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TECHNICAL SPECIFICATIONS

S P E C

FOR

BLACKBURN PARK PARKING LOT IMPROVEMENTS

PROJECT MANUAL:

CITY OF BROOKHAVEN, GEORGIA

BID #20-103

PREPARED BY:

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TECHNICAL PROVISIONS

DIVISION 0 - BIDDING/CONTRACT REQUIREMENTS

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SECTION 01010

SUPPLEMENTAL CONDITIONS

1.1 General: These Conditions are a Supplemental Conditions to the General Conditions of the Contract for Construction

1.2 Drawings and Specifications: See Cover Sheet of Drawings for list of Contract Drawings.

See Table of Contents of Project Specifications for list of Technical Specification Sections. Pay particular attention to Division 1 of the Specifications as they apply to the General Conditions.

1.3 Temporary Equipment: See Section 01600 Materials and Equipment for more detail.

1.4 Lifting Devices and Hoisting Facilities: The Contractor shall provide, operate and maintain construction cranes for hoisting materials, as well as other type hoists, as may be required for execution of the work of all trades as identified in the contract documents and specifications. Such apparatus, equipment and construction shall meet the requirements of labor laws and other applicable state and federal laws.

1.5 Temporary Support Facilities: See Section 01500 Construction Facilities.

1.6 Layout of Site Work: See Section 01050 Field Engineering for general descriptions.

Specific Requirements:
Before commencing any work, the Contractor shall verify all grades, lines, levels and dimensions as indicated on the Drawings. He shall report any errors or inconsistencies to the Landscape Architect before commencing work.

The Contractor shall stake the entire project, both as to location of all construction items as well as finish grades. This stakeout may be accurate or rough, depending on the Contractor's preference. This stakeout shall be made early in the construction process and preserved for reference during construction.

The purpose of the staking, with inspection and adjustment by the Landscape Architect, is to adapt the design to the site rather than allow the design to be forced upon the site. Staking is subject to various degrees of adaptation which can only be determined by the Landscape Architect. This variation is an aesthetic decision, the amount of adjustment most often determined by the existing trees, terrain, soil conditions, utilities, sub-surface water and by other intangibles which are impractical to survey in absolute accuracy.

The Contractor shall notify the Landscape Architect at least five working days before inspection of the stakeout must be made. During the inspection the Landscape Architect will adjust the stakeout as necessary to fit the trees, topography, and all other objects and conditions on the site. At this time the Landscape Architect will clearly mark all trees and

other vegetation to be removed. This staking-inspection process must take place prior to any tree removal, grading, construction, or any other work on the site.

During the inspection, the Contractor shall be at the site along with the person who will superintend the work under this contract.

The staking inspection process shall be repeated for any work not staked and approved or adjusted during the first site visit. No work shall ever be done without the stakeout first being adjusted and approved by the Landscape Architect. All alignment, dimensions and elevation of any grading, excavation, construction, and planting is subject to adjustment to accommodate existing conditions and to save trees and other vegetation.

Any work progress delays caused by inadequate, incomplete or improper staking shall not merit an extension of the contract or delay charges by the contractor.

The Landscape Architect shall have 2 days to respond to any request to come to the site and adjust a stakeout.

The Landscape Architect shall have a minimum of three (3) days to resolve any problems created by unknown conditions discovered during the stakeout or construction.

Contractor shall be responsible to adequately schedule his work to allow constant work to continue. When unknown conditions inhibit the flow of work the contractor shall continue unhindered portions elsewhere on the project and notify the Landscape Architect immediately.

1.7 Unknown Conditions: Subsurface Conditions: Should the Contractor encounter, during the progress of the work, subsurface latent physical conditions at the site, materially differing from those shown on the drawings or specified for unknown conditions of an unusual nature differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the drawings and Specifications, the attention of the Landscape Architect shall be called immediately to such conditions before they are disturbed. The Landscape Architect shall thereupon promptly investigate the condition, and if he finds that they do so materially differ, the contract price shall, with the written approval of the Owner, be increased or decreased in accordance with such conditions.

1.8 Geo-Technical Assistance. The Contractor shall coordinate the involvement and schedule of the Geotechnical Consultant for the project.

The Owner will retain at his own expense the services of a qualified geo-technical engineer to advise on all construction techniques involved in the work, including the design, checking and approval of temporary bracing, shoring, underpinning and other items pertinent to the work, and on construction methods for solution of problems which may be encountered. The geo-technical engineer shall be primarily concerned with construction methods necessary to prevent settlement or failure of walkways, foundations and footings, and/or damage to such surrounding structures as sidewalks, roads, utilities, and embankments on the Owner's property.

1.9 Existing Utilities Shown. Existing utility lines shown on the drawings, such as, cables, ducts, conduits, and piping shall, if damaged (unless they are to be abandoned) be immediately repaired, protected, and maintained in use until relocation of same has been completed or shall be cut and capped where directed or shall be prepared for service connections when so required.

1.10 Utilities Not Shown. Contractor shall be responsible for securing the services of a utility locator to determine any unknown utilities that may be on the site. Any utilities encountered that are not shown on the drawings and are to remain as active utilities, if inadvertently damaged by the Contractor, shall be repaired by him. An adjustment in the contract price will be made at rates determined by the Contractor and approved by the Landscape Architect. If an extra expense is incurred in protecting and maintaining any utility line not shown on the drawings, an adjustment in the price will be made. Contractor shall not be compensated if the utility was improperly located or omitted by locator if it is deemed that the utility could have been detected.

