SECTION 32 01 90 - LANDSCAPE MAINTENANCE

PART 1 – GENERAL

1.01 DESCRIPTION

A. This section includes furnishing labor, materials and equipment for the complete care and guarantee of all planted trees, shrubs, ground covers, lawn areas, seasonal color and mulched areas within the limits of work shown on the Landscape Plan as required by the Landscape Maintenance Specifications.

B. The Landscape Maintenance Contractor shall also be responsible for the complete maintenance and repair of the landscape irrigation system as required by the Landscape Maintenance Specifications.

C. The Contractor's attention is directed to the fact that there are active utilities located within the limits of work. Before commencing any work required under the Contract, he shall find the location of all proper utilities, subsurface drainage, and underground construction and take proper precautions not to disturb or damage any subsurface improvements. The Contractor is responsible for all repairs to damaged utilities resulting from the work covered by this Contract without claims against the Owner for additional cost.

D. The Contractor shall include one year of maintenance in his proposal.

1.02 QUALITY ASSURANCE:

A. Reference Standards: Conform to recommendations, specifications and standards of the following:

1. *Standardized Plant Names*, 1942 Edition, American Joint Committee on Horticultural Nomenclature.
2. *American Standard for Nursery Stock*, 1980 Edition, American Association of Nurserymen.

B. The selection of all materials and the execution of all operations required under the specifications and drawings shall be subject to the approval of the Owner or his designated representative. The Owner’s representative and the Maintenance Contractor shall make monthly site inspections to determine any work, which, in the opinion of the owner’s representative, does not meet the requirements of the Landscape Maintenance Specifications. The Contractor shall promptly correct all rejected work.

C. The Owner shall be assured of a complete maintenance program and plant guarantee for all trees, plants, lawn and mulch areas such that the quality of all planting and lawns shall not deteriorate, but shall obtain vitality and healthy new growth for the duration of the Contract.

D. The Maintenance Contractor is hereby made aware that the Owner anticipates that the landscape maintenance at this site shall be of the very highest quality possible. All work to be performed, such as pruning, mowing, fertilizing, watering, weeding, irrigation maintenance, edging, spraying, policing, plant installation, and over seeding, aerating, and mulching shall be strictly managed and executed and performed by experienced, qualified personnel.

E. The Owner shall be assured of a complete maintenance program for the site landscape irrigation system such that the performance of the system shall not deteriorate below the designed limits of operation and/or the manufacturer's performance specifications.

1.03 SUBMITTALS:

A. The Maintenance Contractor shall provide the Owner with a complete and detailed maintenance schedule, which specifically outlines the maintenance procedures to be, performed at daily, weekly, monthly, and annual intervals.

B. The Contractor shall collect three (3) soil samples, from areas to receive landscaping, for the purposes of testing. Each sample shall be approximately 1 KG in volume (approximately 1 gal. Ziploc bag) and shall receive the following test performed by A&L Agricultural Labs: (a.) S-1A, (b.) S-3

Send soil samples to:
Mr. Lynn Griffith
A&L Southern Agricultural Laboratories
1199 West Newport Center Drive
Deerfield Beach, Florida 33442

Test results shall be submitted annually to the owner’s representative for review by January 30th or within 30 days following execution of the landscape maintenance contract.

1.04 WARRANTY:

A. The Maintenance Contractor shall guarantee and completely replace at no additional cost to the Tenant and Owner 100% of the plants, which, in the opinion of the Owner or his representative, fail to maintain a healthy, vigorous condition (excluding theft or vandalism) regardless of the Contractor responsible for the initial installation. All replacement plant material shall meet all specifications as listed in Landscape Development Specifications and Plant List in regard to species, variety, color and quality. Size of replacement plant material shall equal that of the plant, which is being replaced, and/or the size of existing adjacent like specimens.

B. In the event that the performance of the Maintenance Contractor should fail to satisfy the expectations and standards set forth in the Landscape Maintenance Specifications as interpreted by the Owner and his representative, the Owner reserves the right to obtain others to perform such duties and deduct all costs from the Maintenance Contractor's payments.

PART 2 – PRODUCTS

2.01 PLANTS:

A. All replacement plant material shall meet all specifications as listed in the Landscape Development Contract Documents relative to installation procedures, species, variety, color, quality and spacing. The size of the replacement material shall equal that of the material being replaced and/or the size of existing adjacent like specimens.

2.02 MULCH:

A. Pine Straw or other specified mulch, three inches deep shall be clean, fresh, and free of foreign matter.

2.03 COMMERCIAL FERTILIZER:

A. Commercial fertilizer shall be a complete fertilizer with a W.I.N. (water insoluble nitrogen) value of not less than 60% unless specified otherwise in the soils analysis prepared by the specified testing facility. It shall be delivered to the site in standard size unopened containers, showing weight, analysis, and name of manufacturer. It shall be stored in a weatherproof storage place in such a manner that it will be kept dry.

2.04 WATER:

A. Water shall be available at the site.

2.05 INSECTICIDES:

A. The Contractor shall maintain a valid current state pesticide applicator's and operator's license of project site at all times and shall use all chemicals in strict accordance with the federal, state and county directives on environmental control, and carry an E.P.A. approval number at all times while on the job.

2.06 IRRIGATION EQUIPMENT:

A. All replacement irrigation equipment shall meet the standards as indicated in the Site Irrigation Drawings and Specifications.

PART 3 – EXECUTION

3.01 WATERING:

A. All trees, shrubs, ground covers, seasonal color, planters, and lawns shall be checked weekly for dryness and wetness. If it is determined that there is insufficient moisture, the

Contractor shall thoroughly water the area at once until it is thoroughly saturated by hand watering or manual adjustment of the site irrigation system. Then Contractor shall make adjustments to the irrigation sprays and duration to correct the problem moving forward. If it is determined that there is too much moisture in an area, Contractor shall reduce the irrigation and otherwise take all measures necessary to insure proper drainage of excess water.

3.02 MULCHING:

A. As a part of the maintenance agreement, all tree saucers, shrubs, plant beds, ground cover, and seasonal color areas shall receive 1 complete mulch application per year using a 2" depth of mulch specified plus monthly touch up mulch applications to cover all worn, bare and thin areas.

3.03 FERTILIZATION

A. All trees shall be fertilized per the recommendations of A&L Labs as described on the soil samples test data by spreading fertilizer below canopy of tree at drip line and scratching into soil surface.

B. All shrubs shall be fertilized per the recommendations of A&L Labs as described on the soil samples test data. Fertilization shall be accomplished by spreading material on soil around base of plant, taking care to avoid getting fertilizer on plant parts.

C. All ground cover beds shall be fertilized per the recommendations of A&L Labs as described on the soil samples test data. Fertilization shall be accomplished by spreading material uniformly over area and immediately dusting off the plants lightly with a blower and watering in to remove any material on foliage or stems that may cause chemical burn.

C. All lawn areas shall be fertilized per the recommendations of A&L Labs as described on the soil samples test data. Fertilization shall be accomplished by uniformly distributing material with a mechanical spreader using a crossing pattern.

3.04 PRUNING:

A. All trees and shrubs shall be selectively pruned or thinned periodically to adequately maintain vigor, health and an attractive shape with respect to the intended character of the plant.

B. Trees shall be pruned as needed to remove diseased, dying or dead branches, crossing branches, low hanging branches, suckers, weak crotches or any branches that may propose a safety hazard.

C. Suckers and water sprouts shall be removed as many times as necessary to maintain plants free of extraneous growth.

3.05 STRAIGHTENING TREES:

A. Any leaning trees shall be straightened by leveraging the rootball with shovel and/or other tools. New guy wire and/or stakes shall be installed to hold tree in place. If the tree cannot be successfully straightened by leveraging, then the Contractor shall dig around the root ball and straighten by manipulating the rootball. When wrapping wire around the tree the Contractor shall be sure to install a piece of rubber hose such that the wire will not cut the tree.

3.06 EDGING:

A. The Contractor shall neatly edge turf and trim turf around all plant beds, curbs, walks, streets, trees, plants, and building areas. Mechanical edger may be used for edging turf provided appropriate measures are taken to insure the safety of all persons and property. Plants encroaching into turf or sidewalk areas will be feather pruned by hand to maintain a tidy naturalistic shape. All shapes and configurations of plant beds shall be maintained as installed. A clean trenched line shall be provided between grass and mulched areas. Care shall be taken not to injure trunks of trees or plant materials.

3.07 POLICING:

A. The entire site, including parking areas, sidewalks, roadways, retention ponds, lawn areas and planted areas shall be policed weekly to remove leaf drop, all litter and debris.

B. All debris and litter, collected during policing operations, shall be removed from the site by the Maintenance Contractor.

C. All storm drains, ditches, culverts, etc., within the limits of work will be kept free of litter which could obstruct proper water flow.

D. Blowers may be used by the contractor to clear streets, sidewalks, curbs and parking areas of organic matter accumulation caused by contractor’s maintenance operations unless prohibited by local ordinances.

3.08 SOIL ANALYSIS:

A. Three (3) soil samples shall be at random taken from planted areas of site by the installing landscape contractor for the purposes of determining the liming and fertilization requirements of the proposed landscape materials. This information will be made available to the landscape maintenance contractor for the purposes of determining the specifications of the fertilizers to be used on site. Following the end of landscape warranty period, the landscape maintenance contractor shall annually take three (3) soil samples for analysis to determine if adjustments in fertilization program are needed. Cost for soil analysis shall be borne by the Maintenance Contractor. Soil samples shall be sent to A &L Agricultural Laboratories, attention Lynn Griffith, 1199 West Newport Center Drive, Deerfield Beach, Florida 33442.
Each sample shall receive test S1-A and S-3.

3.09 DISEASE AND INSECT CONTROL:

A. Contractor shall employ mechanical, chemical or organic measures to prevent and/or eradicate diseases or insects that threaten the appearance and vitality of all trees, shrubs, ground covers, and lawn areas.

B. Contractor shall practice integrated pest management on all trees, shrubs and lawn areas as required to maintain healthy, vigorous growth and development.

C. Annual color beds shall be thinned, pruned, deadheaded and fertilized as required to maintain healthy, vigorous plants free of disease and insect pests.

D. Lawn areas shall receive preventative chemical applications as needed to maintain weed free, healthy turf. Any turf that dies, as a result of a failure on the part of the landscape maintenance contractor to take preventative measures during the maintenance period, shall be replaced by the maintenance contractor at no additional cost to the owner.

E. Fire ants will be treated with recommended chemicals as needed to maintain a relatively ant free site.

3.10 WEED CONTROL:

A. Contractor shall employ mechanical or chemical measures to ensure that weeds or undesirable grasses do not encroach upon any lawn or mulched areas.

3.11 MOWING:

A. All Tall Fescue lawn areas shall be mowed to a height of three and one half to four inches (3.5 - 4"). All Bermuda, Centipede and Zoysia lawn areas shall be mowed to a height of one and one half inches (1.5"). All St. Augustine shall be mowed to two to three inches (2”-3”). Raise mowing heights during times of turf stress such as drought, heavy shade, and prior to winter dormancy for warm season grasses.

B. Rotary type mowers designed for commercial use shall be used unless conditions require that smaller rotary mower be used.

C. All lawn areas will be mowed in a one-day operation and performed at a frequency necessary to maintain the specified height.

D. Excess grass clippings will be removed from lawn areas and removed from site by Maintenance Contractor.

3.12 LANDSCAPE IRRIGATION SYSTEM:

A. SYSTEM CHECK: The Irrigation Contractor shall perform periodic inspection of the irrigation system not less than one (1) time per month. Required adjustments and/or replacements discovered during periodic inspections shall be promptly executed. Periodic inspection to include the following:

1. Control Clock must be checked to ensure that program days and station run times are correct for unique plant requirements.

2. Inspect each zone for proper operation of automatic control valves, coverage, and head performance. Ensure that spray nozzles are unclogged, gear driven or impact rotors rotate as designed, and all pop-ups function properly at full extension and completely retract when turned off.
3. Examine manual valves for leaks and proper orientation.
4. Inspect valve boxes of automatic valves, gate valves, and wire splices to ensure that contents are fully enclosed, protected, and free of mud slurry, litter, and that lids are secure.

B. Documentation of system check, adjustments, repairs, and all time spent on irrigation maintenance shall be recorded in a ledger and submitted to the property manager monthly.

C. Seasonal variation of precipitation and soil moisture shall be monitored closely as a continuous practice and separate from the periodic check so that appropriate adjustments can be made to the program day and duration of affected zones to compensate for environmental conditions.

D. Annual preventative maintenance of the irrigation system shall be conducted by the irrigation contractor to preempt possible damage or deterioration of the irrigation equipment due to abuse or material wear. Annual inspection shall include the following:

1. Test water pressure in mainline at a minimum of three (3) different locations via hose bib or quick coupling valves. Determine if leaks exist, repair if needed.
2. Test pressure compensation valves for correct release into lateral lines, as indicated in the contract documents.
3. Re-adjust pressure regulators and flow regulators where applicable, to volumes indicated in the contract documents. Test output to confirm proper operation.
4. Balance and adjust the various components of the irrigation system so that the overall operation of the system is most efficient. This includes synchronization of the controllers, adjustments to pressure regulators, part circle sprinkler heads, and individual station adjustments on the controllers.
5. Perform system check, re-adjust, repair, and replace components as necessary.
6. Written report sent to property manager verifying that the irrigation system is fully operable within the design specifications.

E. The maintenance contractor shall guarantee the operation of the irrigation system and shall replace or repair inoperable or damaged equipment. Following approval from the Owner, required replacements and repairs shall be billed to the Owner following written approval. Should damage to any irrigation equipment result from maintenance procedures or due to neglect by the contractor, 100% of the damage shall be repaired at no additional cost to the Owner.

F. Replacement and repair of the irrigation equipment shall be performed in accordance with the procedures set forth in the irrigation development specifications.

G. All replacement equipment and materials used in the system must be new and without flaws or defects of any type and be the best quality available. Replacements shall meet

all specifications as listed in the irrigation development specifications. All materials shall have a minimum guarantee of one (1) year against material defects or defective workmanship.

H. Approval of replacement work: The irrigation maintenance contractor shall inform the property manager of necessary replacement work before beginning said operations. The owner reserves the right to obtain others to perform such duties, or to oversee and inspect the performance of the irrigation maintenance contractor.

3.13 SAFETY:

A. All materials and performance of work will meet all federal health and safety laws currently in effect. All chemicals to be used in performance of this contract shall carry an E.P.A. approval number.

B. Contractor shall provide and require the wearing of protective clothing, mask, eye protection, etc., during any operation as required or directed by applicable laws, regulations or ordinances, and/or directions of manufacturers of material or equipment.

C. All equipment must be properly maintained and is subject to inspection by the Owner. Any deemed inoperable or unsafe shall be removed from the premises. All equipment must meet the American Standard Safety specifications and OSHA requirements.

D. The Contractor shall adequately protect workers, adjacent property, and the public. The Contractor shall take all necessary precautions for the safety of his employees on the job and of the persons employed at and visiting the facility.

3.14 SEASONAL COLOR:

A. The Landscape Maintenance Contractor shall be responsible for bed preparations, furnishing and installing of seasonal color as indicated by Landscape Development Plan or by the on-site direction of the owner’s representative. The program shall consist of two (2)) color changes per year, spring and fall.

B. The Maintenance Contractor shall be responsible for annual color maintenance operations including feather pruning, deep pruning, deadheading to promote blooming, fertilization, and plant replacement.

C. Contractor will replace annual color plants lost due to lack of proper maintenance at no additional cost to the owner.

E. Upon delivery, annual plants shall be 80% in bloom, free of insects and diseases uniform in height and size, and have a fully developed root system.

END OF SECTION

SECTION 321216 - ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. See Geotechnical (Soils) and Environmental Reports provided by the Owner.

C. See Division 02 Section “Selective Demolition.”

D. See Division 31 Section "Earth Moving

1.2 SUMMARY

A. Section Includes:

1. Cold milling of existing hot-mix asphalt pavement.
2. Hot-mix asphalt patching.
3. Hot-mix asphalt paving.
4. Hot-mix asphalt paving overlay.

1.3 SUBMITTALS

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

1. Job Mix Designs: Contractor shall submit a mix design using either the “Marshall Stability” or “Superpave” Mix Design for each pavement course proposed for construction for the Civil Engineer’s review and approval 45 days prior to schedule production and lay down of the mix.
2. “Marshall Stability” design mix submittals shall include type/name of mix, gradation analysis, grade of asphalt cement, Marshall Stability in pounds flow, effective asphalt content in percent (%), and corresponding copies of Georgia Department of Transportation (DOT) material specifications or regulatory authorities having jurisdiction for each proposed material.
3. “Superpave” design mix submittals including the number of gyrations, performance grade asphalt, and asphalt content may be submitted in lieu of a “Marshall Stability” design mix, meeting the specifications of the Georgia DOT or regulatory authorities having jurisdiction.
4. Material Certificates: Contractor shall submit certificates stating that asphalt mix to be supplied complies with the specifications of the Georgia DOT or regulatory authority having jurisdiction, as well as copies the regulatory specifications corresponding to the asphalt mix formula and material. The certificates shall be signed by the asphalt mix producer and the Contractor.

