owner's Representative's personnel.

3.15 AS-BUILT DRAWINGS:

A. After completion of the piping installation, the Landscape Contractor shall furnish a signed Record Drawing showing exact dimensions, depths and locations of all pipe, drains, controls, heads, etc. of sprinkler system. The drawing shall be also submitted in AutoCAD format 2010 or later. Instruction sheets and parts lists covering all operating equipment will be bound into a folder and furnished to the Owner in duplicate.

3.16 CLEAN-UP:

A. Upon completion of the work and before acceptance and final payment will be made, the Landscape Contractor shall make any necessary repairs, adjustments and corrections to the work as required by the Drawings and Specifications. The Landscape Contractor shall remove from the site all machinery, equipment, surplus and discarded materials, rubbish, temporary structures and all other items not incorporated into the work. The site shall be left in a neat and presentable condition. Any damage to roads buildings, walks, vegetation, utilities or any other item of personal property which is the responsibility of the Landscape Contractor, through accident, negligence or normal usage, shall be satisfactorily repaired or replaced as a requirement for completion of this contract.

3.17 GUARANTEE:

A. For a period of one year from date of final acceptance of the work performed under this Contract, the Landscape Contractor shall promptly furnish, without cost to the Owner, any and all parts and labor which prove defective in material, workmanship, or proper functioning of system.

3.18 REPLACEMENTS:

A. Landscape Irrigation System - During the last month of the guarantee period, the Landscape Architect and Landscape Contractor shall inspect the installation to determine the condition of the complete system. A list of defective materials or installations to be replaced shall be made by the Landscape Contractor within thirty days of receiving written notification. Replaced materials and installation shall be in accord with these Specifications, Drawings and/or schedules.

END OF SECTION 32 80 00

SECTION 32 90 00 – LANDSCAPE PLANTING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. Work included: Work under this Section includes installation of all trees, shrubs, ground cover, annuals, sod and related work required for completion of the project as shown on the Drawings and specified herein.

1. Included hereunder are the furnishing of all equipment, materials and labor necessary to furnish and/or install soil treatment, sodding, planting and mulching of trees, shrubs and vines, protection, maintenance, guarantee and replacement of plants and all work related to the above as specified.

1.2 QUALITY ASSURANCE:

A. Contract landscape work to a single firm specializing in landscape work.

1.3 SOURCE QUALITY CONTROL:

A. General: Ship landscape materials with certificates of inspection required by governing authorities. Comply with regulations applicable to landscape materials.

B. Do not make substitutions. If specified landscape material is not obtainable, submit proof of non-availability to Landscape Architect, together with proposal for use of equivalent material.

C. Analysis and Standards: Package standard products with manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.

PART 2 - PRODUCTS

2.1 TOPSOIL

A. Landscape Contractor will be responsible for fine grading of areas to be planted and sodded.

2.2 SOIL AMENDMENTS

A. The Landscape Contractor shall furnish the Landscape Architect soil analysis and reports as performed by the Agricultural Extension Service or commercial testing laboratory for all area to receive planting. The Landscape Contractor shall incorporate necessary additives in proper quantities as recommended in the soil analysis, or as necessary to bring the soils up to acceptable standards. The Landscape Contractor shall include in his bid and shall pay for all tests required.

B. Commercial fertilizer shall be complete slow release fertilizer as specified by soil analysis and shall conform to the applicable state fertilizer laws. Fertilizer shall be uniform in composition, dry and free- flowing and shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis. Any fertilizer which becomes caked or otherwise damaged making it unsuitable for use will not be accepted.

C. Fertilizer Tablets or Packets. Fertilizer planting tablets or packets shall contain prolonged-release nitrogen, derived from Urea-formaldehyde. Tablets or packets shall be at least a strength of 16-8-5. The amount of available nitrogen, phosphorus or potash may be increased slightly to meet the standard manufactured products available. This fertilizer shall conform to the applicable state fertilizer laws and shall be delivered to the site in the original unopened containers, each bearing the manufacturer's guaranteed analysis.

D. Herbicide shall be an approved commercial grade pre-emergent herbicide used in soil preparation. The particular type of herbicide shall be certified safe for the plants specified in the Plant List or for the plants around which the herbicide shall be used.

E. Lime shall be ground limestone (Dolomite) containing not less than eighty-five (85) percent of total carbonates and shall be ground to a fineness that fifty (50) percent will pass through a 100-mesh sieve and ninety (90) percent will pass through a 20-mesh sieve. Courser material shall be acceptable provided that specified rates of application are increased proportionally on the basis of quantities passing the 100-mesh sieve.