1.11 Inclusion of Accessories: Unless specifically mentioned otherwise, all anchors, bolts, screws, fittings, fillers, hardware accessories, trim and other parts required for, or in connection with, an item of material to make a complete, serviceable, finished and first quality installation shall be furnished and installed as part of the item whether or not shown on the drawings or specified.

1.12 Protection: All materials shall be shipped, stored and handled in a manner that will afford protection and insure their being in first class condition at the time they are incorporated in the work.

After installation all materials shall be properly protected against damage to insure their being in first class condition when the project as a whole is completed and accepted by the Owner.

1.13 Installation: All items shall be installed in a workmanlike manner in accordance with the best recognized practice of the trade. Manufactured items shall be installed in strict accordance with the manufacturer's printed directions, specifications and/or recommendations. All working parts shall be properly adjusted after installation and left in perfect working order. Unless otherwise indicated, items exposed to weather or subject to flooding shall be installed so as to shed water. Items shall in all cases be installed plumb and true and/or in proper relation to surrounding materials.

Samples: Contractor shall be responsible for preparing samples as required in the technical specifications and to obtain approvals prior to construction of the item.

1.14 Reference to Standard Specifications: When standard specifications such as The American Society for Testing and Materials, Federal Specifications, Department of Commerce (Commercial Standards), American Institute of Steel Construction, or other well-known public or trade associates are cited as a standard to govern materials, and/or workmanship, such specifications or portions thereof as referred to shall be equally as binding and have the

full force and effect as though it were copied into these specifications. Such standard as are mentioned are generally recognized by and available to the trades concerned.

1.15 Reference to Manufacture's Publications: Unless otherwise specifically stated, all manufacturer's catalogs, specifications, instructions or other information or literature that are referred to in the specifications shall be considered as the latest edition and/or revision of such publication that is in effect on the date of the Invitation or Advertisement for Bids.

1.16 Document Signatures: See General Conditions.

1.17. Materials Furnished by Others: Whenever the Contractor or any Subcontractor shall receive items from another contractor or from the Owner for storage, erection or installation, the Contractor or Subcontractor receiving such items shall give receipts for items delivered, and any necessary replacing of item or items received. No adjustment will be made to contract price for increased insurance premiums, except for materials and/or equipment furnished by the Owner and not listed as such in other Contract Documents.

1.18. Substitute Materials and Equipment: See Section 01631 Substitutions for more detail.

Approval, by the Landscape Architect, of substitute materials and equipment shall not relieve the Contractor from his responsibility to supply and install any additional materials, equipment, or labor required to make the substitution properly function within the intent of the Contract Documents, as issued for Bid, whether or not recognized by the Landscape Architect or Contractor. The Contractor shall supply and install such required additional cost to the Owner.

1.19. Protection of Existing Structures: The Contractor shall be liable for all damage to existing structures that occurs as a result of his negligence to provide proper and adequate protective measures, including but not limited to buildings, walls, fences, paving, conduits, furniture, pipe, wiring, drains, underground utilities and equipment.

The Contractor shall be liable for all damage to trees, shrubs, turf and other vegetation. See Tree Penalty Clause in Section 02110, page 2.

1.20. Security Considerations: Construction shall not interfere with reasonable access to the adjacent structures.

Contractor shall not interfere with reasonable use of the site facilities.

1.21. Working Hours: See General Conditions.

1.22. Order of Construction: Contractor shall submit a progress schedule at the pre-construction conference outlining the order of his construction process - Priorities within this schedule shall be coordinated with the Owner. See Section 01040 Coordination for more detail.

Sequence of Work. Work is to be processed in an orderly manner. The organization of the Specifications or contract drawings does not necessarily indicate the order of sequence in

which work is to be performed. If prior construction or other contracts on the contract site shall interfere with this work, the Landscape Architect shall declare the time and date when this contract can be started on the site.

Contractor shall not be granted extensions or delay charges when it is deemed clearly that Contractor could have continued work on other components of the project or locations on the site.

1.23. Record of Construction Changes and As-Built Documents: On completion of the work, the Contractor shall mark the appropriate contract drawings in indelible ink showing the final locations of all underground installations including, but not limited to, power lines, irrigation lines, sewage lines, drainage lines, septic tanks, fuel tanks, etc. They also shall record the proper location of all installations above ground where they have been changed on the site from designated locations on the plans.

Contractor shall provide a flash drive containing the as-built plans to the Owner upon completion of the project.

1.24. Guarantee: See Section 017040 Warranties for more detail descriptions. All landscape materials shall be guaranteed by the Contractor in accordance with Section 02900.

1.25. Application for Payment: See Section 01027 Application of Payment for detail instructions.

1.26. Certificates for Payment: Upon receipt of Application for Payment, Owner's Representative with the Landscape Architect shall make an inspection and issue to the Contractor a Certificate for Payment or state in writing to the Contractor a Certificate for Payment or state in writing to the Contractor the corrections which must be made according to the plans and Specifications before he shall be paid. These corrections shall be made at once, and the Owner's representative shall issue a Certificate for Payment on their acceptance. The Owner shall pay the full amount of the Certificate within fifteen (15) days after receiving the Certificate for Payment from the Owner's Representative.