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

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall be registered with and approved by Georgia DOT and product must be on Qualified Product List.

B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of Georgia DOT for asphalt paving work.

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

C. Asphalt-Paving Publication: Comply with Asphalt Institute Manual MS-22, "Construction of Hot Mix Asphalt Pavements," unless more stringent requirements are indicated.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:

1. Tack Coat: Minimum surface temperature of 50 deg F
2. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
3. Asphalt Surface Course: Minimum surface temperature of 50 deg F at time of placement.

PART 2 - PRODUCTS

2.1 AGGREGATES

A. Coarse Aggregate: ASTM D 692, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.

B. Fine Aggregate: ASTM D 1073 or AASHTO M 29, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.

2.2 ASPHALT MATERIALS

A. Asphalt Binder: The type and grade of asphalt cement for the paving mixture shall comply with the applicable requirements of AASHTO Specification M226, Table 2, and meet Georgia Department of Transportation (GDOT) specifications.

1. Performance graded binder: PG 67-22 or 76-22

B. Tack Coat: AASHTO M 140 and Georgia DOT specifications emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.

2.3 AUXILIARY MATERIALS

A. Herbicide: Commercial chemical for weed control, registered by the EPA. Provide in granular, liquid, or wettable powder form.

2.4 MIXES

A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction by Georgia DOT and designed according to procedures in AI MS-2, "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types" and complying with the following requirements unless otherwise required by GDOT:

1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.

PART 3 - EXECUTION

3.1 PREPARATION

A. The Contractor shall obtain the necessary permits and approvals prior to initiating work with in the right-of-way.

3.2 EXAMINATION

A. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

B. Proceed with paving only after unsatisfactory conditions have been corrected.

C. Comply with Division 31 Section "Earth Moving."

3.3 COLD MILLING

A. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.

1. Mill to a depth of 2 inches (50 mm).

3.4 PATCHING

A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches (300 mm) into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.

B. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m).

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

C. Patching: Fill excavated pavements with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.

3.5 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.

C. Prime Coat: Apply uniformly to non-asphalt surfaces when specified on the drawings at a rate of 0.20 gal/sq. yd.

D. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m).

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.6 HOT-MIX ASPHALT PLACING

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

1. Spread mix at minimum temperature of 250 deg F (121 deg C).
2. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet (3 m) wide unless infill edge strips of a lesser width are required.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.7 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 6 inches (150 mm).
3. Offset transverse joints, in successive courses, a minimum of 24 inches (600 mm).
4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."

3.8 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F (85 deg C).

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

G. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.9 INSTALLATION TOLERANCES

A. Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Base Course: ±1/4 inch;

2. Binder (Intermediate) Course: ±1/4 inch; and,
3. Surface Course: ± 1/8 inch.

B. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:

1. Base Course: 1/2 inch;
2. Binder (Intermediate) Course: 1/4 inch; and,
3. Surface Course: 1/4 inch.

C. Contractor's duties relating to testing include:

1. Notify Owner 72 hours prior to asphalt paving;
2. Notifying laboratory of conditions requiring testing; and,
3. Coordinate with laboratory for field testing.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections. Testing agency shall be paid by the Owner.

B. The Owner shall, if desired, pay for and have testing agency take two 4-inch diameter cores per 5,000 sq. yds. of intermediate course, at locations selected by Owner, for thickness tests. Contractor shall repair holes resulting from coring to match existing paving. The Owner reserves the right to take additional testing and should these tests show insufficient thickness, all areas shall be remediated as prescribed by the Owner.

C. The Owner shall, if desired, provide on-site nuclear density testing at random locations during paving operations for all proposed asphalt courses. The nuclear density gauge is to be calibrated with the cores noted above.

D. The Contractor may be required to remove and replace hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements, at no cost to the Owner.

3.11 DISPOSAL

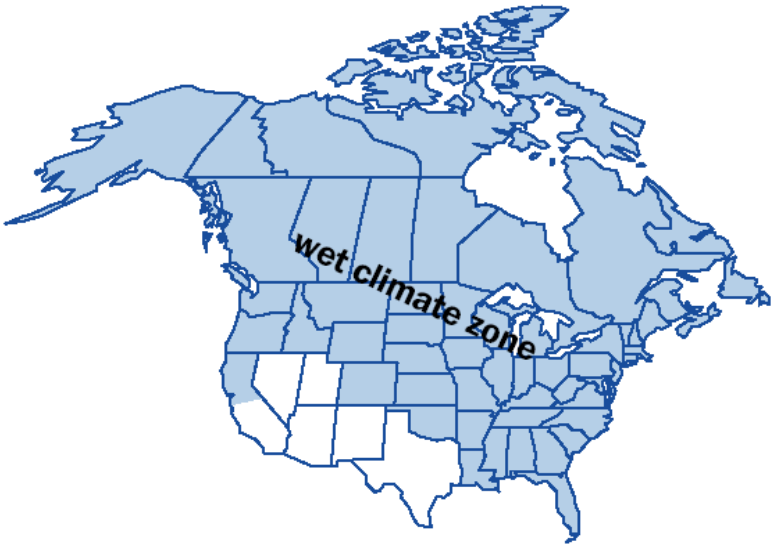
A. Cleaning of asphalt paving equipment and tools is not permitted on site.

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

END OF SECTION 321216

SECTION 32 12 33

TEXTURED ASPHALT PAVING
USING HIGH PERFORMANCE SURFACING SYSTEM FOR WET REGIONS



Only contractors licensed by Integrated Paving Concepts to install StreetPrint Pavement Texturing, and who have valid certification showing successful completion of Level 1 or Level II training may bid for this work.

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes

1. Requirements for the proper installation of textured asphalt pavement using StreetBond HW Surfacing System (High Performance Surfacing System for Wet Climatic Zones).

B. Related Sections

1. Section 02230 Site Clearing
2. Section 02330 Subgrade and Roadbed Preparation
3. Section 02720 Unbound Base Courses
4. Section 02740 Flexible Pavement

1.2 REFERENCES

American Society for Testing and Materials

1 ASTM D-4541 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Tester
2 ASTM D-4060 Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser

3 ASTM D-2697 Standard Test Method for Volume of Nonvolatile Matter in Clear or Pigmented Coatings

1.3 SUBMITTALS

A. Submit documentary evidence of up to date certification of Level I or Level II training to the Engineer at bid stage. Do not begin installation prior to receiving the Engineer's approval.

B. Test results showing that surfacing materials has the following properties:

1. Adhesion (PLI) To an Asphalt substrate (ASTM D-4541) Result: Cohesive failure of asphalt prior to adhesive failure.
2. Taber Abrasion H-10(Dry Wear Index) (ASTM D-4060). Maximum of 0.98 grams/1000 cycles after 7 days cure.
3. Solids by Volume (%) (ASTM D-2697). Minimum = 24 +/-2%.

1.4 DEFINITIONS

C. **"Textured Asphalt Pavement"** shall be described as "StreetPrint Pavement Texturing" or "StreetPrint" on the drawings and documents related to the project.

D. **"Authorized StreetPrint Applicator"** is a contractor licensed by Integrated Paving Concepts Inc., (Tel. 800-688-5652), and shall have a foreman, supervisor or lead hand on site who has successfully completed a StreetPrint Level 1 or Level II Accreditation Training Program.

E. **"StreetPrint Pavement Texturing"** is defined as a proprietary finishing system, which treats the surface of Hot Mix Asphalt Concrete (HMA) by imprinting fully compacted asphalt pavement with "grid style" or other styles of depressions to replicate, in relief, the concrete grout depressions common to hand-laid brick or cobblestone, or any other design as shown on the drawings or described in the specifications, and coating the imprinted asphalt surface using the StreetBond HW Surfacing System.

F. **"Imprinting Hot Mix Asphalt"** is defined as pressing flexible templates into hot, ***fully-compacted***, Hot Mix Asphalt to create the appearance of grout lines or patterns in the asphalt surface.

G. **"StreetBond HW Surfacing System"** is defined as multiple applications of premium coating material StreetBond SP150E.

PART 3 – PRODUCTS

2.1 MATERIALS

A. **"StreetBond SP150E Coating Material"** refers to a high performance premium coating material consisting of epoxy modified acrylic polymers blended with sand and aggregate, and specially formulated by Integrated Paving Concepts, Inc. (Tel. 800-688-5652), for application on asphalt surfaces, to provide a durable, long lasting color and texture to the asphalt surface.

B. **"StreetBond Colorant"** is a highly concentrated, high quality, UV stable pigment blend designed to be added to StreetBond SP150E coating system to provide color to the coating. The colors to be used shall be shown on the drawings. The same StreetBond Colorant shall be used in each SP150E coating layer applied to the asphalt surface. One pint of colorant shall be used with one pail of StreetBond coating material.

2.2 EQUIPMENT

C. **Templates** shall be manufactured from flexible, woven wire rope cut and welded into the patterns, as detailed on the drawings, and used for imprinting Hot Mix Asphalt.

D. **Reciprocating Infra-Red Heater** is equipment specifically designed to apply heat to the asphalt surface to make the upper portion of the asphalt surface pliable enough to accept the imprint of the template. The heating equipment used shall allow continuous monitoring of the surface temperature to ensure the asphalt does not over heat and burn. Equipment that is specifically excluded from this section and shall not be used for reheating of the asphalt is any form of direct flame heaters.

E. **Vibratory Plate Compactor** – shall be used for pressing the wire templates into the heated asphalt to create the specified pattern.

F. **Spray Equipment** – shall be capable applying the coating material to the asphalt surface in a controlled thin film.

PART 3 – EXECUTION

3.1 PREPARATION

A. **Hot Mix Asphalt Concrete Paving (HMA)** shall conform with the requirements of the Georgia DOT, including gradation and compaction requirements. Asphalt thickness and width shall be as per the drawings. The placement of the asphalt shall be carried out with regard for the imprinting process to avoid visible seams. The HMA shall be fully compacted prior to imprinting of the templates.

B. **Heating and Imprinting of Asphalt and Application of Coating** The Contractor shall follow the latest StreetPrint Application Procedures as issued by Integrated Paving Concepts Inc.

C. **Surface Preparation Prior to Coating** The asphalt surface shall be free of dirt, debris, oil or anything that will adversely affect the adhesion of the new coating system. All loose material on the asphalt surface shall be removed by mechanical brooming, or blowing clean using a backpack blower or compressed air. Any difficult to remove dirt shall be removed using a Pressure Washer. Prior to applying the coatings, the asphalt surface shall be completely dry.

3.2 CONSTRUCTION

A. Layout and Imprinting Layout and imprinting of the pattern into the surface of the HMA shall be as per the drawings.

B. Heating of Asphalt The upper portion of the asphalt surface shall be heated using reciprocating infra red re-heating equipment to make the upper portion of the asphalt surface pliable enough to accept the imprint of the template. Overheating of the asphalt shall not be permitted. Direct flame heaters shall not be allowed for the purpose of heating the asphalt. Hot air portable heaters may only be used for heating isolated areas. The temperature of the asphalt surface shall be regularly monitored during the reheating process. The asphalt pavement shall be adequately heat soaked (softened) to a depth of at least ½ inch, without burning the asphalt. The asphalt surface temperature shall not exceed 300ºF. If during the re-heating process the surface is overheated and begins to emit black smoke, the contractor shall stop work immediately. The damaged surface area shall be removed by milling the upper 1" and replaced by a partial depth patch with the topmost layer matching the existing surface layer mix and binder. Patching and all work associated with the repair effort shall be at no cost to the Owner.

C. Surface Imprinting Templates shall be pressed fully into the heated asphalt surface using vibratory plate compactors.

D. Coating Installation The StreetBond HW Surfacing System shall be installed by applying at least four thin layers of StreetBond SP150E coating material to the asphalt surface. Each application of coating material shall be allowed to dry completely before applying the next layer. The color of the coating system shall be as per the drawings. Each layer of the coating system shall consist of the same color.

The coating application shall be spray applied and broomed to work the material into the asphalt surface. Subsequent applications shall be sprayed and rolled, using a 1" to 1½" nap roller or sprayed and broomed. The contractor shall use StreetPrint recommended spray equipment. Total coverage area of combined coating materials shall not be more than 150 square feet per pail of StreetBond SP150E coating.

The Contractor shall apply the StreetBond HW Surfacing System only when the air temperature is at least 50°F and rising, and will not drop below 50°F within 8 hours of application of the coating material. There should be no precipitation expected within 2 hours after applying the final layer of StreetBond SP150E.

3.3 QUALITY CONTROL

A. StreetPrint All StreetPrint projects shall have on site a foreman, supervisor or lead hand who is registered with Integrated Paving Concepts, Inc., as a Level 1 or Level II Accredited StreetPrint Installer.

B. Protection From Traffic No traffic shall be allowed onto the coated surface until the coating has completely dried and has cured as set out in the manufacturer's instructions.

C. **Utility Cuts** All utility, traffic loop detector, and other items requiring a cut and installation under the asphalt surface shall be completed prior to installation of stamped patterned asphalt treatment.

D. **Stamping Depth** Upon completion, the patterned area shall be checked for proper depth of print, by taking random samples. 98% of the stamped area shall have an imprint depth of 1/4 inch. If any sample areas have an imprint depth that is less than 1/4 inch, those areas shall be re-heated and re-stamped prior to applying the coatings.

E. **Coating Thickness** The total thickness shall be monitored by measuring the volume of material used per unit area. For this project an average coverage area for the combined coating layers shall be 150 square feet coated per 5 gallon pail of StreetBond SP150E material used. The Contractor shall provide proof of material usage.

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. **Textured Asphalt** The quantity to be paid will be the area in square yards of stamped asphalt pavement, measured in place, completed and accepted. No deduction will be made for the area(s) occupied by manholes, inlets, drainage structures, or by any public utility appurtenances within the area.

4.2 PAYMENT

A. Price and payment will be full compensation for all work specified in the Section, the quantity, determined as provided above, will be paid for at the contract unit price per square yard.

END OF SECTION 02760

SECTION 321313 - CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. See Geotechnical and Environmental Reports provided by the Owner.

C. See Division 31 Section "Earth Moving.

D. See Division 07 Section “Joint Sealants – Site Structural.”

1.2 SUMMARY

A. Section Includes:

1. Driveways.
2. Parking lots.
3. Curbs and gutters.
4. Sidewalks.
5. On Grade Plaza Areas.

1.3 SUBMITTALS

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

B. Samples: For each exposed product and for each color and texture specified.

C. Other Action Submittals:

1. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.4 QUALITY ASSURANCE

A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of Georgia DOT for concrete paving work.

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

C. ACI Publications: Comply with ACI 301 (ACI 301M) unless otherwise indicated.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. The type of steel reinforcement shall be shown on the drawings.

B. Recycled Content: Provide steel reinforcement with an average recycled content of steel so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

C. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from as-drawn steel wire into flat sheets.

D. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.

E. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.

F. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.

G. Deformed-Steel Wire: ASTM A 496/A 496M.

H. Dowel Bars: ASTM A 615/A 615M, Grade 60 plain-steel bars; zinc coated (galvanized) after fabrication according to ASTM A 767/A 767M, Class I coating. Cut bars true to length with ends square and free of burrs.

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

2.2 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:

1. Portland Cement: ASTM C 150 portland cement Type I, IA or Type III, IIIA

2. Cementitious material may be supplemented with the following:

a. Fly Ash: ASTM C 618, Class C or Class F.
b. No more than 20% of cementitious material by weight

B. Normal-Weight Aggregates: ASTM C 33. Combined aggregate gradation for concrete pavement and other designated concrete shall be 8% - 18% for large top size aggregates (1½") or 8% - 22% for smaller top size aggregates (1" or ¾") retained on each sieve below the top

size and above the No. 100 sieve. Concrete pavements shall have a maximum aggregate size of 1½". Provide aggregates from a single source.

C. Water: Potable and complying with ASTM C 94/C 94M.

D. Admixtures: Certified by manufacturer to contain not more than 0.1 % water-soluble chloride ions by mass of cement and to be compatible with other admixtures, as follows:

1. Air-Entraining Admixture: ASTM C 260;
2. Water-Reducing Admixture: ASTM C 494, Type A;
3. Water-Reducing and High-Range Admixture: ASTM C 494, Type F;
4. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E; and,
5. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

E. Calcium Chloride: The use of calcium chloride or admixtures containing more than 0.05% chloride ions is prohibited.

F. Curing Materials:

1. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry;
2. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet;
3. Water: Potable;
4. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete;
5. Clear Solvent-Borne Liquid-Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B;
6. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B;
7. White Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B

G. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.

1. Color: As indicated on the plans.

2.3 JOINTS, FILLERS, AND SEALANTS

A. See Division 07 Section "Joint Sealants – Site Structural."

B. Joint-Sealant Backer Materials: ASTM D5249, Non-Staining, compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by joint sealant manufacturer based on field experience and laboratory testing.