F. Compost shall be a domestic product consisting of partially decomposed vegetable matter of natural occurrence. It shall be brown, clean, and low in content of mineral and woody materials, mildly acid and granulated or shredded.

G. Ammonium nitrate shall be a commercially available agricultural chemical and shall be furnished under the manufacturer's guaranteed statement of analysis giving percentage of active ingredients.

H. Water. The Owner shall supply, at no expense, an adequate supply of water to meet the needs of this Contract. The contractor shall furnish all necessary hose, equipment, attachments and accessories for the adequate irrigation of planted areas as may be required to complete the work as specified.

2.3 STAKING:

A. Material for Staking and Guying:

1. Material for staking and guying shall be 2 1/2" x 2 1/2" x 8' long solid oak stakes.

2. Wire for fastening trees to stakes shall be No. 10 gauge pliable, galvanized iron. All wires to be placed with brightly colored uniform flagging for easy sighting.

3. Hose to encase wire used for fastening trees to stakes shall be new or used two-ply reinforced rubber garden hose, black or green in color. Only one color shall be used throughout the project.

2.4 GRASSING

A. Sod shall be well-rooted, at least 98% Zoysia completely free of noxious weeds and grasses. It shall be mowed to a height not to exceed 2" before lifting and shall be of uniform thickness, with not over 1-1/4" or less than 1" of soil and shall be approved by the Landscape Architect before planting.

B. Sprigs shall be healthy living stems (stolons or rhizomes) with attached roots, harvested without adhering soil and obtained from approved sources where sod is heavy and thickly matted. The presence of Johnson grass, Nutgrass or other objectionable grasses, weeds, or other detrimental materials will be cause for rejection. Not more than 24 hours shall elapse between harvesting and planting of sprigs, except that when weather or other uncontrollable conditions interrupt the work, a time extension may be granted, providing sprigs are still moist and viable. Sprigs that have heated in stockpiles, become frozen, allowed to be-

come dry or otherwise seriously damaged will be rejected and shall be disposed of as directed by the Landscape Architect.

C. Grass seed shall be clean, new-crop seed complying with tolerance for purity and germination established by Official Seed Analysts of North America. Provide seed mixtures composed of grass species, proportions and minimum percentages of purity, germination, and maximum percentage of weed seed, as specified. Seed shall conform to all State laws and requirements and regulations of the SC Department of Agriculture. The Owner reserves the right to test, reject, or approve all seed.

2.5 MULCH:

A. Shredded and double hammered Hardwood Mulch shall be fresh, clean, and free from sticks and debris. B.

Samples of materials as listed below shall be submitted for inspection, on the site or as otherwise determined by the Landscape Architect. Upon approval of samples by the Landscape Architect, delivery of materials may begin.

MATERIALS	SAMPLE
Shredded and Double Hammered Hardwood Mulch	1 Gallon
Plants	1 of each
Sod	1 Roll

Typical samples shall be furnished from each separate source of supply. Approved samples shall be stored on the site and protected until furnishing of materials is complete. Plant samples may be planted in permanent positions, but labeled as samples.

2.6 PLANT MATERIALS (See Plant List):

A. Nomenclature. The names of plants required under this Contract conform to those given in Standardized Plant Names, 1942 Edition, prepared by the American Joint Committee on Horticultural Nomenclature. Names of varieties not included therein conform generally with names accepted in the nursery trade.

B. Quantities. Provide quantities necessary to complete the planting as shown on the drawings. Contractor must check quantities and differences shall be brought to the attention of the Landscape Architect.

C. Quality and Size. Plants shall have a habit of growth that is normal for the species and shall be sound, healthy, vigorous and free from insect pests, plant diseases and injuries. All plants shall equal or exceed the measurements specified in the Plant List which are minimum acceptable sizes. They shall be measured before pruning with branches in normal position. Any necessary pruning shall be done at the time of planting. Requirements for the measurement, branching, grading, quality, balling and burlapping of plants in the Plant List generally follow or exceed the Code of Standards currently recommended by the American Association of Nurserymen, Inc. in the American Standard for Nursery Stock.

D. Substitutions will be permitted after Award of Contract only upon submission of proof in writing that a plant is not obtainable and authorization by the Landscape Architect for use of the nearest equivalent obtainable size or variety of plant having the same essential characteristics. Should this substitution result in the use of a smaller or less valuable plant, a change order will be issued with an equitable adjustment in contract price.