1.27. Quantities and Measurements:
The following principles shall govern the settlement of disputes which may arise over discrepancies in the contract documents: (a) as between figures given on drawings and the scaled measurements, the scaled measurements shall govern; (b) as between large-scale drawings and small-scale drawings, the larger scale shall govern; (c) as between drawings Form of Agreement and the Specifications, requirements of the Form of Agreement shall govern.

1.28. Maintenance: The Contractor shall be responsible for all maintenance, as required, until completion and acceptance of the work. Various items of maintenance are indicated in applicable sections of the Technical Specifications, to which the Contractor is referred. The Owner shall become responsible for maintenance upon completion and final acceptance of the work.

END OF SUPPLEMENTAL CONDITIONS

SECTION 01026

SCHEDULE OF VALUES

PART 1 GENERAL

1 SCOPE

The work under this Section includes preparation and submittal of a Schedule of Values.

The Construction Items Bid Schedule may substitute for the Schedule of Values when the project is bid by using a Construction Items Bid Schedule. It that case, Construction Items Bid Schedule can be substituted for Schedule of Values in this Section of the Specifications.

See Section 00-350 Construction Items Bid Schedule
See Section 01027 Application for Payment for more detail.

2 GENERAL

A. Timing of Submittal: Submit to the Landscape Architect, a Schedule of Values allocated to the various portions of the work, within 10 days after Notice to Proceed. The first progress payment will not be made until the next pay cycle following the Landscape Architect's approval of the Contractor's Schedule of Values.

B. Supporting Data: Upon request of the Engineer, support the values with data which will substantiate their correctness.

C. Use of Schedule: The schedule of values, unless objected to by the Landscape Architect, shall be used only as a basis of the Contractor's Application for Payment.

D. Construction Items Bid Schedule may serve as the Schedule of Values.

E. Construction Items Bid Schedule form is available through the Consultant in Excel electronic format upon request.

3 FORM AND CONTENT OF SCHEDULE OF VALUES

A. Form and Identification
   1. Prepare schedule of values on 8-1/2 x 11-inch paper in landscape format.
   2. Contractor's standard forms and automated printout may be used.
   3. Identify schedule with:
      a. Title of project and location
      b. Landscape Architect
      c. Name and address of Contractor
      d. Contract designation

c. Date of submission

B. Schedule shall list the installed value of the component parts of the Work in sufficient detail to serve as a basis for computing values for progress payments during construction. Breakdown shall be by number and construction items, for ease of field verification of quantities completed in each line item.

See Section 01027 Applications for Payment for more detail.

C. Format
1. Follow the Construction Items Bid Schedule of the Contract Documents as the format for listing the component items quantities and costs.
2. Identify each item with the number and name of the respective item of the Schedule.

D. For each major line item, list sub-values of major products or operations under the items as shown on the Construction Items Bid Schedule and Bid Form.

E. For the Various Portions of the Work:
1. Each construction item shall exclude any proportional amount of the Contractor's overhead and profit.
2. For items on which progress payments will be requested for stored materials, break down the value into:
   a. The cost of the materials delivered and stored, with taxes paid.
   b. The total installed value, less Contractor's overhead and profit and less item a. above.
   c. Copies of the delivery manifest.

F. In the case where the Construction Items Bid Schedule is used to bid the project, the sum of all the values listed on the Construction Items Bid Schedule plus all addenda shall equal the Bid Total or Contract Amount as shown on the Bid Form.

END OF SECTION 01026

SECTION 01027

APPLICATIONS FOR PAYMENT

1.1 GENERAL

A. Coordinate the Construction Items Bid Schedule and Applications for Payment with the Contractor's Schedule of Payment, Submittal Schedule, and List of Subcontracts.

B. Coordinate preparation of the Construction Items Bid Schedule with preparation of the Contractor's Project Construction Schedule of Work.

1. Correlate line items in the Construction Items Bid Schedule with other required administrative schedules and forms, including:

a. Contractor's Project Construction Schedule.
b. Application for Payment forms, including Continuation Sheets.
c. List of subcontractors and consultants.
d. List of products.
e. List of principal suppliers and fabricators.
f. Schedule of submittals.
g. Schedule of materials stored

2. Submit the Project Construction Timeline Schedule at the earliest possible date but no later than 7 days before the date scheduled for submittal of the first Application for Payment.

C. Format and Content: Use the Construction Items Bid Schedule as the format for establishing the Schedule of Payment. Provide at least one-line item for each Unit Item on the Construction Items Bid Schedule as a payment item.

1. Include the following Project Identification ***Blackburn Park Parking Lot Improvements - City of Brookhaven –***

a. Project name and location – *Blackburn Park Parking Lot Improvements*
b. Name of Architect – *Clark Patterson Lee Inc.*
c. Project number.
d. Contractor's name and address.
e. Date of submittal.

2. Arrange the Schedule of Payments in tabular form with separate columns to indicate the following for each item listed:

a. Item number.
b. Name of the item.
c. Total quantity of the item.

d. Unit price.
e. Total price.
f. Current work completed by dollar value.
g. Previous dollar amount completed.
h. Percentage of Item Sum completed to nearest one-hundredth percent.

3. Provide separate backup for each part of the Work where Applications for Payment include materials or equipment, purchased or fabricated and materials stored, but not yet installed.