C. Joint Sealant: Non-priming, pourable self-leveling silicone sealant for concrete and asphalt.
1. Cold-Applied Joint Sealant ASTM D5893, self leveling silicone sealant. Crafco Inc. "Roadwaver Silicone-SL"; Dow Corning "888, or 890-SL"; Sonneborn "Sonomeric 1 Sealant"; Tremco "Vulkem 45"; and,
2. Hot-Applied Joint Sealant: ASTM D3405, Polymeric sealant. Crafco Inc. "ROADSAVER 22"; W.R. Meadows, Inc. "SEALTIGHT HI-SPEC".

D. Joint Fillers: Resilient pre-molded bituminous impregnated fiberboard units complying with ASTM D 1751, asphalt-saturated cellulosic fiber, ASSHTO M 153, Type I: or ASTM D 1752, cork or self-expanding cork.

E. Exterior Concrete Sealant: Sonneborn “Kure-N-Seal 30” exterior acrylic sealer, or Euclid “Super Rez-Seal”.

2.4 FIBER REINFORCEMENT

A. Synthetic Fiber: Monofilament or fibrillated polypropylene fibers engineered and designed for use in concrete paving, complying with ASTM C 1116/C 1116M, Type III, 1/2 to 1-1/2 inches (13 to 38 mm) long.

2.5 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

F. White, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B, dissipating.

2.6 RELATED MATERIALS

A. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.

2.7 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301 (ACI 301M), with the following properties:

1. Compressive Strength (28 Days): 4000 psi (27.6 MPa) or as otherwise indicated.
2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.
3. Slump Limit: maximum of 5 inches at time of placement for pavement, 3 inches for curb and sidewalk, plus or minus 1 inch (25 mm).
4. Air Content: Target: 5%, delivered to -1 to +2 percent of target.

B. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

C. Synthetic Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd. (0.60 kg/cu. m).

D. Coloring Agent: When required, add coloring agent to mix according to manufacturer's written instructions.

1. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork; and,
2. Coloring Agent: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, nonfading, and resistant to lime and other alkalis. Integral colors shall be selected by the Landscape Architect and shown within the approved Landscape Architecture Plans.

E. Integral Color Concrete: Mix pigments in accordance with manufacture's written instructions. Mix until pigments are uniformly dispersed throughout mixture and disintegrating bags, if used, have disintegrated.

2.8 DECORATIVE MIX CONCRETE MATERIALS AT ON-GRADE PLAZA AREAS

A. Sand: ASTM C 33, for fine aggregate.
1. Color: As required to match Design Professional's design reference sample.

B. Exposed Coarse Aggregate:
1. Type: As required to match Design Professional's design reference sample.
2. Size: ¼ to ½ inch
3. Water Absorption: 24 hour absorption rate not to exceed 0.25%
4. Chips: 100% washed and graded aggregate with no deleterious or foreign matter.
5. Bags: Label with name of supplier, type of aggregate and gradation.

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M. Furnish batch certificates for each batch discharged and used in the Work.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Proof-roll prepared subbase surface below concrete paving and sidewalk to identify soft pockets and areas of excess yielding.

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

C. Comply with Division 31 Section "Earth Moving."

D. The Contractor shall obtain the necessary permits and approvals prior to initiating work with in the right-of-way.

3.2 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.3 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

3.4 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, to match jointing of existing adjacent concrete paving:

E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch (6-mm) radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

F. Joint Fillers: Extend joint fillers full-width and depth of joint, and not less than ½inch or more than 1inch below finished surface where joint sealer is indicated. Furnish joint fillers in one-piece lengths for full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler sections together; and,

G. Joint Sealants: All joints shall be sealed with approved exterior pavement joint sealants and shall be installed per manufacturer’s recommendations.

1. See Division 07 Section “Joint Sealants – Site Structural.”

3.5 CONCRETE PLACEMENT

A. Immediately before placing concrete materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

B. Moisten subbase to provide a uniform dampened condition at time concrete is placed.

C. Comply with ACI 301 (ACI 301M) requirements for measuring, mixing, transporting, placing, and consolidating concrete.

D. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

E. Screed paving surface with a straightedge and strike off.

F. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

3.6 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
2. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
3. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch (1.6 to 3 mm) deep with a stiff-bristled broom, perpendicular to line of traffic.

C. Slip-Resistive Aggregate Finish: Before final floating, spread slip-resistive aggregate finish on paving surface according to manufacturer's written instructions where indicated on drawings.

1. Cure concrete with curing compound recommended by slip-resistive aggregate manufacturer. Apply curing compound immediately after final finishing.
2. After curing, lightly work surface with a steel wire brush or abrasive stone and water to expose nonslip aggregate.

3.7 CONCRETE PROTECTION AND CURING

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

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Moisture cure concrete by water, continuous fog spray, continuously wet absorptive cover, or by moisture-retaining-cover curing. Keep surfaces continuously moist for not less than 7 days; and,

3.8 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:

1. Elevation: 3/4 inch (19 mm).
2. Thickness: Plus 3/8 inch (10 mm), minus 1/4 inch (6 mm).
3. Surface: Gap below 10-foot- (3-m-) long, unleveled straightedge not to exceed 1/2 inch (13 mm).
4. Joint Spacing: 3 inches (75 mm).
5. Contraction Joint Depth: Plus 1/4 inch (6 mm), no minus.
6. Joint Width: Plus 1/8 inch (3 mm), no minus.

3.9 REPAIRS AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.

B. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

C. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

3.10 FIELD QUALITY CONTROL

A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

B. ACI Publications: Comply with ACI 301R-99 and ACI330R-92, unless modified by the requirements of the Contract Documents.

C. The Owner shall provide and pay for testing services. A slump test and air test shall be performed for each load delivered. Four standard test cylinders shall be taken for each 55 cubic yards of concrete or each days pour, whichever is more frequent. Two cylinders shall be broken at 7 days and two cylinders shall be broken at 28 days.

3.11 CLEANING AND DISPOSAL

A. Concrete drums shall not be cleaned or washed out on site.

B. Surplus concrete or drum wash water cannot be discharged on site.

C. Excess concrete from truck washdown area to be bagged and removed from the project site and legally disposed of.

END OF SECTION 321313

SECTION 32 13 13.26 - COLORED CONCRETE PAVING

PART 1- GENERAL

1.1 SUMMARY

A. Section Includes:

1. Integrally Colored Concrete sidewalks and curbs.
2. Curing of Integrally Colored Concrete: Exterior

B. Related Sections:

1. Section 32 13 73 – Concrete Paving Joint Sealants.

1.2 REFERENCES

Other useful publications about colored concrete include:
PCA PA124 - Finishing Concrete Slabs with Color and Texture.
PCA SP021 - Color and Texture in Architectural Concrete.

A. American Concrete Institute (ACI):

1. ACI 301 - Structural Concrete for Buildings.
2. ACI 305R - Hot Weather Concreting.
3. ACI 306R - Cold Weather Concreting.
4. ACI 316 - Recommendations for Construction of Concrete Pavements and Bases.
5. ACI 302 IR – Recommended Practice for Concrete Floor and Slab Construction

B. American Society for Testing and Materials (ASTM):

1. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
2. ASTM C979 - Standard Specification for Pigments for Integrally Colored Concrete.
3. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete

C. American Association of State Highway and Transportation Officials (AASHTO):

1. AASHTO M194 – Chemical Admixtures

1.3 SUBMITTALS

A. Contractor shall submit specified manufacturer’s complete technical data sheets for the following:

1. Colored Admixture
2. Curing compounds

B. Contractor shall construct an on-site mockup for Owner and Consultant approval.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of specified colored admixture and curing compound shall have a minimum 10 years experience in the production of the specified products.

B. Contractor Qualifications: Concrete work shall be performed by firm with 5 years experience with work of similar scope and quality.

C. Perform work in accordance with ACI 301 and ACI 316.

D. Conform to ACI 305 during hot weather.

E. Conform to ACI 306 during cold weather.

F. Obtain each specified material from same source and maintain high degree of consistency in workmanship throughout Project.

G. Colored Concrete Mock-Up & Field Samples:

1. Provide at location on Project selected by Owner, place and finish 4 x 4 feet (1.2 x 1.2m) area for owner review and approval.
2. For accurate color, the quantity of concrete mixed to produce the sample should not be less than three (3) cubic yards (not less than 1/3 the capacity of the mixing drum on the ready-mix truck) and should always be in full cubic yard increments. Excess material shall be discarded according to local regulations.
3. Construct sample-using processes and techniques intended for use on permanent work, including curing procedures. Include samples of control, construction, and expansion joints in sample panels. Mock-up & Field sample shall be produced by the individual workers who will be performing the work for the project.
4. Retain samples of cements, sands, aggregates and color additives used in mock-up for comparison with materials used in remaining work.
5. Accepted mock-up & field sample provides visual standard for work of Section.
6. Mock-up & Field sample shall remain through completion of the work for use as a quality standard for finished work.

1.5 DELIVERY, STORAGE & HANDLING

A. Colored Admixture: Comply with manufacturer's instructions. Deliver colored admixtures in original, unopened packaging. Store in dry conditions.

1.6 PROJECT CONDITIONS

A. Colored Concrete Environmental Requirements:

1. Schedule placement to minimize exposure to wind and hot sun before curing materials is applied.

2. Avoid placing concrete if rain, snow, or frost is forecast within 24 hours. Protect fresh concrete from moisture and freezing.

3. Professional practices as described in ACI 305R Hot Weather Concreting and ACI306R Cold Weather Concreting should be followed

B. Schedule delivery of concrete to provide consistent mix times from batching until discharge. Mix times shall meet manufacturer's written recommendations.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Colored Admixture for Integrally Colored Concrete:
1. Manufacturer:

a. L.M. SCOFIELD COMPANY, Douglasville, Georgia (800) 800-9900

2. Materials:

a. Admixture shall be a colored, water-reducing, admixture containing no calcium chloride with coloring agents that are limeproof and UV resistant.
b. Colored admixture shall conform to the following:

1) ASTM C979 - Standard Specification for Pigments for Integrally Colored Concrete.
2) ASTM C494 – Standard Specification for Chemical Admixtures for Concrete
3) AASHTO M194 – Chemical Admixtures

CHROMIX® Admixtures as manufactured by the L.M. SCOFIELD COMPANY, Douglasville, Georgia, are considered to conform to the requirements of this specification.

B. Curing Compound for Integrally Colored Concrete: Curing compound shall comply with ASTM C309 and be approved by color additive manufacturer for use with colored concrete.

1. Exterior Colored Concrete

a. Manufacturer:

1) L.M. SCOFIELD COMPANY, Douglasville, Georgia (800) 800-9900

b. Materials:

1) LITHOCHROME® COLORWAX as manufactured by the L.M. SCOFIELD COMPANY, Douglasville, Georgia shall be used to cure all exterior flatwork that will be allowed to cure naturally with only occasional maintenance.

C. Concrete Sealer for Integrally Colored Concrete:

1. Exterior Colored Concrete

a. Manufacturer:
1) L.M. SCOFIELD COMPANY, Douglasville, Georgia (800) 800-9900
b. Materials:

1) REPELLO as manufactured by the L.M. SCOFIELD COMPANY, Douglasville, Georgia shall be used to seal all exterior flatwork.

D. Joint sealants shall be color-matched to the concrete and specially formulated for high-performance in pedestrian and vehicular traffic areas.

1. Manufacturer:

a. TREMCO
b. Sika
c. Sonnenborn
d. Pecora Corporation

2. Materials:

a. Dymonic FC manufactured by TREMCO
b. Sikaflex -2c NS TG manufactured by Sika
c. Sonneborn NP 2 manufactured by Sonneborn
d. UNREXPAN NR 200 manufactured by Pecora

E. SUBSTITUTIONS: The use of any products other than those specified will be considered providing that the contractor requests it's use in writing within fourteen (14) days prior to bid date. This request shall be accompanied by:

1. A certificate of compliance from the material manufacturer stating that the proposed products meet or exceed the requirements for this specification, including standards ASTM C979, ASTM C494 and ASSHTO M194.

2. Documented proof that the proposed material has a ten (10) year proven record of performance for staining concrete substrates, confirmed by at least five (5) local projects that the Architect can examine.

2.2 CONCRETE MIX DESIGN

A. A recommended cement content of six (6) sacks per cubic yard of concrete shall be used.

B. Slump of the concrete shall be consistent throughout the project at four (4) inches or less. At no time shall the slump exceed five (5) inches

C. Calcium chloride shall not be added to the mix since it causes mottling and surface discoloration.

D. Supplemental admixtures, such as additional water-reducing admixtures, water-proofing agents, and super plasticizers shall not be used.

2.3 COLORS

A. Concrete Color[s]:

1. Cement: Color shall be selected by Landscape Architect and approved by Owner.
2. Sand: Color shall be selected by Landscape Architect and approved by Owner.
3. Aggregate: Color shall be selected by Landscape Architect and approved by Owner.
4. Colored Admixture: to be selected by Landscape Architect and approved by Owner or owner approved alternate.
5. Curing Compound: Color to match colored concrete
6. Sealants: Siloxcene or Silocene penetrating sealer.

B. Colored admixture shall be added to the mix per manufacturer's written instructions in a pre-measured bag and shall not be added by weight of cement content.

.2.4 CONCRETE FINISH RETARDER

A. Spray applied, film forming, water based top surface retarder, calibrated for specific sized aggregate and finish requirements.

1. Acceptable Materials: "Top Cast" by Grace Construction Products. Customer Service Center - 888-336-9303, www.graceconstructionproducts.com or contact Dennis Baugh Product Specialist W.R. Grace & Co. 62 Whittemore Ave., Cambridge, MA 02140. 800-354-5414 x 5439, 703-626-1577

B. Spray applied film forming protective coating for surfaces adjacent to retarded finish surfaces.

1. Acceptable Materials: "Face Off" by Grace Construction Products, www.graceconstructionproducts.com, Grace Customer Service Center 888-336-9303 or Dennis Baugh Product Specialist W.R. Grace & Co. 62 Whittemore Ave., Cambridge, Ma 02140. 800-354-5414 x 5439, 703-626-1577

PART 3 - EXECUTIONS

3.1 FINISHING

A. All surfaces shall be finished uniformly with the following finish:

1. Finish shall be exposed aggregate finish or specified otherwise on drawings.

3.2 CURING

A. Colored Concrete: Apply curing compound for colored concrete in accordance with manufacturer's instructions using manufacturer's recommended application techniques.

Apply curing compound at consistent time for each pour to maintain close color consistency.

C. Curing compound shall be the same color as the colored concrete and supplied by the same manufacturer of the colored admixture.

D. Precautions must be taken in hot weather to prevent plastic cracking resulting from excessively rapid drying at the surface as described in CIP 5 Plastic Shrinkage Cracking published by the National Ready Mixed Concrete Association.

E. The concrete shall never be covered with plastic sheeting.

3.3 TOLERANCES

A. Minor variations in appearance of colored concrete, which are similar to natural variations in color and appearance of uncolored concrete, are acceptable.

END OF SECTION

SECTION 32 14 00 - UNIT PAVING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section includes the following:

1. Brick pavers sand set on aggregate sub-base
2. Brick Pavers mortar set on conc. sub-slab
3. Rough-stone pavers set in aggregate and mortar setting beds

1.2 SUBMITTALS

A. Product Data: For materials other than water and aggregates.

B. Samples for unit pavers and joint materials.

C. Sieve analyses for grading of bedding and joint sand shall be submitted.

1.3 QUALITY ASSURANCE

A. Mockups: Build mockups for each form and pattern of unit paver.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
2. Installation shall be by a contractor and crew with at least one year of experience in placing unit pavers on projects of similar nature or dollar cost.
3. The Contractor shall conform to all local, state/provincial licensing and bonding requirements.

1.4 PROJECT CONDITIONS

A. Cold-Weather Protection: Do not use frozen materials or build on frozen sub grade or setting beds.

B. Cold-Weather Requirements for Mortar and Grout: Heat materials to provide mortar and grout temperatures between 40 and 120 deg F (4 and 49 deg C). Protect unit paver work against freezing for 24 hours after installation.

1.5 DELIVERY, STORAGE, HANDLING

A. Unit pavers shall be delivered to the site in steel banded, plastic banded, or plastic wrapped cubes capable of transfer by fork lift or clamp lift. The pavers shall be unloaded at the job site in such a manner that no damage occurs to the product.

B. Bedding and joint sand shall be covered with a secure waterproof covering to prevent exposure to rainfall or removal by wind.

C. Delivery and paving schedules shall be coordinated in order to minimize interference with normal use of buildings adjacent to paving.

PART 2 - PRODUCTS

2.1 CLAY BRICK PAVERS

A. Temporary Protective Coating: Pre-coat exposed surfaces of brick pavers with a temporary protective coating that is compatible with brick, mortar, and grout products.

B. Pedestrian Brick Pavers:

1. ASTM C 902, Class SX, Type I, Application PX.
2. Provide brick w/o frogs or cores in surfaces exposed to view once complete.
3. Refer to plans & details for brick specifications.

C. Vehicular Brick Paving:

1. Heavy vehicular brick paver meeting ASTM C 1272 standards, Type R
2. Refer to plans & details for brick specifications.