E. Type of Protection to Roots:

1. Balled and Burlapped Plants. Plants shall be balled and burlapped unless otherwise noted on the Drawings. They shall be dug with firm, natural balls of earth of sufficient diameter and depth to encompass the fibrous and feeding root system necessary for full recovery of the plant and of minimum sizes shown on the Plant List. Balls shall be firmly wrapped with untreated burlap or similar material and bound with twine, cord or wire mesh. Where necessary to prevent breaking or cracking of the ball during the process of planting, the ball may be secured to a platform.

2. Container-grown plants designated in the Plant List shall have been grown in a container such as pots, cans, tubs or boxes and have sufficient roots to hold earth together intact after removal with- out being root bound. Container size shall be in proportion to plant size and in accordance with AAN Standards. The Landscape Architect shall have the option to reject container-grown material if the growing media is too porous to hold adequate water for the plant's survival without watering more than once a week.

F. Protection after Delivery. The balls of plants which cannot be planted immediately upon delivery shall be covered with moist soil or mulch or provided with other protection from drying winds and sun. All plants shall be watered as necessary until planted.

PART 3 - EXECUTION

3.1 PLANTING METHODS:

A. Time of Planting. Planting operations shall be conducted under favorable weather conditions preferably during the period from October 1 to April 1. The Landscape Contractor has the option and assumes full responsibility for planting during unseasonable conditions. Trees should be dug and heeled in or in container and placed in a well-watered holding area provided by the nursery or Landscape Contractor until the time of planting. Landscape Contractor to be responsible for the welfare of the tree until project is completed, when the owner will assume responsibility.

B. Plants to Remain. The Landscape Contractor shall take all necessary precautions to preserve and protect all existing plants that are to remain on the site. This shall include, but is not limited to, hand excavation of planting pits in close proximity to existing shrubs or within the spread of branches of larger trees, watering of existing materials adjacent to plant pits, trimming or pruning to permit installation of new plants or to repair damaged existing plants.

C. Obstructions Below Ground or Overhead:

1. It is not contemplated that planting shall be done where the depth of soil over underground construction, obstructions or rock, is insufficient to accommodate the roots or where pockets in rock or impervious soil will require drainage. Where such conditions are encountered in excavation of planting areas and where the stone, boulders or other obstructions cannot be broken and removed by hand methods in the course of digging plant pits of the usual size and where trees to be planted are found to be under overhead wires, other locations for the planting may be designated by the Landscape Architect.

2. Removal of rock or other underground obstruction, relocation of construction and provisions of drainage for planting areas shall be done only as directed by the Landscape Architect.

3. Should the Landscape Contractor encounter unsatisfactory surface or subsurface drainage conditions, soil depth, latent soils, hard pan, steam or other utility lines or any other conditions that will

jeopardize the health and vigor of the plantings, he must advise the Landscape Architect in writing of the conditions prior to installing the plants. Otherwise, the Landscape Contractor warrants that the planting areas are suitable for proper growth and development of the plants to be installed.

D. Lawns

1. See Planting Plans for location of areas to be sodded.

2. Fine Grading Areas to be sodded shall be brought to within the thickness of the sod of the finished grade. Allowance for settlement shall be made. Fine grading for all areas will be performed by the Landscape Contractor prior to any planting or sodding.

3. Soil Improvements:

   a. Ground limestone shall be applied at the rate recommended by the testing laboratory. b.

      Fertilizer shall be applied at the rate recommended by the testing laboratory.

   c. Application. Limestone shall be thoroughly mixed into the topsoil and as far ahead of sodding as possible, to prevent interfering with other grading operations.

E. Laying of Sod

1. Before any sod is laid, all soft spots and inequalities in grade shall be corrected. Fertilizer spread shall be raked in. Sod shall be laid so that no voids occur, tamped or rolled and then watered thoroughly. The completed sodded surface shall be true to finished grade, even and firm at all points.

2. Sod on slopes steeper than 2 1/2 to 1 shall be held in place by wooden pins about 1" square and about 6" long, driven through the sod into the soil until they are flush with the top of the sod or by other approved methods for holding the sod in place. Stakes shall be spaced along the center-line of a strip of sod at intervals of approximately 3'.