4. Change Orders or Construction Change Directives that change the Contract Sum must be pre-approved before commencing the work or applying for payment. Pre-approved change orders may be attached to the application for payment as a new items line at the bottom of the Payment Schedule after completion and acceptance of the work.

5. Maintain a cronological on-going Ledger List of deletions or additions to the contract to be attached to each payment request.

6. Consultant can provide a sample Pay Request if requested by contractor.

D. Applications for Payment shall be consistent with previous applications and payments as certified by the Owner's Representative and paid to date by the Owner.

E. Payment-Application Times: Payment dates are indicated in the Agreement. The period covered by each application is the period indicated in the Agreement.

F. Payment-Application Forms: Use AIA Document G702 and Continuation Sheets G703 as the form for Applications for Payment, or the form supplied by the Owner.

G. Application Preparation: Complete every entry, including notarization and execution by a person authorized to sign on behalf of the Contractor. The Landscape Architect will return incomplete applications without action.

1. Entries shall match data on the Schedule of Payment and the Contractor's Construction Items Bid Schedule. Use updated schedules if revisions were made.
2. Include amounts of Change Orders and Construction Change Directives approved prior to the last day of the construction period covered by the application.

H. Transmittal: Submit 3 executed original copies of each Application for Payment to the Owner's Representative within 24 hours. One copy shall be complete, including waivers of lien and similar attachments.

1. Transmit each copy with a transmittal listing attachments and recording appropriate information related to the application.

I. Waivers of Mechanics Lien: With each Application for Payment, submit waivers of lien from every entity who may file a lien arising out of the contract and related to the work covered by the payment.

1. Submit partial waivers on each item for the amount requested, prior to deduction for retainage, on each item.
2. When an application shows completion of an item, submit final or full waivers.
3. Submit each Application for Payment with Contractor's waiver of lien for the period of construction covered by the application.
    a. Submit final Applications for Payment with final waivers from every entity involved with performance of the Work covered by the application who may file a lien.
4. Waiver Forms: Submit waivers of lien on forms, and executed in a manner, acceptable to the Owner.

J. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following:

Provisions of the contract regarding payment shall supersede any applicable provisions of the Georgia Prompt Payment Act.

1. List of subcontractors.
2. List of principal suppliers and fabricators.
3. Schedule of Payments.
4. Contractor's Construction Schedule (*preliminary if not final*).
5. Submittal Schedule (*preliminary if not final*).
6. List of Contractor's staff assignments.
7. Copies of necessary building permits.
8. Copies of required licenses from governing authorities.
9. Certificates of insurance and insurance policies.
10. Performance and payment bonds.
11. Traffic control plan if required

K. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

1. Administrative actions and submittals that shall precede or coincide with this application include the following:

    Provisions of the contract regarding payment shall supersede any applicable provisions of the Georgia Prompt Payment Act:

    a. Occupancy permits.
    b. Warranties and maintenance agreements.
    c. Test/adjust/balance records.

d. Maintenance instructions.
e. Meter readings.
f. Changeover information related to Owner's occupancy.
g. Final cleaning.
h. Application for reduction of retainage and consent of surety.
l. Final Payment Application: Administrative actions and submittals that must precede or coincide with submittal of the final Application for Payment include the following:

L. Retainage: Client shall retain 10% of all approved pay requests until substantial completion of the project. Retainage may drop to 5% until final inspection and acceptance with approval of the Owner.
1. Completion of Project closeout requirements.
2. Completion of items specified for completion after Substantial Completion.
3. Transmittal of Project construction records to the Owner.
4. Certified As-Built survey.
5. Proof that taxes, fees, and similar obligations were paid.
6. Removal of temporary facilities and services.
7. Change of door locks to Owner's access.
8. Fulfillment of all erosion control measures.

M. Final Ledger: Contractor shall request payment for 100% of all construction items as shown on the Construction Schedule and Payment Request. The final tabulation of the ledger will be either a subtraction from the total contract or an addition. In the case of subtractions, the contractor shall enter the total deleted at the bottom of the request. In the case of an addition, the Landscape Architect shall prepare a final change order for approval by the Contractor and Owner.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION (Not Applicable)

END OF SECTION 01027

SECTION 01035

MODIFICATION PROCEDURES

1.1 GENERAL

A. Minor Changes in the Work: The Landscape Architect will issue instructions authorizing changes in the Work that do not alter the contract amount on AIA Form G710.

B. Owner-Initiated Change Order Proposal Requests: The Landscape Architect will issue a description of proposed changes in the Work that require adjustment to the Contract Sum or Time. The description may include supplemental or revised Drawings and Specifications.

1. Proposal requests are for information only (RFI). Do not consider them an instruction to stop work or to execute the proposed change.

2. Within 20 days of receipt of a Change Request, submit an estimate of costs necessary to execute the change for the Owner's review.
   a. Include an itemized list of products required and unit costs, with the total amount of purchases.
   b. Use unit costs from the Schedule of Values. If unit costs have to change, submit detail documentation to explain the need to change a unit price.
   c. Indicate taxes, delivery charges, equipment rental, and amounts of trade discounts.
   d. Indicate the effect the change will have on the Contract Time.

C. Contractor-Initiated Proposals: When unforeseen conditions require modifications, the Contractor may submit a request for a change to the Landscape Architect.