2.2 NATURAL STONE UNIT PAVERS

A. Bluestone Paving in mortar setting bed

1. Basis-of-Design Product: Pennsylvania Bluestone
2. Finish: Thermal
3. Thickness: 1” min. with square edges
4. Size: 18" x 24" modular pieces
5. Color: Full range without “brown” stones

B. Bluestone Garden Steps

1. Basis-of-Design Product: Pennsylvania Bluestone
2. Finish: Thermal
3. Thickness: 2” min. with square edges
4. Size: as shown in detail
5. Color: Full range without “brown” stones

C. Granite Cobbles

1. Refer to plans & details for specifications

2.3 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.

2.4 AGGREGATE SETTING-BED MATERIAL

A. The granular base material shall be graded in accordance with the requirements of ASTM D 2940, as presented in Table 2

TABLE 2:
BASE MATERIAL GRADING REQUIREMENTS

ASTM D 2940	
Sieve Size	Percentages Passing
2 in. (50 mm)	100
1½ in. (37.5 mm)	95 to 100
¾ in. (19 mm)	70 to 92
3/8 in. (9.5 mm)	50 to 70
No. 4 (4.75 mm)	35 to 55
No. 30 (600 µm)	12 to 25
No. 200 (75 µm)	0 to 8 *

* In order to prevent damage by frost heaving, it may be necessary to limit the percentages of material passing the No. 200 sieve to less than shown in the tables.

B. Bedding sand as described in section 2.6

C. Joint Sand as described in section 2.6

D. Geotextile as required by Project's geotechnical report.

2.5 BITUMINOUS SETTING-BED MATERIALS

A. Primer for Base: ASTM D 2028, cutback asphalt, grade as recommended by unit paver manufacturer.

B. Fine Aggregate for Setting Bed: ASTM D 1073, No. 2 or No. 3.

C. Asphalt Cement: ASTM D 3381, Viscosity Grade AC-10 or Grade AC-20.

D. Neoprene-Modified Asphalt Adhesive: Paving manufacturer's standard adhesive consisting of oxidized asphalt combined with 2 percent neoprene and 10 percent long-fibered mineral fibers containing no asbestos.

E. Joint Sand as described in section 2.6

2.6 BEDDING AND JOINT SAND

A. The bedding and joint sand shall be clean, sub-angular to angular (depending on use), non-plastic, and free from deleterious or foreign matter. It can be natural or manufactured from crushed rock. Do not use limestone screenings or stone dust that do not conform to the grading requirements in Table 3. When unit pavers are subject to vehicular traffic, the sands shall be as hard as practically available and angular. Round to sub-angular sands such as Silica sands are not acceptable in areas receiving vehicular traffic. Contractor shall submit test data for Joint and Bedding sand to confirm.

B. The bedding sand shall conform to the grading requirements of ASTM C 33 as shown in Table 3.

TABLE 3:
BEDDING SAND GRADING REQUIREMENTS

ASTM C 33	
Sieve Size	Percent Passing
3/8 in. (9.5 mm)	100
No. 4 (4.75 mm)	95 to 100
No. 8 (2.36 mm)	85 to 100
No. 16 (1.18 mm)	50 to 85
No. 30 (600 µm)	25 to 60
No. 50 (300 µm)	10 to 30
No. 100 (150 µm)	2 to 10

C. The joint sand shall conform to the grading requirements of ASTM C 144 as shown in Table 4 below:

TABLE 4:
JOINT SAND GRADING REQUIREMENTS

ASTM C 144

	Natural Sand	Manufactured Sand
Sieve Size	Percent Passing	Percent Passing
No. 4 (4.75 mm)	100	100
No. 8 (2.36 mm)	95 - 100	95 to 100
No. 16 (1.18 mm)	70 - 100	70 to 100
No. 30 (600 µm)	40 - 75	40 to 75
No. 50 (300 µm)	10 - 35	20 to 40
No. 100 (150 µm)	2 - 15	10 to 25
No. 200 (75 µm)	0	0 to 10

2.7 DRAINAGE GEOTEXTILE

A. Drainage Geotextile: Nonwoven needle-punched geotextile made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following:

1. Apparent Opening Size: No. 40 (0.425-mm) sieve, maximum; ASTM D 4751.
2. Permittivity: 0.5 per second, minimum, ASTM D 4491.

2.8 MORTAR SETTING BED MATERIALS

A. Hydrated Lime: ASTM C 207, Type S.

B. Sand: ASTM C 144.

C. Latex Additive: Water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by manufacturer for use with field-mixed Portland cement mortar bed, and not containing a retarder.

D. Water: Potable.

E. Portland Cement ASTM C-150, Type I or Type II

2.9 GROUT MATERIALS

A. Non shrink type coarse sanded grout.

1. Product Type: Dry mix, containing Portland cement and silica sand, in dry, re-dispersible form, prepackaged with other dry ingredients.

2. Grout Colors:
   a. Brick-LaFarge Magnolia mason's mix
   b. Bluestone-LaFarge 'Charcoal'

B. Water: Potable.

2.10 BITUMINOUS SETTING-BED MIX

A. Mix bituminous setting-bed materials at an asphalt plant in approximate proportion, by weight, of 7 percent asphalt cement to 93 percent fine aggregate unless otherwise indicated. Heat mixture to 300 deg F (149 deg C). PART 3 - EXECUTION

2.11 MORTAR & GROUT MIXES

A. General: Comply with referenced standards and with manufacturers' written instructions. Discard mortars and grout if they have reached their initial set before being used.

B. Polymer-Modified Bed Mix: Proportion and mix grout ingredients according to grout manufacturer's written instructions.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

B. Cut unit pavers with motor-driven masonry saw equipment to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible.

C. Expansion and Control Joints: Provide foam filler as backing for sealant-filled joints. Install joint filler before setting pavers.

D. 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.

E. Provide edge restraints as indicated. Install edge restraints before placing unit pavers.

3.2 SITE PREPARATION

A. The site must be stripped of all topsoil and other objectionable materials to the grades specified.

B. All sub drainage of underground services within the pavement area must be completed in conjunction with sub grade preparation, and before the commencement of sub base construction.

C. Note: All service trenches within the pavement area must be back filled to the sub-grade level with approved material placed in uniform lifts not exceeding 4 in. (200 mm) loose thickness. Each lift must be compacted to at least 100 percent Standard Proctor Density as specified in ASTM D 698.

D. After trimming to the grades specified, the pavement is to be proof rolled to 100 percent Standard Proctor Density in the presence of the Consultant, with soft spots or localized pockets of objectionable material excavated and properly replaced with approved granular material.

E. The sub grade shall be trimmed to within 0 to ½ in. (0 to 10mm) of the specified grades. The surface of the prepared sub grade shall not deviate by more than 3/8 in. (10mm) from the bottom edge of a 39 in. (1m) straight edge laid in any direction.

F. The Contractor shall ensure that the prepared sub grade is protected from damage from inundation by surface water. No traffic shall be allowed to cross the prepared sub grade. Repair of any damage resulting shall be the responsibility of the Contractor and shall be repaired.

G. Under no circumstances shall further pavement construction proceed until the sub grade has been inspected by the Owner or the Consultant.

3.3 GRANULAR SUBBASE AND BASE INSTALLATION

A. After proper construction of the edge restraints for the interlocking concrete pavement as per Section 3.5, and upon approval by the Consultant, aggregate base shall be placed in uniform lifts not exceeding 6 in. (150 mm) loose thickness. Each lift shall be compacted to at least 100 percent Standard Proctor Maximum Dry Density.

B. Base thickness shall be per plans.

C. The granular base shall be trimmed to within 0 to 3/8 in. (0 to 10 mm) of the specified grade. The surface of the prepared base shall not deviate by more than 3/8 in. (10 mm) from the bottom edge of a 10 ft. (3 m) long straight edge laid in any direction.

D. The upper surface of the base shall be sufficiently well graded and compacted to prevent infiltration of the bedding sand into the base both during construction and throughout its service life. Segregated areas of the granular base shall be blended by the application of crushed fines that have been watered and compacted into the surface.

E. Before commencing the placing of the sand bedding course and the placement of the unit pavers, the base shall be inspected by the Owner or the Consultant.

3.4 AGGREGATE SETTING BED APPLICATIONS

A. Verify that sub-grade preparation, compacted density and elevations conform to the specifications.

B. Note: For installation on a compacted aggregate base and soil sub-grade, the specifier should be aware that the top surface of the pavers may be 1/8 to 1/4 in. (3 to 6 mm) above the final elevation after compaction. This difference in initial and final elevation is to compensate for possible minor settling.

C. Note: Compaction of the soil sub-grade to at least 95% Standard Proctor Density per ASTM D 698 is recommended. Higher density or compaction to ASTM D 1557 (Modified Proctor Density) may be necessary for areas subject to vehicular traffic. Stabilization of the sub-grade and/or base material may be necessary with weak or saturated sub-grade soils. The Architect/Engineer should inspect sub-grade preparation, elevations, and conduct density tests for conformance to specifications.

D. Verify that geotextiles, if applicable, have been placed according to specifications and drawings.

E. Verify that aggregate base materials, thickness, compaction, surface tolerances and elevations conform to the specifications.

F. Note: Local aggregate base materials typical to those used for flexible pavements are recommended, or those conforming to ASTM D 2940. Compaction to not less than 95% Proctor Density in accordance with ASTM D 698 is recommended for pedestrian areas. Compaction to not less than 98% Modified Proctor Density according to ASTM D 1557 is recommended for vehicular areas.

G. Note: The aggre¬gate base should be spread and compacted in uniform layers not exceeding 6 in. (150 mm) thickness. Recommended base surface tolerance should be plus or minus 3/8 in. (10 mm) over a 10 ft. (3 m) straight edge. The Architect/Engineer should inspect geotextile materials and placement (if applicable), base preparation, surface tolerances, elevations, and conduct density tests for conformance to specifications.

H. Note: Mechanical tampers (jumping jacks) are recommended for compaction of soil sub-grade and aggregate base around lamp standards, utility structures, building edges, curbs, tree wells and other protrusions. Areas not accessible to roller compaction equipment should be compacted to the specified density with mechanical tampers. CAUTION - Care shall be taken around the perimeters of excavations, buildings, curbs, etc. These areas are especially prone to consolidation and settlement. Wedges of backfill should not be placed in these areas. If possible, backfilling and compacting in these areas particularly should proceed in shallow lifts, parallel to the finished surface.

I. Verify the proper installation of the concrete curbing, in terms of location, elevation, and adherence to the specifications.

J. Verify that the base is dry, uniform, even and ready to support sand, pavers and imposed loads.

K. Beginning of bedding sand and paver installation shall signify acceptance of base and edge restraints.

3.5 MORTAR SETTING BED APPLICATIONS

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

B. Apply mortar-bed bond coat over surface of concrete sub base 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 to sub grade elevations required for accurate setting of pavers to finished grades indicated.

D. Mix and place only that amount of mortar that can be covered with pavers before initial set. Cut back 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 time of laying.

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

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 or disturb pavers for purposes of realigning finished surfaces or adjusting joints.

H. Spaced Joint Widths: Provide 1/2-inch (19-mm) nominal joint width with variations not exceeding plus or minus 1/16 inch (1.5 mm).

I. Grout joints as soon as possible after initial set of setting bed.

1. Force grout into joints, taking care not to smear grout on adjoining surfaces.
2. Tool exposed joints slightly concave when thumbprint hard.

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

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

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

3.6 BITUMINOUS SETTING-BED APPLICATIONS

A. Apply primer to concrete slab or binder course immediately before placing setting bed.

B. Prepare for setting-bed placement by locating 3/4-inch- (19-mm-) deep control bars approximately 11 feet (3.3 m) apart and parallel to one another, to serve as guides for striking board. Adjust bars to subgrades required for accurate setting of paving units to finished grades indicated.

C. Place bituminous setting bed where indicated, in panels, by spreading bituminous material between control bars. Spread mix at a minimum temperature of 250 deg F (121 deg C). Strike setting bed smooth, firm, even, and not less than 3/4 inch (19 mm) thick. Add fresh bituminous material to low, porous spots after each pass of striking board. After each panel is completed, advance first control bar to next position in readiness for striking adjacent panels. Carefully fill depressions that remain after removing depth-control bars.

D. Roll setting bed with power roller to a nominal depth of 3/4 inch (19 mm). Adjust thickness as necessary to allow accurate setting of unit pavers to finished grades indicated. Complete rolling before mix temperature cools to 185 deg F (85 deg C).

E. Apply neoprene-modified asphalt adhesive to cold setting bed by squeegeeing or troweling to a uniform thickness of 1/16 inch (1.6 mm). Proceed with setting of paving units only after adhesive is tacky and surface is dry to touch.

F. Place pavers carefully by hand in straight courses, maintaining accurate alignment and uniform top surface. Protect newly laid pavers with plywood panels on which workers can stand. Advance protective panels as work progresses, but maintain protection in areas subject to continued movement of materials and equipment to avoid creating depressions or disrupting alignment of pavers. If additional leveling of paving is required, and before treating joints, roll paving with power roller after sufficient heat has built up in the surface from several days of hot weather.

G. Joint Treatment: Place unit pavers with hand-tight joints. Fill joints by sweeping

3.7 PAVER RESTRAINTS

A. Adequate edge restraint shall be provided along the perimeter of all paving as specified. The face of the edge restraint, where it abuts pavers, shall be vertical down to the sub base.

B. All concrete edge restraints shall be constructed to dimensions and level specified and shall be supported on a compacted sub base not less than 6 in (150 mm) thick.

C. Concrete used for the construction of edge restraints shall be air-entrained and have a compressive strength as specified. All concrete shall be in accordance with ASTM C 94 requirements.

3.8 PAVER INSTALLATION

A. Spread the bedding sand evenly over the base course and screed to a nominal 1 in. (25 mm) thickness, not exceeding 1 ½ in. (40 mm) thickness. The screeded sand should not

be disturbed. Sufficient sand shall be placed in order to stay ahead of the laid pavers. Do not use the bedding sand to fill depressions in the base surface.

B. Note: The spread sand shall be carefully maintained in a loose condition, and protected against incidental compaction, both prior to and following screeding. Any incidentally compacted sand or screeded sand left overnight, shall be loosened before further paving units are placed. Sand shall be lightly screeded in a loose condition to the predetermined depth, only slightly ahead of the paving units. Under no circumstances shall the sand be screeded in advance of the laying face to an extent to which paving will not be complete on that day.

C. Screed sand shall be fully protected against incidental compaction, including compaction by rain. Any screeded sand which is incidentally compacted prior to laying of the paving unit shall be removed and brought back to profile in a loose condition. Neither pedestrian nor vehicular traffic shall be permitted on the screeded sand.

D. The Contractor shall screed the bedding sand using either an approved mechanical spreader (e.g.: an asphalt paver) or by the use of screed rails and boards.

E. Initiation of paver placement shall be deemed to represent acceptance of the pavers.

F. Pavers shall be free of foreign material before installation.

G. Pavers shall be inspected for color distribution and all chipped, damaged or discolored pavers shall be replaced.

H. The pavers shall be laid in the pattern(s) as shown on the drawings. String lines or chalk lines on bedding sand should be used to hold all pattern lines true.

I. Joints between the pavers on average shall be between 1/16 in. and 1/8 in. (2 mm to 4 mm) wide. In order to maintain the desired pattern, joint spacing must be consistent. This spacing must also be provided for the first row abutting the edge restraint.

J. Note: Installing pavers too tightly may lead to chipping at the edges.

K. Gaps at the edges of the paved area shall be filled with cut pavers.

L. Note: Units cut no smaller than one third of a whole paver are allowed along edges subject to vehicular traffic.

M. Pavers to be placed along the edge shall be cut with a double blade paver splitter or masonry saw.

N. Note: The use of infill concrete or discontinuities in patterns will not be permitted except along the outer pavement boundaries, adjacent to drains and manholes.

O. Upon completion of cutting, the area must be swept clean of all debris to facilitate inspection and to ensure pavers are not damaged during compaction. (Debris or sand particles left on pavers which are being compacted can cause point loading which may chip, scrape or break the paver.)

P. After sweeping and prior to compaction, the paved area must be inspected by the owner or consultant to ensure satisfactory color blending. Pavers can be moved easily at this time to achieve good color distribution.

Q. Low amplitude, high frequency plate compactor shall be used to compact the pavers into the sand. The compactor shall transmit an effective force not less than 75 kN per square metre (1600 Lb/ft2) of plate area. The frequency of vibration shall be within the range of 75 to 100 Hz. Use Table 5 below to select size of compaction equipment:

R. TABLE 5:

S. PAVER THICKNESS AND REQUIRED MINIMUM COMPACTION FORCE

A. Paver Thickness	B. Compaction Force
C. 2 1/4 in.	D. 3000 lbs [13 kN]
E. 2 3/4 in. F. 3 1/8 in.	G. 5000 lbs [22 kN]

Note: Use of a urethane plate compactor pad is recommended to minimize any scuffing of the paving stone surface.

T. The pavers shall be compacted to achieve consolidation of the sand bedding and brought to level and profile by not less than three passes. Initial compaction should proceed as closely as possible following the installation of the paving units and prior to the acceptance of any traffic or application of sweeping sand.