3. During dry periods, sod must be watered as it is laid.

F. Sprigging

1. Sprigs shall be applied at a rate no less than 17.5 bushels per 1,000 square feet (750 bushels per acre). Sprigging shall not be done during windy weather, or when the ground is excessively wet, frozen, or otherwise untillable. If the soil is not sufficiently moist when sprigs are being set, water shall be applied until the soil contains sufficient moisture. Sprigs shall be broadcast by hand or by suitable equipment in a uniform layer over the prepared surface with spacing between sprigs not to exceed 8 inches. The sprigs shall then be forced into the soil to a depth of 2 to 3 inches with a disk harrow or other satisfactory tool set to cover the sprigs to the required depth. A portion of the sprig foliage should be left exposed at the soil surface. After the planting of sprigs and prior to compaction, the surface shall be cleared of stone larger than 2-1/2", large clods, roots, and other litter brought to the surface during sprigging. The sprigged areas shall be compacted within 24 hours from the time sprigging has been completed, weather and soil conditions permitting, by cultipackers, rollers, or other suitable equipment. Compaction shall not be done when the soil is in such condition that it is being picked up by the equipment, nor shall clay soils be compacted. Ensure adequate moisture to all sprigged areas during initial establishment period. A second application of fertilizer shall be applied after plants have become established, applied in a dry form as directed by soil testing results.

2. Acceptance. Sprigged areas shall achieve a 90% rate of coverage after 8 weeks, and 100% coverage at the end of the growing season. Coverage will be determined on a square yard basis.

G. Seeding

1. Areas to be seeded shall be uniform and shall conform to the finished grade as shown on the plans. The seedbed shall be loosened to a miniumum depth of 3 inches before agricultural lime, fertilizer or seed is applied. Areas to be seeded shall be cleared of stones larger than 2.5 inches in any dimension, roots and other debris. At areas to be grassed where the existing seed bed has little or no topsoil, the Contractor shall furnish and place topsoil in order to ensure a good stand of grass.

2. Lime and/or fertilizer shall be spread uniformly over the designated areas and shall be thoroughly mixed with the soil to a depth of 2 inches. Lime and fertilizer shall be applied at the rate specified by the soil test report. Lime and fertilizer may be applied by approved mechanical spreaders or by hydraulic methods as a mix of fertilizer and seed.

3. Within 24 hours following the covering of the seed, straw or hay mulch material shall be spread at the rate of 2 tons per acre. Mulch shall be held in place by an approved tacking agent applied at the manufacturer's recommended rate. Hydroseeding may be performed using 1500 pounds per acre wood, cellulose, or a wood/cellulose mix hydroseeding mulch with the manufacuturer's recommended rate of an approved tacking agent.

4. The Contractor shall obtain a satisfactory stand of perennial vegetation whose root system shall be developed sufficiently to survive dry periods and winter weather, and be capable of re- establishment in the spring. The perennial vegetative cover shall have a minimum coverage density of 70% for the seeded areas.

H. New Plantings:

1. Layout. New planting shall be located where shown on the Drawings except where obstructions below ground or overhead are encountered or where changes have been made in the construction. Necessary adjustments shall be made only after approval by the Landscape Architect. No planting, with the exception of ground cover, espalier plants and hedge, shall be placed closer than 2' to pavement or structures. The Landscape Contractor shall be responsible for staking and layout of plantings on this project. The Landscape Architect shall be advised when stakes are in place and ready for inspection on various planting areas. All layout work shall be inspected and approved by the Landscape Architect prior to opening any plant pits.

2. Planting Pits. Reasonable care shall be exercised to have pits dug and soil prepared prior to moving plants to their respective locations for planting to insure that they will not be unnecessarily ex- posed to drying elements or to physical damage. However, no open holes shall be left overnight or unmarked or unattended.

a. Circular pits with vertical sides shall be excavated for all plants in beds or trenches. See Planting Plan for more detailed information regarding preparation of planting areas. Diameter of pits for trees and shrubs shall be at least 2'greater than the diameter of the ball or spread of roots. The depth of pits for trees, shrubs and vines shall be enough to accommodate the ball or roots when the plant is set to finished grade allowing for 6" of compacted topsoil or prepared soil in the bottom of the pit.

b. Before planting any area, fill a representative sample of the excavated planting pits and beds with water to a depth 6" or more as required to verify if the subsoil is permeable enough to percolate satisfactorily and drain adequately after plants are installed. Advise the Landscape Architect in writing if any problems are anticipated regarding excessive ground water or unsuitable percolation.