1. Describe the proposed change. Indicate reasons for the change and the effect of the change on the Contract Sum and Time.
2. Include an itemized list of products required and unit costs, with the total amount of purchases.
3. Indicate taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Additional work already included on the Schedule of Values shall be submitted at the same price as originally quoted unless otherwise agreed prior to submittal.

D. Proposal Request Form: Use AIA Document G709.

E. Allowance Adjustment: Base Change Order Proposals on the difference between the purchase amount and the allowance, multiplied by the measurement of work-in-place. Allow for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1. Include installation costs only where indicated as part of the allowance.

2. Prepare explanations and documentation to substantiate margins claimed.
3. Submit substantiation of a change in work claimed in the Change Orders related to unit-cost allowances and quantities.

F. Submit claims to increase costs due to a need to change an allowance, whether for purchase order amount or handling, labor, installation, overhead, and profit. Submit claims within 21 days of receipt of authorization to proceed. The Owner will reject claims submitted later than 21 days.

1. Do not include indirect expense in cost amount unless the Work has changed from that described in Contract Documents.
2. No change to indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

G. Construction Change Directive: When Owner and Contractor disagree on the terms of a Proposal Request, the Architect may issue a Construction Change Directive on AIA Form G714 instructing the Contractor to proceed with a change.

1. The Construction Change Directive contains a description of the change and designates the method to be followed to determine change in the Contract Sum or Time.

H. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completing the change, submit an itemized account and supporting data to substantiate Contract adjustments.

I. Change Order Procedures: Upon the Owner's approval of a Proposal Request, the Architect will issue a Change Order on AIA Form G701.

J. Contractor shall submit Requests for Information (RFI) whenever items or parts of the central documents are unclear or incorrect. Contractor shall maintain a list of Requests by number and date with responses from the Architect.

K. Unit Item Cost: When changes effect unit items for which costs have already been established, change request must utilize the agreed unit prices for additions or deletions.

L. Unit Item Cost Changes: Unit item costs previously accepted by the Owner may be subject to change if the contractor submits sufficient documentation to verify the need for such a change.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION (Not Applicable)

END OF SECTION 01035

SECTION 01040

COORDINATION

1.1 GENERAL

A. This Section includes requirements for coordinating construction operations including, but not necessarily limited to, the following:

1. Coordination drawings.
2. Administrative and supervisory personnel.
3. Coordinate with Project Landscape Architect/Engineer.
4. Clearing and protection.
5. Coordinating with Property Officer or Owner's Representative
6. Staking Layout and Utility Locations
7. Utilities connections and coordination with all utility providers.
8. Coordinate with adjacent tenants.
9. Coordinate with tenant associations and groups
10. Coordinate with Municipal, Regional, and National agencies to close streets and control traffic.
11. Coordination between various sub-contractors.
12. Coordination between other on-site contractors.
13. Coordination with other contractors engaged by the Client or utility.
14. Coordination of sleeves, pipe holes, and other items to assist subcontractors

B. See Section 01013 Sequencing Conditions

1.2 COORDINATION

A. Coordinate construction to assure efficient and orderly installation of each portion of the Work. Coordinate operations that depend on each other for proper installation, connection, and operation.

1. Schedule operations in a sequence required to obtain the best results where installation of one part depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to assure maximum accessibility for maintenance, service, and repair.
3. Make provisions to accommodate items scheduled for later installation.
4. Schedule operations with Parks Director to avoid interference with pre-scheduled operations by tenants.
5. Coordinate regularly with the tenant groups on site to insure cooperation and notification.
6. Coordinate with local law enforcement to execute a Traffic Control Plan.

B. Where necessary, prepare memoranda for distribution to each party involved, outlining procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.

1. Prepare similar memoranda for the Owner and separate contractors where coordination of their work is required.
2. Notify Owner when pre-scheduled operations may constitute a hardship for the contractor.
3. Prepare weekly reports during construction to be given to industrial park tenant

C. Administrative Procedures: Coordinate scheduling and timing of required procedures with other activities to avoid conflicts and assure orderly progress. Such activities include, but are not limited to, the following:

1. Preparation of schedules.
2. Delivery and processing of submittals.
3. Progress meetings.
4. Project closeout activities

D. Conservation: Coordinate construction to assure that operations are carried out with consideration for conservation of energy, water, and materials.

1. At the request of the Owner, salvage materials and equipment involved in performance of, but not incorporated in, the Work.
2. Deliver salvaged items to location to be specified by the owner.

E. Coordination Drawings: Prepare coordination drawings if needed for installation of products and materials fabricated by separate entities. Prepare coordination drawings where limited space necessitates maximum utilization of space for efficient installation of different components.

1. Show the relationship of components shown on separate shop drawings.
2. Indicate required installation sequences.
3. Comply with requirements contained in Section "Submittals."

F. Staff Names: On date of Pre-Construction meeting, submit a list of the Contractor's staff assignments, including the superintendent and other personnel assigned to the Project. Identify individuals and their responsibilities. List their addresses and telephone numbers.

1. Provide copy of list to the owner and Landscape Architect/Engineer.
2. Post copies in the Project meeting room, the temporary field office, and each necessary telephone number.
3. Contractor shall always maintain a list of site tenants and their contact information on site in the construction trailer .

G. Subcontractor Assistance:

It is the Contractor's duty to coordinate with his subcontractors in advance so that pipe holes, sleeves, inserts, etc., for subcontractors are installed as work progresses. This includes coordination with other independent Contractors working on related work.