U. Any units that are structurally damaged during compaction shall be immediately removed and replaced.

V. Dry joint sand shall be swept into the joints until the joints are full. This will require at least two or three passes with the compactor. Do not compact within 3 ft. (1 m) of the unrestrained edges of the paving units.

W. All work to within 3 ft. (1 m) of the laying face must be left fully compacted with sand filled joints at the completion of each day.

X. Excess joint sand shall be swept off when the job is complete.

3.9 FIELD QUALITY CONTROL

A. Final elevations shall be checked for conformance to the drawings after removal of excess joint sand.

B. All surface and pavement structures shall be true to the lines and levels, grades, thickness and cross sections shown on the drawings. All pavements shall be finished to lines and levels to ensure positive drainage at all drainage outlets and channels. In no case shall the cross-fall of any portion of pavement be less than 2 percent. The final surface elevations shall not deviate more than 3/8 in. (10 mm) under a 10 ft. (3 m) long straight edge.

C. The surface elevation of pavers shall be 1/8 to 1/4 in. (3 to 6 mm) above adjacent drainage inlets, concrete collars or channels.

END OF SECTION

SECTION 321723 - PAVEMENT MARKINGS AND REMOVAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. See Geotechnical and Environmental Reports provided by the Owner.

1.2 SUMMARY

A. This section includes specifications for proposed temporary and permanent pavement markings, including pavement marking removal.

1.3 SUBMITTALS (not used)

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Within public right-of-way, comply with the standards of the authorities having jurisdiction of the right-of-way.
2. Comply with notification and inspection procedures of the authorities having jurisdiction prior to commencement of any striping or pavement marking work.

1.5 PROJECT CONDITIONS

A. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 50 degrees F not exceeding 90 degrees F and relative humidity at a maximum of 85%.

B. Surface Preparation: The surface shall be clean and free of dirt, grease, oil, or other contaminants which could interfere with adhesion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Temporary and Permanent Pavement-Marking Paint:

1. Sherwin Williams Setfast Non- leaded Chlorinated Rubber - White on asphalt (TM5126), yellow on concrete (TM5127), or as indicated on the drawing(s).
2. Sherwin Williams “Setfast Acrylic Waterborne Traffic Marking Paint” – White on asphalt (TM226, yellow on concrete (TM225), or as indicated on the drawing(s).

3. Valspar Enterprise Latex Traffic Marking Paint – White on asphalt (#2540), yellow on concrete (#2541), or as indicated on the drawing(s).
4. PPG (Pittsburgh Paints) “SPEEDHIDE® Traffic and Zone Marking Flat Latex” – White on asphalt (11-23), yellow on concrete, or as indicated on the drawing(s).

PART 3 - EXECUTION

3.1 PREPARATION

A. The Contractor shall obtain the necessary permits and approvals prior to initiating work with in the right-of-way.

3.2 PERMANENT PAVEMENT MARKINGS

A. Allow new asphalt paving to age a minimum of 48 hours before painting. New concrete pavement shall age a minimum of 30 days before painting.

B. Sweep and clean surface to eliminate loose material and dust prior to application.

C. Apply paint material at manufacturer’s recommended rates to provide a minimum wet film thickness of 15 mils and dry film thickness of 10 mils (each coat).

D. Paint shall be applied in two coats to a clean, dry surface using template or a striping machine. Stripes shall be of uniform width of 4 inches wide, unless otherwise noted on the drawing(s). Other markings shall be provided as shown on the construction drawings.

E. Pavement markings in the City and State right-of-ways shall be Georgia DOT standard thermoplastic.

3.3 TEMPORARY PAVEMENT MARKINGS

A. Temporary paint shall be applied in accordance with permanent pavement marking specifications. However, only one coat of paint shall be required to a clean, dry surface using template or a striping machine. The Contractor may also propose to utilize temporary/removable pavement marking tape, as approved by the Owner or jurisdiction having authority.

B. Markings shall be applied using butyl adhesive pads or paint to clean dry pavement surfaces which are free of cracking, checking, spalling, or failure of underlying base material.

C. When required, removable marking tape or pavement marking paint shall be applied on clean dry surfaces at designated locations. Tape that has become damaged and is no longer serviceable shall be replaced without additional compensation.

D. All temporary markings and striping shall be removed when no longer required. Any pavement area that has been determined to be damaged as a result of the removal operation shall be repaired at no cost to the Owner.

3.4 PAVEMENT MARKING REMOVAL

A. Existing pavement marking lines and symbols shall be removed as to not materially or structurally damage the surface or texture of the pavement. A motorized abrasive device shall be utilized to remove existing markings. The Contractor shall repair any damage to the pavement at no expense to the Owner. The pavement surface shall be left in a condition that will not mislead or misdirect customers or motorists. Pavement marking removal within public rights of way shall be completed in accordance with the regulatory authority having jurisdiction and the specifications.

END OF SECTION 321723

SECTION 32 84 00 – PLANTING IRRIGATION

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

A. Extent of underground irrigation system is shown on the Drawings and in Schedules. Provide all labor, materials, and equipment required by or inferred from the Drawings and Specifications to complete the work of this section.

B. Provide additional work and materials required by local authorities at no extra cost to owner.

C. Sprinkler system shall include backflow preventers, check valves, sprinklers, drip components, valves, fittings, controllers, wiring, all as sizes and types as shown on drawings and specified. System shall be constructed to grades and conform to areas and locations as shown on the drawings.

D. Sprinkler lines shown on the drawings are diagrammatic. Spacing of the sprinkler heads, drip components, control valves or quick coupling valves are shown on the drawings and shall be exceeded only with written permission of Designer.

E. Unless otherwise specified or shown on drawings, construction of the sprinkler system shall include furnishing, installing, and testing of all main lines, lateral lines, risers and fittings, sprinkler heads, drip components, gate valves, control valves, controllers, wiring, controls, backflow preventers, enclosures and other necessary specialties. Construction shall also include the removal and/or restoration of existing improvements, excavating and backfilling, and all other work in accordance with the plans and specifications required for a complete system.

1.02 QUALITY ASSURANCE

A. Referenced Standards: American Society for Testing and Materials, Annual Book of ASTM Standards, latest edition.

B. Subcontract Irrigation Work to a single firm specializing in irrigation installation, acceptable to the Landscape Architect. The Irrigation Contractor shall continuously maintain a competent superintendent, satisfactory to the Owner, on the work during progress with authority to act in all matters pertaining to the work.

C. Conference: Before any work is started a conference shall be held between the Irrigation Contractor, General Contractor and/or the Owner concerning the work under this contract.

D. Codes and Standards: Perform irrigation work in compliance with applicable requirements of governing authorities having jurisdiction. County regulations supersede

these specifications. Notify Landscape Architect in writing of all discrepancies immediately.

E. Do not make substitutions: If the Irrigation Contractor desires to make substitutions of materials, sufficient descriptive literature and material samples must be furnished to establish the material as an equal substitute. In addition, the Irrigation Contractor must state his reasons for the substitution. Submit this request and information to the Landscape Architect.

F. Approval and Selection of Materials and Work: The selection of all materials and the execution of all operations required under the Drawings and Specifications is subject to the approval of the Owner and Landscape Architect. They have the right to reject any and all materials or work which, in their opinion, does not meet the requirements of the Contract Documents at any stage of the operations. Remove rejected work and or materials from project site and replace promptly.

G. Workmanship: Install materials in a neat and professional manner following manufacturer's recommendations.

1.03 SUBMITTALS

A. General: Submit in accordance with Shop Drawings, Product Data, and Samples.

B. Shop Drawings and Equipment Product Information:

1. Prior to purchasing materials, submit product information for acceptance on all sprinkler heads, automatic valves, drip components, quick coupling valves, controller, wiring, sensors, and piping.
2. Contractor shall review drawings and data to supply actual precipitation rates and times for each zone in maintenance package.

C. Record Drawings and Instructions

1. Upon completion of installation, furnish one set of reproducible and one set of printed record drawings showing all sprinkler heads, valves, drains, and pipelines to scale with dimensions. These drawings shall have dimensions from easily located stationary points. Clearly note all approved substitutions of size, material, etc. Complete, concise instruction sheets and parts lists covering all operating equipment and weathering techniques shall be bound into folders and furnished to the Owner in three (3) copies. Submission of this information is a requirement for final acceptance.

D. Before irrigation system acceptance, submit written operating and maintenance instructions in a format set forth by the Landscape Architect.

1.04 PROJECT CONDITIONS

A. The irrigation system is designed to operate under the following conditions: a minimum of 45 psi water pressure at the tap, and at least 12.5 gpm available water supply.

B. It shall be the responsibility of the Irrigation Contractor to report in writing to the Landscape Architect any deviations between drawings, specifications and the site. Should deviations exist, installation without resolution will be at the Irrigation Contractor's expense.

C. Obtain all required permits and pay all required fees at no additional cost to the Owner. Any penalties due to failure to obtain permits or pay fees shall be the responsibility of the Irrigation Contractor.

D. Existing Site Improvements: Perform work in a manner which will avoid possible damage. The Irrigation Contractor is responsible for any damage of mechanical nature or damage resulting from leaks in the irrigation system.

E. Test water conditions: It will be the responsibility of the Irrigation Contractor to check the pressure at the tap and confirm pressure meets operating pressure noted in specifications. If the water pressure is insufficient to operate the system at 100% efficiency, the Irrigation Contractor is responsible for providing and installing a booster pump system capable of increasing the pressure to the required flow and pressre. The pump will be operated by a magnetic starter connected to the pump start switch located in the irrigation controller unless otherwise detailed or specified. If the booster pump is required, electrical service for the pump shall be the responsibility of the Owner. The cost of this pump system will be agreed upon prior to installation and shall be paid for by the Owner. In the event water pressure significantly exceeds the operation pressure noted in specifications, it will be the contractor's responsiblity to provide and install a pressure regulator downstream of the backflow preventer.

F. Sleeves, whether installed by the General Contractor or Irrigation Contractor, shall be installed per details. The General Contractor is to expose irrigation sleeves for the Irrigation Contractor prior to start of irrigation work in all areas where sleeving is not installed per details and specifications. Coordination and scheduling for sleeve end excavation is the responsibility of the Irrigation Contractor.

G. Coordinate and schedule all work with General Contractor.

H. Damages to work of other trades resulting from irrigation installation must be repaired at the expense of the Irrigation Contractor in a timely fashion.

I. Make minor adjustments to system layout as may be required and requested at no additional cost to the Owner.

J. Keep site clean and orderly at all times.

K. Adjustment of the sprinkler heads and automatic equipment to provide optimum performance will be done by the Irrigation Contractor upon completion of installation.

L. After completion, testing, and acceptance of the system, the Irrigation Contractor shall verbally instruct the Owner or his representative in the operation and maintenance of the system.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Hunter Industries Sprinkler Manufacturing Company, San Marcos, California

B. Rain Bird Corporation, Tucson, AZ

C. OR APPROVED EQUAL

2.02 GENERAL

A. All materials used in the system must be new and without flaws or defects of any type and be the best quality available. All materials have a minimum guarantee of one year against material defects or defective workmanship.

B. Comply with pipe sizes indicated. No substitution of smaller pipes will be permitted. Larger sizes may be used subject to acceptance of the Landscape Architect. Remove damaged and defective pipe.

C. Provide pipe continuously and permanently marked with manufacturer's name or trademark, size schedule and type of pipe, working pressure at 73 degrees F and National Sanitation Foundation (NSF) approval.

2.03 PIPE AND FITTINGS

A. All main line plastic pipe from sizes 3" and above shall be Class 200, SDR 21, unplasticized rigid PVC pipe with integral bell and rubber ring gasket unless otherwise specified. Pipe from sizes 2 1/2" to ¾" shall be Class 200, solvent weld PVC pipe. All pipe shall be supplied in 20' standard lengths and shall be manufactured by CertainteedCorp. Crestline, Dura or equal. All pipe that is exposed or not below grade shall be Schedule 80 PVC.

B. Fittings for integral bell with rubber ring gasket pipe shall be Ductile Iron of the gasket type manufactured by Harco, Inc or equal. Fittings for solvent weld pipe shall be a Schedule 40 PVC fitting rated for 200 psi (ASTM D-3139) and shall be manufactured by Lasco Plastic Pipe Fittings or equal.

C. All pipe fittings 3" and larger shall be gasket type manufactured by Harco Inc or equal. All fittings 2 1/2" and under shall be Schedule 40 solvent weld. Use Sch. 80 PVC type for Sch. 80 PVC pipe.

D. Solvent weld PVC pipe, if and when used in construction of this system, shall be rigid PVC pipe and shall be assembled using appropriate PVC pipe cleaner/primer and solvent cement in accordance with the manufacturer's recommendations.

E. All solvent weld fittings shall conform to Schedule 40 or Schedule 80 PVC dimensions and specifications for solvent weld fittings and shall be as manufactured by Spears or equal.

F. All piping downstream of electric valves, sizes 4" and smaller, shall be solvent weld unplasticized PVC 200 psi working pressure extruded from virgin parent material of the type specified on the drawings. The pipe shall be homogeneous throughout and free from visible cracks, holes, foreign materials, blisters, and wrinkles.

G. All plastic fittings to be installed shall be molded fittings manufactured of the same material as the pipe and shall be suitable for solvent weld, slip joint ring tight seal, or screwed connections. No fitting of other materials shall be used except as hereinafter specified.

2.04 SLEEVES

A. All sleeves are to be installed with Sch. 40 PVC pipe and shall be installed by the general or site contractor

2.05 CONTROL SYSTEM

A. The automatic controller(s) shall be as shown on the plans.

B. Install climate sensor that will adjust control timer schedule to replace the moisture lost each day to evapotranspiration.

2.06 ELECTRIC WIRING

A. All 120 Volt AC Wiring: 120 volt service to consist of three wires: one black, one white, and one ground. Electrical service to be provided by General Contractor unless otherwise directed by Owner.

B. All splices in controller wiring shall be waterproof using 3M-DBR\Y-6 wire connectors.

C. All control wiring shall be 24 volt solid wire UL approved for direct burial in round. Minimum wire size: 14 gauge red for control wire and 14 ga white for common wire. All control wiring and wiring connections from the controller to the valves is included in this contract. Any and all wire splices to be located in electric control valve boxes or a minimum 10" round valve box.

2.07 CONTROL VALVES

A. Provide electric remote control valve model – size as indicated on contract documents. Valve to conform to manufacturer's specifications concerning performance and given pressure.

B. Zone Control Valves

1. Globe-type diaphragm valves of normally closed design, with bronze bodies and covers (type noted on drawings). Operation accomplished by means of an integrally mounted heavy-duty 24 volt AC solenoid complying with National Electrical Code, Class II Circuit, solenoid coil potted in epoxy resin within plastic coated stainless steel housing. Solenoids shall be completely waterproof, suitable for direct underground burial. Provide a flow stem adjustment in each valve.

2.08 VALVE BOXES

A. All valves shall be installed in thermoplastic valve access boxes of the size required to permit access to the valve. Valve boxes shall include manufacturer Ametek, Carson, or equal. Remote Control Valve Boxes shall be 10" round with green lids. Box lid shall be marked "RCV". Gate Valves 3" and larger shall require Ametek, Carson, or equal valve boxes 12"x18" rectangular with green lids and extensions as needed. For gate valves 2 ½" & smaller and quick coupling valves, use Ametek, Carson, or equal 10" round with green lids.

B. Gate Valve Box lids shall be permanently marked "Irr. Gate" or "Water".

2.09 THRUST BLOCKS

A. Place one cubic foot of concrete for each inch of pipe diameter for thrust block. Thrust shall not allow vertical or horizontal movement of pipe in any direction unless otherwise noted on design. Thrust blocking shall be provided on all piping two and one half (2 1/2) inches diameter and larger.

PART 3 – EXECUTION

3.01 GENERAL

A. During the installation, the Landscape Architect may make regular inspections and reject any work and materials which do not meet the Standards called for in the contract documents. Rejected work must be promptly corrected and no time extension will be allowed for this reason.

3.02 INSPECTION

A. Inspect project site prior to start of work to determine that all site conditions are acceptable for irrigation work to begin. Inform Landscape Architect of unsuitable conditions. Do not proceed with installation of irrigation system until unsatisfactory conditions have been corrected in a manner acceptable to Irrigation Contractor.

3.03 EXCAVATION AND BACKFILL

A. Trenches for sprinkler lines shall be excavated to sufficient depth and width to permit proper handling by the Irrigation Contractor. The backfill shall be thoroughly compacted and evened off with the adjacent soil level. Selected fill dirt or sand shall be used if soil conditions are rocky. In rocky areas the trenching depth shall be two (2) inches below normal trenching depth to allow for this bedding. The fill dirt or sand shall be used in

filling four (4) inches above the pipe. The remainder of the backfill shall contain no lumps or rocks larger than three (3) inches. The top twelve (12) inches of backfill shall be topsoil, free of rocks, subsoil, or trash. Any open trenches or partially backfilled trenches left overnight or unsupervised shall be barricaded to prevent undue hazard to the public.

B. The Irrigation Contractor shall backfill in six (6) inch compacted lifts as needed to bring the soil to its original density.