I. Soil Preparation for Planting Trees and Shrubs:

1. Soil used in planting shall be existing soil and/or re-spread topsoil. The prepared soil mix in tree pits as herein before specified shall be thoroughly mixed with one part compost to three parts of existing soil.

2. Fertilizer tablets or packets shall be placed in each tree or shrub plant pit at a depth of 6" to 8" when the plant is set in place. The exact quantity and distribution of tablets or packets shall be in strict accordance with the manufacturer's recommendation for the sizes of material specified.

3. Excess excavated soil shall be disposed of off site by the Landscape Contractor unless specific permission is obtained from the owner to dispose of excess material on the site.

J. Soil Preparation for Planting Ground Cover and Annuals:

1. Loosen subgrade of lawn areas to a minimum depth of 6". Remove stones over 1 1/2" in any dimension, sticks, roots, rubbish, and other extraneous matter. Limit preparation to areas which will be planted promptly after preparation.

2. Soil used in planting shall be existing soil as herein before specified and shall be thoroughly mixed with one part compost to three parts of existing soil.

3. Add specified soil amendments as per soil analysis and mix thoroughly into upper 4" of topsoil.

4. Excess excavated soil shall be disposed of off site by the Landscape Contractor unless specific permission is obtained from the Owner to dispose of excess material on the site.

K. Setting Plants. Unless otherwise specified, all plants shall be planted in pits, centered and set on 6" of compacted soil or prepared soil to such a depth that the finished grade level at the plant after settlement will be the same as that at which the plant was grown. Prior to setting container-grown plants, make four to five cuts 1/2" - 1" deep, top to bottom on root-bound mass to loosen roots. Plants shall be planted up- right and faced to give the best appearance or relationship to adjacent structures. No burlap shall be pulled out from under balls. Plant forms, wires and surplus binding from top and sides of the balls shall be removed. All broken or frayed roots shall be cut off cleanly. Prepared soil shall be placed and com- pacted carefully to avoid injury to roots and to fill all voids. When the hole is nearly filled, add water as necessary and allow it to soak away. Fill the holes to finished grade. After the ground settles, additional soil shall be filled in, to the level of the finished grade.

L. Guying and Staking. Trees shall be supported immediately after planting. All trees shall be staked as detailed and shown on the Plans. Wires shall be encased in hose to prevent direct contact with the bark of the tree and shall be placed around the trunk in a single loop. Wires shall be tightened and kept taut by the use of turnbuckles. Stakes shall be equally spaced about each tree and shall be driven vertically into the ground to a depth of about 2' in such a manner as not to injure the ball or roots. Trees shall be fastened to each stake at a height where substantial branching will hold encased wire in place. Wire shall be doubled and twisted taut. Stakes shall be uniform in length and placed according to the type, size and location of the

tree.

M. Herbicide Treatment. All tree saucers, shrub and ground cover beds shall be treated after plants have been installed with an approved pre-emergent herbicide recommended by the manufacturer. Plants installed during the fall planting season shall be treated with the approved herbicide during the first week of April of the following year. Plants installed in the spring shall be treated with the approved herbicide immediately after installation. Herbicide shall be cleared by the manufacturer as safe for use around plants itemized in the Plant List.

N. Shredded Hardwood Mulching. Tree and shrub beds shall be mulched with 3" of double-hammered, shredded hardwood mulch. This mulch shall cover the entire bed area and shall have a neat and well-defined edge between lawn area and shrub bed. Trees in lawn areas with individual saucers shall be mulched with 3" of shred- ded hardwood mulch.

O. Pruning and Repair. All pruning and repair work must be completed within a ten day period after planting. The amount of pruning included under the work of this Section shall be limited to the minimum necessary to remove dead or injured twigs and branches and to compensate for the loss of roots as a result of transplanting operations.

1. Trees and some shrubs will be pruned back after planting to maintain a balance between the reduced root system and the branches. Care will be taken in this work to insure that the plants preserve their natural form.

2. The natural form of newly planted trees and shrubs will be preserved in pruning by the removal of branches and/or part of branches at different lengths in accord with standard horticulture practices and as directed by the Landscape Architect. Pruning will always be done with a clean cut in living wood without bruising or tearing of bark and without leaving any stubs which would prevent the wound from healing over. Horizontal cuts may cause rot and will be avoided.