1.3 **PRODUCTS** (Not Applicable)

1.4 EXECUTION

A. Inspection of Conditions: Require Installers of major components to inspect substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected. Provide photographs and daily reports of the inspected conditions.

B. Coordinate temporary enclosures with inspections and tests to minimize the need to uncover completed construction.

C. Clean and protect construction in progress and adjoining materials, during handling and installation. Apply protective covering to assure protection from damage.

D. Clean and maintain completed construction as necessary through the construction period. Adjust and lubricate operable components to assure operability without damaging effects.

E. Limiting Exposures: Supervise construction to assure that no part is subject to harmful, dangerous, or damaging exposure. Such exposures include, but are not limited to, the following:

1. Excessive static or dynamic loading.
2. Excessive internal or external pressures.
3. Excessively high or low temperatures.
4. Water exposure
5. Solvents and chemicals.
6. Abrasion.
7. Soiling, staining, and corrosion.
8. Combustion.

F. Tenant Delivery Schedules: Coordinate with the Property Officer and tenant organizations to schedule and accommodate delivery schedules to various tenants.

END OF SECTION 01040

SECTION 01045

CUTTING AND PATCHING

1.1 GENERAL

A. Cutting and Patching Proposal: Submit a proposal describing procedures in advance of the time cutting and patching will be performed. Request written approval by the Project Landscape Architect/Engineer to proceed. Include the following:

1. Describe extent of cutting and patching. Describe how action will be performed and indicate why it cannot be avoided.
2. Describe changes to existing construction. Include changes to structural elements, operating components, changes to the building's appearance and/or other significant visual elements.
3. List products to be used and firms that will perform work.
4. Indicate dates and completion timeline for cutting and patching to be performed.
5. Utilities: List utilities that will be disturbed or relocated and those that will be temporarily out-of-service. Indicate dates and timeline of service that will be disrupted.
6. Where cutting and patching involves adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with the original structure.
7. Approval to proceed does not waive the Project Landscape Architect/ Engineer's right to later require complete removal and replacement of unsatisfactory work.

B. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would affect their load-carrying capacity or load-deflection ratio.

1. Obtain written approval from the Project Engineer before cutting and patching the following structural elements:

    a. Foundation construction.
    b. Bearing and retaining walls.
    c. Asphalt roads and parking.
    d. Utility lines or storm pipes.
    e. Brickwork or sidewalks.
    f. Free standing walls of fences.

C. Operational Limitations: Do not cut and patch operating elements in a manner that would reduce their capacity to perform as intended. Do not cut and patch operating elements in a manner that would increase maintenance or decrease operational life or safety.

1. Obtain permission for operating utility provider before cutting a utility.

2. Advise the Property Officer and tenants of any utility shut down before work begins.

3. Obtain written approval from the Landscape Architect before cutting and patching the following operating elements or safety related systems:

   a. Primary operational systems and equipment.
   b. Fire protection systems.
   c. Electrical wiring systems.
   d. Public address system.
   e. Traffic control systems.
   f. Gas, water, phone, power, cable or other utility systems.

D. Visual Requirements: Do not cut and patch exposed construction in a manner that would, in the Project Landscape Architect's opinion, reduce the structure's aesthetic qualities. Do not cut and patch in a manner that would result in visual evidence of cutting and patching. Remove and replace any construction cut and patched that is deemed visually unsatisfactory by the Project Landscape Architect and Owner.

1. Retain the original Installer to cut and patch the exposed Work listed below. If it is impossible to engage the original Installer, engage a recognized experienced and specialized firm:
   a. Ornamental metal.
   b. Matched-veneer brickwork.
   c. Stucco and ornamental plaster.
   d. New Asphalt roads and parking

E. Existing Warranties: Replace, patch, and repair material and surfaces cut or damaged in such a manner as not to void warranties.

1.2 PRODUCTS

A. Use materials identical to existing materials. Use materials that visually match adjacent surfaces to the fullest extent possible if identical materials are unavailable. Use materials whose performance will equal that of existing materials.

1.3 EXECUTION

A. Examine surfaces to be cut and patched and conditions under which work is to be performed before cutting. If unsafe or unsatisfactory conditions are encountered, take corrective action:
   1. Before proceeding, meet with parties involved. Review areas of potential interference and conflict for the tenants of the parks. Coordinate procedures and resolve potential conflicts before proceeding:

B. Temporary Support: Provide temporary support of work to be cut.

C. Protection: Protect existing construction to prevent damage. Provide protection from adverse weather conditions for portions that might be exposed during cutting and patching operations.

D. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

E. Avoid cutting pipe, conduit, or ductwork serving the project site or business, but scheduled to be removed or relocated until provisions have been made to bypass them.

F. Performance: Employ skilled workmen. Proceed at the earliest feasible time and complete without delay:

1. Coordinate construction so as to install necessary components and/or perform construction (i.e. subsequent fitting and patching required to restore surfaces to their original condition).