C. In the spring following the year of installation, the Irrigation Contractor shall repair any settlement of trenches by returning them to grade of surrounding areas. This shall be followed by seeding with type appropriate to adjacent areas. Watering and maintenance of the repaired areas shall be the responsibility of the Owner.

3.04 INSTALLATION OF PIPING

A. Plastic pipe shall be installed in a manner that permits expansion and contraction as recommended by the manufacturer.

B. Pipe shall be cut in such a fashion to ensure square cuts without burrs. Burrs at cut ends shall be removed prior to installation in order that a smooth unobstructed flow will be obtained.

C. All plastic to plastic joints shall be solvent weld joints or slip seal joints. Only the solvent recommended for the pipe and fittings shall be installed. Installation shall be according to manufacturer's recommendations. The Irrigation Contractor assumes full responsibility for proper installation.

D. PVC pipe joints shall be allowed to set for twenty four (24) hours before pressure is applied to the system.

3.05 CONTROLLER/ELECTRICAL CONNECTIONS

A. All electrical connections shall conform to the National Electrical Code(NEC), latest edition.

B. Control wiring placed under walkways, drives, or other permanent surfaces shall be installed in sleeving at depths required by NEC.

C. All wire splices shall be located in valve boxes.

D. Twenty four (24) inch wiring loops shall be provided at each valve location for expansion/contraction and servicing.

E. 120 VAC electrical power supply to the controller location shall be provided byothers.

3.06 SPRINKLER HEADS

A. High Pop-Up Shrub Heads: Finish height to be determined by Landscape Architect.

B. Backfill and compact soil around sprinkler head assembly to stabilize the head so that no lateral motion is exhibited during operation.

C. Sprinkler heads on risers shall be maintained on a Schedule 80 PVC riser coupled by a Schedule 40 F.I.P.T. coupling (Lasco #420-007) to a polyethylene riser first out of the lateral fitting. Height of all sprinklers located in bed areas to be determined in the field by the Landscape Architect. All risers to be painted a color specified by the Landscape Architect.

D. Drip Irrigation Emitters are to be located in a manner that will provide optimum concentration of water to the plant material.

3.07 CONTROL EQUIPMENT

A. Install automatic valves and controllers according to manufacturer's recommendations. Locations are shown on the drawings.

3.08 SURGE PROTECTION EQUIPMENT

A. Install surge protection equipment on primary (110 VAC) power lines. Connect each surge protection unit to at least one 5/8" diameter by 8' long copper clad grounding electrode driven into the soil to its full depth. Place electrodes no closer than two (2) feet from the controller cabinet or any control or power wire. Be consistent in locating ground rods throughout the installation with respect to controller positions and note locations on As-Built drawings.

B. Ground wire between surge protection device and grounding electrode to be single strand bare copper #6 wire. Route ground wire away from power and control wires where possible. When it is necessary to pass through the controller cabinet wall, use two (2) #L-70 copper grounding lugs and a brass bolt. Use a CadWeld connector to make connection between ground rod and ground wire. Bury ground wire passing between controller and ground rod a minimum of ten (10) inches. Install 10" valve box over ground rod location and CadWeld connection in a manner that allows connection to be inspected.

3.09 METER

A. To be installed by the Owner or General Contractor. Provide meter(s) as indicated on the drawings. Comply with manufacturer's specifications and applicable local codes.

3.10 BACKFLOW PREVENTER

A. To be installed by the Irrigation Contractor. Provide Watts Double Check Valve or Reduced Pressure Backflow Assembly Backflow Preventer Model 007-QT, RPZ, or equal as required by jurisdictional plumbing code. The backflow preventer shall be a double check valve or reduced pressure assembly type capable of having a flow rate of 15 gallons per minute (GPM) with a pressure loss not to exceed 12 pounds per square inch (psi) and shall be suitable for supply pressure up to 150 psi. The backflow preventer body to be bronze, internal parts stainless steel, and the check valve assembly's tight seating rubber. The backflow preventer assembly must include two gate valves for

isolating unit and two ball ball valve test cocks for testing unit to insure proper operation. All backflow devices must conform to all local codes and regulations.

3.11 FLUSHING AND TESTING

A. Prior to the installation of sprinklers heads on new piping and risers, all control valves shall be opened and a full head of water used to flush out the system.
B. Sprinkler mains shall be tested under normal water pressure for a period of twelve (12) hours. If leaks occur, make necessary repairs and repeat testing. Testing shall be scheduled with the Landscape Architect with at least twenty four (24) hours prior notice.
C. Prior to final inspection for final payment, the entire installation shall be tested for proper operation, adequate coverage, and any necessary repairs. Repairs to be made at the expense of the Irrigation Contractor.
D. Adjustment of sprinkler heads and automatic equipment for optimum coverage will be completed by the Irrigation Contractor. Minor adjustments during the guarantee period will be the responsibility of the Owner.

PART 4 – WARRANTY AND GUARANTEE

4.01 WARRANTY AND GUARANTEE

A. The Irrigation Contractor shall furnish a Certificate of Warranty and a written Guarantee of Work and Materials for a one year period from the date of final acceptance of the irrigation system by the Owner.

4.02 OWNER ORIENTATION

A. Upon completion of the irrigation system and final acceptance by the Owner and Landscape Architect, the Irrigation Contractor is responsible for the orientation of maintenance personnel in the operation, maintenance, and repair of the system. Furnish copies of all available parts lists, troubleshooting lists, and specifications sheets to the Owner prior to final payment.

B. Set the initial watering schedule and program the automatic controller at the direction of the Landscape Architect.

4.03 WINTERIZING THE SYSTEM

A. At the Owner’s discretion, the irrigation piping must be winterized by first blowing the system clear of water using compressed air (80 psi maximum) admitted into the piping at a quick coupling valve or hose bib located at a higher elevation on the system piping. Activate individual zones, higher zones first, then proceed through the system toward lower elevation. Proceed through all zones twice. The air compressor supplied by the Irrigation Contractor and used to winterize the system must have an engine separate from the compressor tanks to prevent high temperature air from being injected directly into the system piping.

END OF SECTION

SECTION 32 91 00 - FINISH GRADING

PART 1 – GENERAL

1.1 DESCRIPTION

This section covers furnishing all labor, materials, equipment, tools, and incidentals necessary to finish grade the landscaped areas shown on the drawings. This section includes work along roadways, in parking islands and planters adjacent to buildings.

PART 2 – EXECUTION

2.1 BACKFILLING

A. The general contractor shall be responsible for rough grading all site areas to within ±.20 of a foot of final proposed grades. The landscape contractor will be responsible for fine grading of parking islands as well as backfilling of low spots or inequities in parking islands, medians, behind curbs, and all other landscaped areas on site. Any additional soil needed to correct the grade inequities left by the general contractor may be available on site.

B. The general contractor is responsible for backfilling all planters up to the bottom of the sidewalk slab. The landscape subcontractor shall be responsible for backfilling the planters as required to provide for positive drainage away from the buildings and out of planters.

2.2 LANDSCAPE BERM SHAPING

A. The landscape contractor shall be responsible for final shaping of all landscape berms in parking islands, landscape areas and road frontages at the direction of the Landscape Architect. Landscape contractor shall be responsible for the removal and off-site disposal of all debris collected during the berm grading operations.

2.3 PREPARATION FOR LAWNS

A. The landscape contractor shall be responsible for fine grading with a small rubber tired tractor all the areas on site to receive lawn type grassing and sodding. The landscape architect will inspect all fine graded areas for approval prior to grassing operations.

PART 3 - OWNER'S ACCEPTANCE

A. The landscape contractor is responsible for maintaining the finish grades until final acceptance by the Owner or Owner's representative. Repairs required resulting from negligence are at the contractor's expense.

END OF SECTION 32-91-00

SECTION 32 92 00 – LANDSCAPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section includes furnishing labor, materials, equipment and services for all trees, shrubs, ground covers, bedding, installation, and related work required by the Drawings and Specifications.

B. The Contractor's attention is directed to the fact that there are active utilities located within the limits of work. Before commencing any work required under the Contract, he shall find the location of all utilities, subsurface drainage, and underground construction and take proper precautions not to disturb or damage any subsurface improvements. The Contractor is responsible for all repairs to damaged utilities resulting from the work covered by this Contract without claims against the Owner for additional cost.

C. The Contractor shall make a field examination of the project site for the purpose of verifying the following:

1. Accuracy of all finish grades within the work area
2. That drawing dimensions relate with actual field conditions.

D. The Contractor shall notify the Landscape Architect of any conditions that will prevent proper execution of the work.

1.2 QUALITY ASSURANCE

A. Reference Standards: Conform to recommendations, specifications and standards of the following:

1. *Standardized Plant Names*, 1942 Edition, American Joint Committee on Horticultural Nomenclature.
2. *American Standard for Nursery Stock*, 1980 Edition, American Association of Nurserymen.

B. The selection of all materials and the execution of all operations required under the Specifications and Drawings shall be subject to the approval of the Landscape Architect. The Landscape Architect shall have the right to reject any or all materials and any or all work, which, in his opinion, does not meet the requirements of the Contract Documents at any stage of the operations. The Contractor shall move all rejected materials promptly from the site.

C. The Landscape Contractor is hereby made aware that both the Owner and the Landscape Architect anticipate that the landscape installation of this facility shall be of the highest quality possible. To this end, the landscape contractor shall insure the following:

1. All plant material shall be selected from the highest quality stock, and be specimen quality.
2. All work to be performed, such as preparing plant pits, installing plant mix, planting procedures, staking, guying, and pruning shall be strictly managed and executed and performed by experienced personnel.
3. A competent superintendent with on site decision making capacity will be present at all times.

1.3 SUBMITTALS

A. The Contractor shall collect one soil sample, from three different locations slated to receive landscaping, for the purposes of testing. Each sample (three total samples) shall be approximately 1 KG in volume (approximately 1 gal. Ziploc bag) and shall receive the following test performed by A&L Agricultural Labs:

1. S-1A
2. S-3
3. Texture Analysis

B. Send soil samples to:

Mr. Lynn Griffith
A&L Southern Agricultural Laboratories
1199 West Newport Center Drive
Deerfield Beach, Florida 33442

Phone: (954) 571-2103

B. Test results shall be submitted to the landscape architect by successful bidder within 14 days following bid award date.

C. Contractor shall provide 5”x7” color photographs of all selected plant material at nursery. Show a 10’ minimum measuring rod next to all trees . Label each picture with name and size of submittal. Submitted photograph are to be used for landscape architect’s review for preliminary approval.

D. List of Plant Material, Size, Remarks, Nursery Location.

E. Date for trip to nursery to select and tag all trees.

F. The landscape contractor shall submit bills of lading for all fertilizer tablets, soil amendments and Mycorrhizal tree inoculants to the Landscape Architect for review and verification of delivery to site.

1.4 GUARANTEE

A. The guarantee period for all trees, plants, shrubs or ground covers shall begin at the date of final acceptance by the Landscape Architect's construction representative.

B. The Contractor shall guarantee all plant materials for a period of one (1) year beginning at date of final acceptance of the Work in total. The Owner may either contract with the installation Contractor for maintenance or the Owner may follow the prescribed

maintenance procedures. No replacements are necessitated by neglect or abuse by the Owner.

1.5 PLANT MATERIAL SELECTION & TAGGING

A. Landscape Contractor to arrange a selection and tagging trip to nursery for the purpose of securing project plant material. All trips are to be made within ten hours. Landscape Architect has allocated three (3) trips for the above. Landscape Contractor to pay for all expenses including a fee of $850.00 per day for all trips over the allotted three trips. Landscape Contractor to participate in trip.

B. Landscape Contractor to provide locking straps for all selected plant material.

PART 2 - PRODUCTS

2.1 PLANTS

A. Specific requirements concerning the various species and the manner in which they are to be furnished are shown in the drawings and plant list:

1. Quantity and Size: Plants shall be nursery grown except where noted, freshly dug, normally shaped and well branched, full foliaged when in leaf and shall have healthy, well-developed root systems. Trees must be self-supporting, with straight trunks and with leaders intact. All plants furnished shall be free of insect infestations and eggs and shall have been grown under climatic conditions with temperature extremes similar to those of the locality of the project for a minimum of two (2) years prior to use on this project. All plants shall be true to species and variety. Plants used where symmetry is required shall match. Varieties common to an area (i.e. parking lot) shall match in height and form. The Landscape Architect will permit no substitutions without written permission.
2. Material furnished in a size range specified shall be interpreted to mean that not less than 50% shall be of the maximum size specified within each range.
3. The determining measurements for trees shall be caliper, height, and spread. Caliper shall be taken 6" above the ground for the trees up to and including 6" in caliper. Trees over 6" in caliper shall be measured at 12" above the ground line.
4. Foliage Width and Origin: Must be measured across the mean foliage width dimension, not including random outstanding branches. Foliage height shall be measured from the top of the growing container or root ball to the top of plant not including random outstanding branches.
5. Plants larger in size than those specified may be used with approval of the Landscape Architect at no additional cost to the Owner. If the use of larger plants is approved, the ball of earth or spread of roots shall be increased proportionately.
6. Container-grown plants in containers or wooden boxes of equal quality as balled and burlapped plants may be substituted in lieu thereof. Plants grown in containers shall be delivered and remain in containers in a shady location until planted. Plants in containers shall be watered prior to transportation and shall be

kept moist until planted. The container must be removed prior to planting, with care being exercised not to injure the plant.

2.2 AVAILABILITY

A. If proof is submitted in writing that any plant specified is not obtainable in the eastern United States by a minimum of five (5) reliable nursery sources which are members of The American Nurserymen's Association, then a proposal will be considered for use by the Landscape Architect of the nearest equivalent size or variety with no increase of contract price.

2.3 BURLAP

A. Burlap for wrapping earth ball shall be made of jute and weigh not less than 7.02 oz. per square yard.

2.4 FOREST HUMUS OR PREPARED SOIL ADDITIVES

A. Forest humus or prepared soil additives shall be air-dried, finely shredded, and suitable for horticultural purposes. Its pH value shall be between 5.5 and 6.5, and it shall contain no more than 35% moisture by weight.

B. Prepared soil additives for use in the preparation of backfill soil mixes shall be fully composted, non-odorous, pasteurized, air-dried, finely shredded, and suitable for horticultural purposes. Its pH value shall be between 5.5 and 7.0, and it shall contain no more than 35% moisture by weight. If the pH of the existing, on-site soil is less than 5.0 use a soil amendment that has a pH of 7.0 (neutral). If the existing soil has a pH greater than 5.0 use a 1:1 mix of peat moss and pine fines as the amending material. Any soil additive or soil mix determined to have an offensive odor by the landscape architect shall be immediately removed from site and replaced with fully composted non-odorous product, at the expense of the contractor.

1. Basis of Design Product: Mr. Natural CLM Mix
2. Deductive Alternate: Erth Food Products TLM Mix
3. Deductive Alternate: Cowart: Blackened Topsoil
4. Deductive Alternate: Cowart Organic Compost

2.5 PREPARED SOIL MIXES

A. Prepared Soil Mixes for annuals, perennials and vegetable beds planting areas shall be one of the following products:

1. Mr. Natural CLM Mix
2. Erth Food Products TLM Mix
3. Cowart Blackened Topsoil

2.6 MULCH

A. Common landscape beds to receive pine straw mulch unless otherwise noted. Mulch shall be three inches deep, long-needle, red, clean, fresh, and free of branches, cones and foreign matter for all landscape areas unless otherwise noted.

B. Flowerbeds to receive pine bark mini-nuggets, two inches deep.

C. Sedum, sempervivum and thyme beds shall be mulched with expanded slate/ Permatill or Mexican beach pebbles ¼ to ½ "size or other miniature rock specified by landscape architect to a depth of 1".

2.7 PH FACTOR READINGS

A. The Contractor shall be responsible for neutralizing the soil to a pH reading of not less than 6 and not more than 7.5 by means described on the soils test performed by the specified agricultural soil testing laboratory.

2.8 COMMERCIAL FERTILIZER

A. Commercial fertilizer shall be a complete fertilizer, 60% of the nitrogen of which is derived from natural organic sources or urea form. The following nitrogen-phosphorous-potash ratio types shall be applicable 16-4-8. It shall be delivered to the site in standard size unopened containers, showing weight, analysis, and name of manufacturer. It shall be stored in a weatherproof storage place in such a manner that it will be kept dry. Refer to soil test data prepared by specified testing facility for fertilizer analysis.

B. Agriform 21 gram slow release fertilizer tablets shall be used for all tree and shrubs at the following rates:

1. Fertilizer Tablet Application Rates:

Container/Tree Size:	No. of Tablets
4" Pots	1 tablet
1 gal.	1 tablet
3 gal.	3 tablets
7 gal.	5 tablets
15 gal.	10 tablets
1.5-3" cal. tree	20 tablets
3.5-5+" cal. tree	30 tablets

C. MycorTree Tree Saver Transplant (Mycorrhizal Transplant Inoculant) shall be incorporated into the backfill mix for all trees and shrubs per manufacturer's recommended rate of application.