3.2 CLEAN-UP:

A. Clean-up. Any soil, bark, peat or similar material which has been brought onto paved areas within or outside the construction area by hauling operations or otherwise shall be removed promptly, keeping these areas clean at all times. Upon completion of the planting, all excess soil, stones and debris which have not been cleaned up shall be removed from the site or disposed of as directed by the Landscape Architect. All planting areas shall be prepared for final inspection.

B. Other Work. The Landscape Contractor shall be responsible for the repair of any damage caused by his activities or those of his subcontractors within or outside the construction area such as the storage of topsoil or other materials, operation of equipment and other usage. Such repair operations shall include any regrading, sodding or other work necessary to restore damaged work or areas to an acceptable condition.

3.3 MAINTENANCE:

A. Maintenance shall begin immediately following the last operation of installation for each portion for each plant and shall continue until installation of planting is complete and the planting is formally accepted. Maintenance shall include mowing, watering, weeding, cultivating, mulching, tightening and repairing of guys, removal of dead material, resetting plants to proper grades or upright positions, restoration of the planting saucer and other necessary operations. Any damage resulting from planting operations shall be repaired promptly.

B. The Owner shall be responsible for all required maintenance after the planting is formally accepted (final acceptance).

3.4 INSPECTION FOR ACCEPTANCE:

A. Inspection of the work of this Section to determine completion of the Landscape Contractor's work, exclusive of the possible guarantee replacement of plants, shall be made by the Landscape Architect upon receipt of written notice requesting such inspection submitted by the Landscape Contractor at least ten (10) days prior to the anticipated date of inspection.

B. Acceptance. After inspection, the Landscape Contractor will be notified in writing by the Landscape Architect of acceptance of all work of this Section, exclusive of the possible replacement of plants subject to guarantee or the Landscape Contractor will be notified in writing if there are any deficiencies from the requirements for completion of the work. Replacements, maintenance and repair work remaining to be done shall be subject to re-inspection before acceptance.

3.5 PLANT GUARANTEE AND REPLACEMENT:

A. Guarantee. This guarantee shall be provided to the owner by the contractor responsible for planting and irrigation. Plants shall be guaranteed for the duration of one (1) full year after the formal acceptance of the planting by the Owner and shall be alive and in satisfactory growth at the end of the guarantee period. The Owner shall be responsible for all maintenance necessary to keep the plants alive and healthy between the time the plantings are accepted and the end of the guarantee period. The basic needs of the plants during this period are for adequate water and protection from insects and other similar pests. Plants severely damaged by vandals are not subject to replacement by this Landscape Contractor.

B. Sodded lawn areas are not subject to a one year guarantee.

B. Should the Landscape Contractor find the plant material is not receiving the proper maintenance at any time prior to the end of the guarantee period, he should advise the Landscape Architect and the Owner immediately in writing so corrective measures may be initiated.

D. Replacement. At the end of the guarantee period, inspection will be made by the Owner and the Landscape Architect upon written notice requesting such inspection submitted by the Landscape Contractor at least ten (10) days prior to the anticipated date. Any plant installed under this Contract that is dead or not satisfactory in growth as determined by the Landscape Architect shall be removed from the site. These, and any plants missing due to the Landscape Contractor's negligence, shall be replaced as soon as conditions permit but during the normal planting season.

1. Any plant that has die-back or otherwise loses 30% or more of its branches, excluding branches removed by trimming and pruning, as existing and living prior to removal from the nursery field shall be rejected. In case of any question, the Landscape Contractor may elect to allow such plant to remain through another complete growing season at which time the rejected plant, if found to be dead or in an unhealthy or badly impaired condition, shall be replaced.

2. The Landscape Contractor shall be responsible for removing dead or diseased plants from the site during the guarantee period upon notification by the Owner or Landscape Architect. Dead plants may be removed by the Owner during the guarantee period provided they keep a photographic record of all plants removed. Photographs should show plant to such a degree that is clearly evident the plant is dead. Replacements shall be made only at the end of the guarantee period as described herein.

3. The Landscape Architect shall inspect replaced plants when all replacements have been made. Any plant that is not alive and in a healthy vigorous condition shall be replaced again by the Landscape Contractor.

E. Materials and Operations. All replacements shall be plants of the same kind and size as specified in the Plant List. They shall be furnished and planted as specified under "New Planting", the cost of which shall be borne by the Landscape Contractor.

F. Replaced plants are not subject to a full one (1) year guarantee, but replacements must be alive and vigorous when inspected after planting and must leaf out fully in spring, if replacements are made while the plant is dormant.

END OF SECTION 32 90 00