G. Cutting: Cut using methods that will not damage elements retained or adjoining construction. Comply with the original Installer's recommendations:

1. Use hand or small power tools designed for sawing or grinding, (i.e. not hammering and chopping). Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. To avoid marring finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
3. Cut through concrete and masonry using a cutting machine, such as a Carborundum saw or a diamond-core drill.
4. Comply with requirements of applicable Division 2 Specification Sections where cutting and patching requires excavating and backfilling.
5. Where services are required to be removed, relocated, or abandoned, by-pass utility services before cutting. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

H. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances:

1. Inspect and test patched areas to demonstrate integrity of the installation.
2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Where removing walls or where partitions extend from one finished area into another, patch and repair ground and wall surfaces. Provide an even surface of uniform color and appearance. Remove ground and wall coverings and replace with new materials to achieve uniform color and appearance.

a. Where patching occurs in a smooth painted surface, extend final paint coat over entire surface containing the patch after the area has received primer and second coat.

4. Patch, repair, or rehang ceilings as necessary to provide an even-plane surface of uniform appearance.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar items. Clean piping, conduit, and similar features before applying paint or finishing materials. Restore damaged pipe covering to its original condition.

END OF SECTION 01045

SECTION 01050

FIELD ENGINEERING

1.1 GENERAL

A. This Section specifies requirements for field-engineering services including, but not limited to, the following:
   1. Land survey work to locate easement, utilities, and subterranean objects.
   2. Civil engineering services to assure positive drainage.
   3. Location of underground utilities.
   4. Geotechnical monitoring.
   5. Field adjustments to layout.
   6. Erosion Control measurements.
   7. Design/Build Services.

B. Submit a certificate certifying location and elevation of improvements.

C. Project Record Documents: Submit a record of Work performed and record copy of survey data collected in the field. TerraMark has already surveyed the entire site and it is available to the contractors in Cad format upon request.

D. Surveyor Qualifications: Engage a land surveyor registered in the state where the Project is located.

E. Geotechnical Data: When required, engage qualified Geotechnical Engineers familiar with the conditions of the site and approved by the Owner.

F. Professional Design Services: Secure design consultants and engineers licensed in the state and approved by the Owner.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION

A. Identification: The surveyor will identify existing control points and property line corner stakes. Boundaries are indicated on the existing survey by TerraMark.

B. Verify layout information, in relation to property survey and existing benchmarks, before proceeding to lay out the Work. Locate and protect existing benchmarks and control points. Preserve permanent reference points during construction.

   1. Do not change or relocate benchmarks or control points without written approval. Report destroyed reference points or requirements to relocate reference points because of changes in grades.

2. Replace destroyed Project control points. Base replacements on the original survey control points and property corner pins.

C. Field locate adjacent street right-of-way lines on the ground to use as reference during staking and construction.

D. Existing Utilities: The existence of underground utilities and construction is not guaranteed. Verify location of underground utilities and other construction before beginning site work or excavation.

1. Prior to construction, verify location and invert elevation at points of connection to storm sewers, and water-service piping, and underground utility boxes.

E. Work from lines and levels established by the property survey. Establish benchmarks and markers to set lines and levels at each story of construction and to locate each element. Calculate and measure required dimensions within indicated or recognized tolerances. Do not scale Drawings to determine dimensions.

1. Advise entities engaged in construction activities of marked lines and levels provided for their use.
2. As construction proceeds, check every element for line, level, and plumb.

F. Surveyor's Log: Maintain a surveyor's log of control and other survey work. Make this log available for reference.

1. Record deviations from lines and levels. Advise the Architect when deviations exceed tolerances. On Project Record Drawings, record deviations that are accepted and not corrected.
2. On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and site work.

G. Site Improvements: Locate and lay out site improvements, including pavements, stakes grading, fill and topsoil placement, conduit locations, utility slopes, and invert elevations.

I. Existing Utilities: Furnish information necessary to adjust, move, or relocate existing granite curbs, structures, utility poles, lines, services, or other appurtenances located in or affected by construction. Coordinate with local authorities and utility providers having jurisdiction.

J. Geotechnical Monitoring: Contractor shall coordinate the services of the Owner’s Geotechnical Engineer to take the soil borings necessary to verify the construction requirements for the following project elements are acceptable.

1. Sidewalk stabilization.
2. Curb stabilization.
3. Retaining wall foundations.

4. Road surfaces.

K. Subsurface Conditions: Contractor is responsible to correct all subsurface conditions necessary to insure the structural integrity of all elements of the project. Reference each section of the Technical Specifications for detailed execution requirements.

END OF SECTION 01050

SECTION 01095

REFERENCE STANDARDS AND DEFINITIONS

1.01 GENERAL

A. Definitions: Basic contract definitions are included in the Conditions of the Contract.

B. "Indicated" refers to graphic representations, notes, or schedules on the Construction Drawings; or to other paragraphs or schedules in the Specifications and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the user locate the reference. Location is not limited.

C. Where the word or words "as directed", "as required", "as approved", "as permitted" “as selected”, “as requested”, “as authorized”, or words of like effect are used ln the specifications or on the drawings, the Contractor shall understand that direction, requirement, approval or permission of the Landscape Architect is intended. Similar words "approved", "acceptable", "satisfactory", or words of like import mean approved by, acceptable to or satisfactory to the Landscape Architect.

D. "Approved": When used in conjunction with the Project Landscape Architect's action on the Contractor's submittals, applications, and requests, is limited to the Project Landscape Architect's duties and responsibilities as stated in the Conditions of the Contract.

E. "Regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the work.

F. "Furnish" means to supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install" describes operations at the project site including the actual unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide" means to furnish and install, complete and ready for the intended use.