2.9 GUYING AND STAKING

A. See detail.

2.10 TREE GUYING SYSTEM

A. See detail.

2.11 PLANTING SOIL MIX

A. Planting soil mix backfill for all trees and shrubs shall consist of the following: 1 part prepared soil additive (refer to Section 2.4) to 2 parts native or existing soil provided the

soil meets the results of the specified test (Section 1.03-A). The planting soil mix may be prepared by the following methods:

1. For all trees and shrubs planted in individual planting pits: mix 1 part prepared soil additive to 2 parts native or existing soil from on site topsoil stockpile.
2. For all shrubs and ground covers mass planted in beds with a spacing less than 24" on center: spread prepared soil additive to a depth of 4 inches over entire bed area and incorporate into the existing soil using roto-tiller. Excavate plant pits and back fill using the cultivated soil mix.

B. Rose Bed Preparation: The contractor shall prepare all rose beds as follows: Remove all weeds, rocks and debris from area. Place 6" depth of specified prepared soil additive over entire rose bed and incorporate into the existing soil using roto-tiller. Crown soil in bed to height of 6” above grade. Seasonal Color and Perennial Bed Preparation: The contractor shall prepare all Seasonal Color beds; and beds containing all Perennials (except Daylilies) as follows: Remove all weeds, rocks and debris from area to receive annuals. Remove 6" depth of existing soil from entire annual bed and replace with 12" depth (crown of bed will be 6” above grade) of 100% “Mr. Natural” CLM plant mix or approved alternate.

C. Seasonal Color, Perennial, and Vegetable Bed Preparation: The contractor shall prepare all Seasonal Color beds, Perennial, and Vegetable beds when indicated on the plant list as follows: Remove all weeds, rocks and debris from area to receive annuals. Remove 6" depth of existing soil from entire annual bed and replace with 12" depth (crown of bed will be 6” above grade) of “Mr. Natural” CLM plant mix.

D. Sedum Bed Preparation: The contractor shall prepare all sedum beds as follows: Remove 6” depth of existing soil. Place 6” depth of ‘Mr. Natural CLM plant mix and 4” depth of ’89 Stone over the entire surface of the planting bed. Mix in CLM and ’89 Stone to a depth of 12 “. Crown the bed to ensure positive drainage.

E. Rhododendron, Azalea, Pieris, & all other Ericaceous Plants Bed Preparation: Remove weeds and debris from bed area. Place shrubs on top of ground at specified spacing and back fill around each plant with 100% specified soil additive. Do not included any native or on site soil into the backfill.

F. Pots and Hanging baskets will be filled with Fafard Mix #3 professional Potting Mix. In pots, the finished grade of the soil should be just above the rim of the pot and sloping down to 2” below the rim of the pot.

G. Apply pre-emergent herbicide to landscape beds excluding annual, rose, seeded areas, pots, baskets and perennial areas.

2.12 SOIL TO ACHIEVE A FINISHED GRADE

A. The general contractor will be responsible for providing and placing soil to achieve a finished grade in all islands and planting areas; however, the landscape contractor shall be responsible for finish grading of all areas to receive landscape improvements including filling any voids or inequities in the areas backfilled by the general contractor, and

insuring positive drainage of all landscape areas. (Refer to Section 32 91 00 Finish Grading & Soil Preparation)

2.13 WATER

A. Water will be available at the site. The landscape contractor will be responsible for the all cost associated with obtaining and transporting any water required to perform his work until the date of final acceptance of the work.

2.14 CERTIFICATES OF INSPECTION

A. Certificates of Inspection shall accompany the invoice for each shipment of plants as may be required by law for transportation. File Certificates with the Landscape Architect prior to acceptance of the material. Inspection by Federal or State Governments at place of growth does not preclude rejection of plants at the site.

2.15 FIELD OBSERVATION OF PLANT MATERIALS PRIOR TO DIGGING

A. The Landscape Architect will observe trees or plants from the bidder's source for acceptability. In the event that the trees or plants are rejected, the Contractor shall pursue and examine other sources of plants until acceptable specimens are found. Such a change will not constitute an increase in cost to the Owner. Additional travel cost for tagging shall be borne by the contractor. Plants shall also be subject to field observation and approval by the Landscape Architect for conformity to specification requirements. Such approval shall not impair the right of inspection and rejection during the progress of the Work. The Contractor shall inform the Landscape Architect in writing of the plants he proposes to supply at least 20 calendar days prior to proposed digging dates.

2.16 PREPARATION, HANDLING AND DIGGING

A. Prepare plants for shipment in a manner that will prevent any damage to the branches, shape or future development of the plant.

1. Protection Against Drying Out: Handle plants so that roots, stems and branches are adequately protected at all times from drying out. Plants that cannot be planted immediately on delivery shall be kept in the shade, well protected with soil, wet moss or other acceptable material and shall be kept well watered. Plants shall not remain unplanted for longer than three (3) days after delivery.
2. Digging: Retain as many fibrous roots as possible.
3. Balled Plants: Plants designated "B & B" shall be adequately balled with firm natural balls of soil in sizes as specified in American Standard for Nursery Stock. Balls shall be firmly wrapped in burlap and securely tied with heavy twine or rope. Plants with loose, broken or manufactured balls will be rejected. Balls shall be lifted from the bottom only, not by stems or trunks.
4. Delivery: All delivery vehicles shall be either enclosed van or covered by tarpaulin. Plants shall not be transported when the temperature is below 20 degrees F.

PART 3 - EXECUTION

3.1 PLANTING

A. All plants, deciduous and evergreens, shall be planted at such times of the year as the job may require, with the agreement of the Contractor to guarantee the material as herein specified.

3.2 LAYOUT OF MAJOR PLANTING

A. Locations for plants and outlines of areas to be planted shall be approved by the Landscape Architect before excavation is begun. Review the applicable architectural and engineering drawings and be familiar with the alignment of underground utilities before digging. The Contractor shall be fully responsible for all damage of utility lines.

3.3 EXCAVATION OF PLANT TRENCHES AND PITS

A. Dig pits as shown on planting details.

1. Hardpan or Moisture Barrier: All tree pits must be loosened to a depth of two (2) feet below the bottom of the pit or to such depth that any hardpan has been broken and moisture is allowed to move through freely. If in the opinion of the Contractor the drainage is still not sufficiently handled relative to the life of the tree, the Contractor shall notify the Landscape Architect of such in writing before installing the trees in the questionable area; otherwise the Contractor is deemed to be totally responsible for the guarantee and livability of the tree.
2. Notify the Landscape Architect in writing immediately of all/any soil conditions, which the Contractor considers detrimental to growth or survival of plant material. State conditions and submit proposal for correction, including cost of corrections. Obtain approval of method of correction before continuing the affected portion of the Work. Alternate locations may be selected by the Landscape Architect and the Contractor shall prepare such areas with no additional cost to the Owner.
3. Prepare planting pits as specified, and as shown on the drawings, prior to inserting plants.
4. The planting area between the pits shall be filled to the required grade with clean soil from the excavation of the plant areas or with other acceptable soil. Until planting in area is finished, all plant beds shall be neatly edged and kept in this condition until the Work is accepted.
5. Once a tree or shrub is installed, prior to backfilling, the contractor shall place Mycor Tree Saver Transplant (Plant Health Care) Inoculant and Agriform 21 gram Fertilizer tablets around each plant per the rate specified on the drawings or specifications. If application rate is not indicated in the contract documents, contractor shall use the manufacturer’s specified rates. Failure on the part of the contractor to provide delivery confirmation information requested above and/or failure on the part of the contractor to perform the work as specified will result in withholding of funds until such work has been successfully completed.
6. Planting beds shall be entirely cleaned of debris, roots, rocks, and vegetation prior to planting. Plants shall be evenly spaced in straight rows and set to finish

grade requirements. Immediately spread pre-emergent herbicide per the manufacturer's recommended rate and apply specified mulch.

3.4 SETTING PLANTS

A. All plants shall be set so that when settled they will occur approximately 2" - 3" above the finished grade and also 2" - 3" above the grade that they bore to the natural grade before transplanting. Each plant shall be planted neatly in the center of the pit, and according to on-center spacing requirements. (Refer to Planting Details).

B. Set plants plumb and brace rigidly in position until the planting soil mix has been tamped solidly around the ball and roots.

C. Cut ropes, string or wire from top of the root ball after the plant has been set and lay open the burlap. Leave burlap or cloth wrapping intact around the edge of the root ball.

D. Form shallow saucers to the finished grade outside the tree pit approximately 4" -6" in height capable of holding water about each plant by placing a mound of topsoil around the edge of each filled-in pit.

3.5 FINISH GRADE OF PLANTING AREAS

A. Raise planting areas to conform to specified grades after full settlement has occurred and before mulch has been applied.

3.6 WATER

A. Water (soak) all plants immediately after planting, and continue thereafter as necessary until acceptance of the Work in total.

3.7 MULCHING

A. Immediately after the work of planting and watering has been completed, a layer of mulch as specified above in part 2 shall be placed on the finished surface about the plant. The mulch around isolated plants shall cover the entire area of the pit. Where plants are planted in groups, the area about, as well as the entire area between, the plants shall be covered with mulch.

3.8 STAKING, GUYING AND PRUNING

A. Staking shall be completed immediately after planting. Plants shall stand plumb after staking in accordance with the detail drawings.

B. Staking Trees: Stake immediately as shown on the drawings after planting and maintain stakes and guying straps until acceptance.

C. Guying trees taller than 8' shall be done with three (3) guys of guying straps spaced equally about each tree. Each guy shall consist of guying straps attached to the tree trunk at an angle of about 60 degrees and at about two-fifths the height of the tree and anchored to eye bolts attached to planter wall.

D. Pruning of deciduous material (except sidewalk street trees) shall be limited to the removal of injured twigs and branches. Leave intact the normal shape of the plant unless otherwise directed by the Landscape Architect.

E. Additional pruning will be required on street trees located in sidewalk planters to allow for visibility to storefront signage. All trees with central leader shall be pruned to a clear trunk height of 8’ and all secondary growth (twigs and leaves) shall be removed to a height of 12’. All sidewalk trees with without central leader shall be pruned to remove all secondary branches and leaves to a height of 12’.

3.9 INTERIM MAINTENANCE OF TREES AND SHRUBS

A. Maintenance shall begin immediately after each plant is planted and shall continue until final acceptance of the Work in total by the Landscape Architect with the following requirements:

1. Maintenance of new planting shall consist of pruning, watering, cultivating, weeding, mulching, tightening and repairing of guys, resetting plants to proper grades or upright position, restoration of planting saucer, and furnishing, supplying, and applying such sprays as are necessary to keep the plantings free of insects and diseases. If planting is performed after grass area preparation, proper protection to grass areas shall be provided, and any damage resulting from planting operations repairs promptly. Contractor shall provide interim maintenance until the time of final acceptance of the Work in total by the Landscape Architect upon completion of all Work under this contract.
2. Planting areas and plants shall be protected at all times against trespassing and damages of any kind for the duration of the maintenance period. If any plants become damaged or injured, they shall be treated or replaced as directed by the Landscape Architect at no additional cost to the Owner. No work shall be done within, adjacent to, or over any plant or planting area without proper safeguards and protection to the plant material.
3. The Contractor shall be responsible for keeping all planting and work incidental thereto in good condition by replanting, replacing, watering, weeding, cultivating, pruning, spraying, re-guying, and performing all other necessary operations to care for promotion of root growth and plant life so that work is in satisfactory condition at final acceptance.
4. The root systems of all plants shall be watered at such intervals as will keep the surrounding soil in the best condition for promotion of root growth and plant life.
5. Sidewalks, streets and other paved areas shall be continuously kept clean when planting and maintenance operations are in progress, and the entire work area shall be cleaned at the end of each day's work.

3.10 OWNER'S ACCEPTANCE

A. The completion of the contract will be accepted and Notice of Completion recorded only when the entire contract is completed to the satisfaction of the Landscape Architect.

B. Within ten (10) days of the Contractor's notification that the installation is complete, the Owner's construction representation will inspect the installation and if a final acceptance is not given, will prepare a "Punch List" indicating work that does not conform to the

plans and specifications. Prior to final acceptance, the Contractor shall complete all items on the punch list. All items on the "Punch List" must be completed before additional "Punch List" trips are provided. Notify the Landscape Architect in writing that all "Punch List" items are complete. All costs associated with additional "Punch List" review trips caused by the contractor's lack of preparation, completion, or neglect will be the responsibility of the Landscape Contractor and pay the Landscape Architect's hourly rate of $100/ hour for time spent.

3.11 TERMINATION OF MAINTENANCE

A. The Contractor's responsibility for complete maintenance (exclusive of replacement) shall terminate on the date of final acceptance of the Work in total unless the Maintenance Agreement is accepted, whereas the contractor shall continue maintenance of the project for a period of one (1) year following the date of the final acceptance of the work.

3.12 MONTHLY INSPECTION

A. The Contractor shall make monthly inspections, at no extra cost to the Owner, during the guarantee period to determine what changes, if any, should be made in the maintenance program. All such recommended changes shall be submitted in writing to the Landscape Architect and the Owner.

3.13 PLANT REPLACEMENT

A. The Contractor shall replace without cost to the Owner, and as soon as weather conditions permit, all dead plants and all plants not in a vigorous, thriving condition, as determined by the Landscape Architect during and at the end of the one (1) year guarantee period. Replacement shall match adjacent specimens of the same species, and shall be subject to selection in the field by the Landscape Architect prior to digging. Replacements shall be subject to requirements in this specification.

3.14 CONTRACTOR LIABILITY

A. The Contractor shall make all necessary repairs to grades, lawn areas, and paving required because of plant replacements. Such repairs shall be done at no extra cost to the Owner.

3.15 REPLACEMENT PLANT ACCEPTANCE

A. The acceptance of all replacement plants by the Landscape Architect shall terminate the Contractor's liability for such. In the event that a replacement plant dies, the Owner may elect a substitution.

3.16 CLEARING OF GROUND

A. Upon completion of the Work, the grounds shall be cleared of all debris, superfluous materials, and equipment, which shall be entirely removed from the premises to the satisfaction of the Landscape Architect and the Owner.

END OF SECTION

SECTION 32 92 19.16 - HYDRAULIC SEEDING

PART 1- GENERAL

1.1 VERIFICATION OF DIMENSIONS

A. Before proceeding with any work, the hydroseeding landscape contractor shall carefully check and verify all dimensions and planting area conditions and shall immediately inform the Architect of any discrepancies between the Drawings and/or actual specifications and actual conditions. No work shall be done on any area where there are such discrepancies or where conditions are unsuitable for successful plant material establishment until approval for it has been given by the Architect.

B. Septic Drain Field Areas shall be seeded with compost blanket per Section 32 92 19.13 Seeding w/ Compost Blanket Installation and Maintenance.

1.2 QUALITY OF WORK

A. The hydroseeding work shall be performed by a competently trained individual or hydroseeding company subject to approval by Architect, and will be in accordance with the best standards and practices related to the trade and under the continuous supervision of a competent foreman capable of interpreting the plans and specifications.

1.3 INSPECTION OF CONDITIONS

A. The Contractor shall examine related work including irrigation and grading surfaces before proceeding with any work and inform Architect in writing on conditions, which may prevent the proper execution of this work. Commencement of work shall be construed that work in place is acceptable.

PART 2 - PRODUCTS

2.1 HYDROSEEDING COMPONENTS AND ADDITIVES

A. 1,500 lbs. per acre cellulose fiber mulch.

B. 900 lbs. per acre 10-10-10 commercial fertilizer.

C. Lime: Add lime at the rate of 800 lbs./acre.

2.2 SEED MIXES

A. See Plan For Seed Mix Specified

1. General Seeding

General Seeding areas to include one of the following seasonally dependent seed mixes:

a. Certified Common Bermuda Seed
Seeding Rate: 3 lbs. per 1000 SF
(May 15-August 1)

b. Tall Fescue / Korean Lespedeza/Annual Rye Mix
20% Unhulled Lespedeza w/ innoculant
Seeding Rate: 35 lbs per acre
30% Annual Rye
Seeding Rate: 50 lbs per acre
60% Tall Fescue “Rebel II”
Seeding Rate: 200 lbs per acre
(October 15-December 1)

c. Rebel II Tall Fescue
Seeding Rate: 350 lbs. per acre
(August 15 –Oct. 1)

2. Wildflower
Mix by Applewood Seed Company (303) 431-7333
Seeding Rate: 1 lb. /1000 SF
50% Cosmos sulphureus
50% Cosmos bipinnatus
(seed 6 weeks before job opening)

3. Detention Basin Mix by:
Applewood Seed Company (303) 431-7333
Seeding Rate: 9-12 lbs./acre

2.3 DELIVERIES AND STORAGE

A. All materials shall be standard approved and first grade quality and shall be in prime condition when installed and accepted. If necessary, care shall be taken to store all hydroseeding materials in a cool, dry place. Any commercial process or packaging material shall be undisturbed and materials delivered to the site in their original unopened condition bearing the manufacturer's guaranteed analysis.

PART 3 - EXECUTION

3.1 SLOPE SCARIFICATION

A. Cut Slopes: All cut slopes shall be scarified or horizontally ripped to a depth of six (6) inches across the slope and spaces not more than twelve (12) inches apart on the slope. The area shall then be mechanically "drag raked" to obtain a smooth, even, surface before hydroseeding.

B. Fill Slopes: All fill slopes shall be sheep foot rolled and mechanically "drag raked" to a surface suitable for hydroseeding.

C. Flat Areas: Flat areas and along roadsides and easement where hydroseeding is to be utilized should be cultivated to a depth of six (6) inches and mechanically "drag raked" to obtain a surface suitable for hydroseeding.

3.2 HYDROMULCHING APPLICATION AND PLANTING SCHEDULE

A. The hydro mulching shall be applied in the form of a slurry consisting of organic soil amendments, commercial fertilizer and chemicals specified. When hydraulically sprayed onto the soil, the mulch shall form a blotter-like material evenly distributed throughout specified area.

3.3 PREPARATION OF HYDROSEEDING MIXTURE

A. The slurry shall be prepared at the site and its components shall be mixed to supply the rate of application as per specifications.

B. Spraying shall commence immediately when the tank is full and the slurry is mixed.

3.4 TIME LIMIT

A. The hydro mulching components are not to be left in the hydro mulch machine for more than two (2) hours. Any seeds left in the machine longer than two (2) hours shall be rejected and disposed of off site at the Contractor's expense.

3.5 PROTECTION

A. Special care is to be exercised by the Contractor to prevent any of the slurry from being sprayed onto any hardscape areas including concrete walks, fences, walls, buildings, etc. Any slurry sprayed onto these areas shall be cleaned off at the Contractor's expense.

3.6 HYDROMULCHING SCHEDULE

A. If needed because of dry soil conditions, the hydroseeded slope area shall be presoaked with water by the temporary irrigation system or water truck to a depth of three (3) inches 48 hours before the hydroseeding installation.

3.7 FERTILIZATION PROGRAM

A. The installing Contractor shall fertilize all areas seeded at 90 day intervals after installation with nitrogen applied at the rate of three (3) pounds per 1,000 square feet until final acceptance of Work.

3.8 WEEDING

A. Any concentrated development of weed growth appearing in the seed mix planting areas shall be eradicated.

3.9 MAINTENANCE OF LAWN AREAS

A. Maintenance of grass shall consist of fertilizing, watering, weeding, cutting and reseeding as necessary to establish a uniform stand of grass. Maintenance shall continue until acceptance of the Work.

3.10 PROTECTION OF LAWN AREAS

A. All lawn areas shall be protected until acceptance. Repair or replace eroded and damaged areas regardless of cause. Reseed areas as required to produce uniform grass cover.

3.11 FINAL INSPECTION AND ACCEPTANCE

A. When the lawns have been established with a uniform cover of grass, as defined by no more than one (1) 1/2" x 1/2" open area every 150 sq. ft., and no visible ruts from drainage, a final inspection of the Work will be made by the Architect.

B. If the Work is found to be satisfactory and in accordance with all requirements of the Contract Documents, the Work will be accepted.

C. It shall be the sole responsibility of the contractor to schedule hydroseeding as required to establish a permanent, uniform cover of grass on all areas to receive hydroseeded turf.

D. The guarantee period will commence with the date of acceptance of the Work.

END OF SECTION

SECTION 32 92 23 - SODDING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section includes provisions of labor, materials and equipment to perform all sodding.

1.2 QUALITY ASSURANCE

A. Verification of Dimensions: Before proceeding with any work, the Contractor shall carefully check and verify all dimensions and planting area conditions and shall immediately inform the Landscape Architect of any discrepancies between the drawings and/or specifications and actual conditions. No work shall be done on any area where there are such discrepancies or where conditions are unsuitable for successful plant material establishment until the Landscape Architect has given approval for it.

B. The sodding work shall be performed by a competently trained individual or sodding company in accordance with the best standards and practices related to the trade and under the continuous supervision of a competent foreman capable of interpreting the plans and specifications.

1.3 GUARANTEE

A. The guarantee period for all sodded lawn areas shall begin at the date of final acceptance by the Landscape Architect.

B. All sod shall be guaranteed by the Contractor for a period of one (1) year beginning at date of final acceptance of the Work in total, provided that the Owner has either contracted with the Contractor for such maintenance or that the Owner has followed the prescribed maintenance procedures and that no such replacements are necessitated by neglect or abuse by the Owner.

1.4 JOB CONDITIONS

A. Protect adjacent work during sodding operations.

B. Keep areas clean of trash and debris resulting from sodding operations.

PART 2 – MATERIALS

2.1 FERTILIZER

A. See fertilization analysis, rate and frequency recommendations for existing soils prepared by specified testing facility.

2.2 SOD

A. *See Plan for Sod Type*

2.3 LIMESTONE

A. Dolomitic lime.

PART 3 – EXECUTION

3.1 INSPECTION

A. Examine related work including irrigation and grading surfaces before proceeding with sodding work and inform Landscape Architect in writing of conditions which may prevent the proper execution of this Work. Failure to report unsuitable conditions to the Landscape Architect will constitute acceptance of conditions to perform sodding and no claims will be allowed for additional cost to the Owner.

3.2 SOIL PREPARATION

A. Remove all existing vegetation and dispose of off site.

B. Rake or "drag" to produce a smooth, even surface, which is free of stones, limbs, clods and debris.

C. Correct all inequalities and soft spots before sod is laid.

D. Add dolomitic limestone to area to receive sod (per rate recommended in soils analysis) to (2) days prior to sodding.

3.3 SODDING

A. Transplant (install) sod within 48 hours after harvesting.

B. Lay sod on a smooth, even surface conforming to finish grade requirements. Thoroughly water area to be sodded.

C. Lay sod perpendicular to the direction of slope and in a manner, which will permit joints to alternate.

D. Fit sod pieces together tightly so that no joint is visible.

E. After sodding is complete and has been approved, roll sod as necessary to achieve a smooth, even surface.

F. Soak soil using fine spray nozzles to a minimum depth of 4" immediately after sodding. Keep all surfaces continuously moist for 30 calendar days after sod has been laid.

3.4 FERTILIZATION

A. The Contractor shall fertilize all areas sodded at 90-day intervals after installation with nitrogen to insure dark green vigorous growth until final acceptance.

3.5 WEEDING

A. Any concentrated development of weed growth appearing in the sodded lawn areas shall be eradicated.

3.6 MAINTENANCE OF LAWN AREAS

A. Maintenance of grass areas shall consist of watering, weeding, cutting and re-sodding as necessary to establish a uniform stand of grass. Maintenance shall continue until acceptance of the Work.

3.7 PROTECTION OF LAWN AREAS

A. All lawn areas shall be protected until final acceptance. Repair or replace all eroded and damaged areas regardless of cause. Re-sod areas as required to produce uniform grass cover.

3.8 FINAL ACCEPTANCE

A. When the lawns have been established with a uniform cover of grass, as defined by no more than one (1) 1/2" x 1/2" open area in 200 sq. ft., a final inspection of the Work will be made by the Landscape Architect and Owner.

B. If the Work is found to be satisfactory and in accordance with all requirements of the Contract Documents, the Work will be accepted.

B. The guarantee period will commence with the date of acceptance of the Work.

END OF SECTION

(NOT USED)

SECTION 32 92 19.16 - HYDRAULIC SEEDING

PART 1- GENERAL

1.1 VERIFICATION OF DIMENSIONS

A. Before proceeding with any work, the hydroseeding landscape contractor shall carefully check and verify all dimensions and planting area conditions and shall immediately inform the Architect of any discrepancies between the Drawings and/or actual specifications and actual conditions. No work shall be done on any area where there are such discrepancies or where conditions are unsuitable for successful plant material establishment until approval for it has been given by the Architect.

B. Septic Drain Field Areas shall be seeded with compost blanket per Section 32 92 19.13 Seeding w/ Compost Blanket Installation and Maintenance.

1.2 QUALITY OF WORK

A. The hydroseeding work shall be performed by a competently trained individual or hydroseeding company subject to approval by Architect, and will be in accordance with the best standards and practices related to the trade and under the continuous supervision of a competent foreman capable of interpreting the plans and specifications.

1.3 INSPECTION OF CONDITIONS

A. The Contractor shall examine related work including irrigation and grading surfaces before proceeding with any work and inform Architect in writing on conditions, which may prevent the proper execution of this work. Commencement of work shall be construed that work in place is acceptable.

PART 2 - PRODUCTS

2.1 HYDROSEEDING COMPONENTS AND ADDITIVES

A. 1,500 lbs. per acre cellulose fiber mulch.

B. 900 lbs. per acre 10-10-10 commercial fertilizer.

C. Lime: Add lime at the rate of 800 lbs./acre.

2.2 SEED MIXES

A. See Plan For Seed Mix Specified

1. General Seeding

General Seeding areas to include one of the following seasonally dependent seed mixes:

a. Certified Common Bermuda Seed
Seeding Rate: 3 lbs. per 1000 SF
(May 15-August 1)

b. Tall Fescue / Korean Lespedeza/Annual Rye Mix
20% Unhulled Lespedeza w/ innoculant
Seeding Rate: 35 lbs per acre
30% Annual Rye
Seeding Rate: 50 lbs per acre
60% Tall Fescue “Rebel II”
Seeding Rate: 200 lbs per acre
(October 15-December 1)

c. Rebel II Tall Fescue
Seeding Rate: 350 lbs. per acre
(August 15 –Oct. 1)

2. Wildflower
Mix by Applewood Seed Company (303) 431-7333
Seeding Rate: 1 lb. /1000 SF
50% Cosmos sulphureus
50% Cosmos bipinnatus
(seed 6 weeks before job opening)

3. Detention Basin Mix by:
Applewood Seed Company (303) 431-7333
Seeding Rate: 9-12 lbs./acre

2.3 DELIVERIES AND STORAGE

A. All materials shall be standard approved and first grade quality and shall be in prime condition when installed and accepted. If necessary, care shall be taken to store all hydroseeding materials in a cool, dry place. Any commercial process or packaging material shall be undisturbed and materials delivered to the site in their original unopened condition bearing the manufacturer's guaranteed analysis.

PART 3 - EXECUTION

3.1 SLOPE SCARIFICATION

A. Cut Slopes: All cut slopes shall be scarified or horizontally ripped to a depth of six (6) inches across the slope and spaces not more than twelve (12) inches apart on the slope. The area shall then be mechanically "drag raked" to obtain a smooth, even, surface before hydroseeding.

B. Fill Slopes: All fill slopes shall be sheep foot rolled and mechanically "drag raked" to a surface suitable for hydroseeding.

C. Flat Areas: Flat areas and along roadsides and easement where hydroseeding is to be utilized should be cultivated to a depth of six (6) inches and mechanically "drag raked" to obtain a surface suitable for hydroseeding.

3.2 HYDROMULCHING APPLICATION AND PLANTING SCHEDULE

A. The hydro mulching shall be applied in the form of a slurry consisting of organic soil amendments, commercial fertilizer and chemicals specified. When hydraulically sprayed onto the soil, the mulch shall form a blotter-like material evenly distributed throughout specified area.

3.3 PREPARATION OF HYDROSEEDING MIXTURE

A. The slurry shall be prepared at the site and its components shall be mixed to supply the rate of application as per specifications.

B. Spraying shall commence immediately when the tank is full and the slurry is mixed.

3.4 TIME LIMIT

A. The hydro mulching components are not to be left in the hydro mulch machine for more than two (2) hours. Any seeds left in the machine longer than two (2) hours shall be rejected and disposed of off site at the Contractor's expense.

3.5 PROTECTION

A. Special care is to be exercised by the Contractor to prevent any of the slurry from being sprayed onto any hardscape areas including concrete walks, fences, walls, buildings, etc. Any slurry sprayed onto these areas shall be cleaned off at the Contractor's expense.

3.6 HYDROMULCHING SCHEDULE

A. If needed because of dry soil conditions, the hydroseeded slope area shall be presoaked with water by the temporary irrigation system or water truck to a depth of three (3) inches 48 hours before the hydroseeding installation.

3.7 FERTILIZATION PROGRAM

A. The installing Contractor shall fertilize all areas seeded at 90 day intervals after installation with nitrogen applied at the rate of three (3) pounds per 1,000 square feet until final acceptance of Work.

3.8 WEEDING

A. Any concentrated development of weed growth appearing in the seed mix planting areas shall be eradicated.

3.9 MAINTENANCE OF LAWN AREAS

A. Maintenance of grass shall consist of fertilizing, watering, weeding, cutting and reseeding as necessary to establish a uniform stand of grass. Maintenance shall continue until acceptance of the Work.

3.10 PROTECTION OF LAWN AREAS

A. All lawn areas shall be protected until acceptance. Repair or replace eroded and damaged areas regardless of cause. Reseed areas as required to produce uniform grass cover.

3.11 FINAL INSPECTION AND ACCEPTANCE

A. When the lawns have been established with a uniform cover of grass, as defined by no more than one (1) 1/2" x 1/2" open area every 150 sq. ft., and no visible ruts from drainage, a final inspection of the Work will be made by the Architect.

B. If the Work is found to be satisfactory and in accordance with all requirements of the Contract Documents, the Work will be accepted.

C. It shall be the sole responsibility of the contractor to schedule hydroseeding as required to establish a permanent, uniform cover of grass on all areas to receive hydroseeded turf.

D. The guarantee period will commence with the date of acceptance of the Work.

END OF SECTION

SECTION 32 92 23 - SODDING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section includes provisions of labor, materials and equipment to perform all sodding.

1.2 QUALITY ASSURANCE

A. Verification of Dimensions: Before proceeding with any work, the Contractor shall carefully check and verify all dimensions and planting area conditions and shall immediately inform the Landscape Architect of any discrepancies between the drawings and/or specifications and actual conditions. No work shall be done on any area where there are such discrepancies or where conditions are unsuitable for successful plant material establishment until the Landscape Architect has given approval for it.

B. The sodding work shall be performed by a competently trained individual or sodding company in accordance with the best standards and practices related to the trade and under the continuous supervision of a competent foreman capable of interpreting the plans and specifications.

1.3 GUARANTEE

A. The guarantee period for all sodded lawn areas shall begin at the date of final acceptance by the Landscape Architect.

B. All sod shall be guaranteed by the Contractor for a period of one (1) year beginning at date of final acceptance of the Work in total, provided that the Owner has either contracted with the Contractor for such maintenance or that the Owner has followed the prescribed maintenance procedures and that no such replacements are necessitated by neglect or abuse by the Owner.

1.4 JOB CONDITIONS

A. Protect adjacent work during sodding operations.

B. Keep areas clean of trash and debris resulting from sodding operations.

PART 2 – MATERIALS

2.1 FERTILIZER

A. See fertilization analysis, rate and frequency recommendations for existing soils prepared by specified testing facility.

2.2 SOD

A. *See Plan for Sod Type*

2.3 LIMESTONE

A. Dolomitic lime.

PART 3 – EXECUTION

3.1 INSPECTION

A. Examine related work including irrigation and grading surfaces before proceeding with sodding work and inform Landscape Architect in writing of conditions which may prevent the proper execution of this Work. Failure to report unsuitable conditions to the Landscape Architect will constitute acceptance of conditions to perform sodding and no claims will be allowed for additional cost to the Owner.

3.2 SOIL PREPARATION

A. Remove all existing vegetation and dispose of off site.

B. Rake or "drag" to produce a smooth, even surface, which is free of stones, limbs, clods and debris.

C. Correct all inequalities and soft spots before sod is laid.

D. Add dolomitic limestone to area to receive sod (per rate recommended in soils analysis) to (2) days prior to sodding.

3.3 SODDING

A. Transplant (install) sod within 48 hours after harvesting.

B. Lay sod on a smooth, even surface conforming to finish grade requirements. Thoroughly water area to be sodded.

C. Lay sod perpendicular to the direction of slope and in a manner, which will permit joints to alternate.

D. Fit sod pieces together tightly so that no joint is visible.

E. After sodding is complete and has been approved, roll sod as necessary to achieve a smooth, even surface.

F. Soak soil using fine spray nozzles to a minimum depth of 4" immediately after sodding. Keep all surfaces continuously moist for 30 calendar days after sod has been laid.

3.4 FERTILIZATION

A. The Contractor shall fertilize all areas sodded at 90-day intervals after installation with nitrogen to insure dark green vigorous growth until final acceptance.

3.5 WEEDING

A. Any concentrated development of weed growth appearing in the sodded lawn areas shall be eradicated.

3.6 MAINTENANCE OF LAWN AREAS

A. Maintenance of grass areas shall consist of watering, weeding, cutting and re-sodding as necessary to establish a uniform stand of grass. Maintenance shall continue until acceptance of the Work.

3.7 PROTECTION OF LAWN AREAS

A. All lawn areas shall be protected until final acceptance. Repair or replace all eroded and damaged areas regardless of cause. Re-sod areas as required to produce uniform grass cover.

3.8 FINAL ACCEPTANCE

A. When the lawns have been established with a uniform cover of grass, as defined by no more than one (1) 1/2" x 1/2" open area in 200 sq. ft., a final inspection of the Work will be made by the Landscape Architect and Owner.

B. If the Work is found to be satisfactory and in accordance with all requirements of the Contract Documents, the Work will be accepted.

B. The guarantee period will commence with the date of acceptance of the Work.

END OF SECTION

(NOT USED)