I. "Installer" is the Contractor, or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, who performs a particular construction activity including installation, erection, application, or similar

operations. Installers are required to be experienced in the operations they are engaged to perform.

1. The term "experienced," when used with the term "installer," means being familiar with the special requirements indicated; and having complied with requirements of authorities having jurisdiction.

2. Using terms such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter."

J. "Project Site" is the space available to the Contractor for performing construction activities, either exclusively or in conjunction with others performing work as part of the project. The extent of the project site is shown on the Construction Drawings and may or may not be identical with the description of the land on which the project is to be built.

K. "Testing Agencies": A testing agency is an independent entity engaged to perform specific inspections or tests, either at the project site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

L. Specification Format: These Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 16-division format and "Master Format" numbering system.

1. Abbreviated Language: Language used in the Specifications is abbreviated. Words implied, but not stated, shall be interpolated as the sense requires. Singular words shall be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.
2. Streamlined language is generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor or by others when so noted.

a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

M. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

N. Publication Dates: Comply with the standards in effect as of the date of the Contract Documents.

O. Copies of Standards: Copies of applicable standards are not bound with the Contract Documents. Where copies of standards are needed to perform a required construction activity, the Contractor shall obtain copies directly from the publication source and make them available on request.

P. Abbreviations and Names: Where abbreviations and acronyms are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-generating organization, authorities having jurisdiction, or other entity applicable to the context of the text provision. Refer to Gale Research Inc.'s "Encyclopedia of Associations," which is available in most libraries.

Q. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the work.

R. Engineer, Architect, Landscape Architect, all indicate the design consultant responsible to the Owner for observing the construction of the project.

1.02 PRODUCTS (Not Applicable)

1.03 EXECUTION (Not Applicable)

END OF SECTION 01095

SECTION 01200

PROJECT MEETINGS

1.1 GENERAL

A. This Section specifies administrative and procedural requirements for project meetings, including, but not limited to, the following:

1. Preconstruction conferences.
2. Preinstallation conferences.
3. Progress meetings.
4. Weather Records and Calendar
5. Final punch list inspection

B. Preconstruction Conference: Schedule a preconstruction conference before starting construction. Review responsibilities and personnel assignments.

C. Attendees: Authorized representatives of the Owner, Landscape Architect, and their consultants; the Contractor and its superintendent; major subcontractors; and other concerned parties shall attend.

1. Participants shall be familiar with the Project and authorized to conclude matters relating to the Work.

D. Agenda: Discuss items that could affect progress, including the following:

1. Tentative construction schedule.
2. Critical work sequencing.
3. Submittal of Shop Drawings, Product Data, and Samples.
4. Use of the premises.
5. Weather conditions and schedule
6. Sequencing and Traffic Control

E. Preinstallation Conferences: Conduct a conference before each activity that requires coordination with other operations.

F. Attendees: The Installer and representatives of manufacturers and fabricators involved in or affected by the installation shall attend. Advise the Landscape Architect of scheduled meeting dates.

1. Review the progress of other operations and preparations for the activity under consideration at each preinstallation conference, including requirements for the following:

a. Compatibility problems and acceptability of substrates.

b. Time schedules and deliveries.
c. Manufacturer's recommendations.
d. Warranty requirements.
e. Inspecting and testing requirements.

2. Record significant discussions and agreements and disagreements, and the approved schedule. Promptly distribute the record of the meeting to everyone concerned, including the Owner and the Landscape Architect.

3. Do not proceed with the installation if the conference cannot be successfully concluded. Initiate actions necessary to resolve problems and reconvene the conference.

G. Progress Meetings: Conduct progress meetings at the Project Site at regular intervals as agreed in the contract. Notify the Owner and the Architect of scheduled dates. Coordinate meeting dates with preparation of the Payment Request.

H. Attendees: The Owner, Architect, and other entities concerned with current progress or involved in planning, coordination, or future activities shall be represented. Participants shall be authorized to conclude matters relating to the Work.

I. Agenda: Review and correct or approve minutes of the previous meeting. Review items of significance that could affect progress. Include topics for discussion appropriate to Project status.

1. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule. Determine how to expedite construction behind schedule; secure commitments from parties involved to do so. Discuss revisions required to insure subsequent activities will be completed within the Contract Time.

2. The schedule shall indicate the dates for the starting and completion of various stages of construction and shall be revised monthly as required by the conditions of the work.

3. Review the present and future needs of each entity present, including the following:
a. Time.
b. Sequences.
c. Status of submittals.
d. Deliveries and off-site fabrication problems.
e. Temporary facilities and services.
f. Quality and work standards.
g. Change Orders.
h. Daily reports and weather conditions

i. Onsite inspections and adjustments
j. Traffic control plan

3. Reporting: Distribute meeting minutes to each party present and to parties who should have been present. Include a summary of progress since the previous meeting and report.
4. Schedule Updating: Revise the Contractor's Construction Schedule after each meeting where revisions have been made. Issue the revised schedule concurrently with the report of each meeting.
6. Record Drawings: Contractor shall maintain a current and complete set of all Contract Documents on-site at all times.
7. Review 'Requests for Information' and resolve.
8. Review 'Change Orders' and resolve.
9. Review pay requests and schedule of payments.
10. Resolve on-site issues and adjustments.
11. Review weather reports and status of schedule and delays.

J. Daily Construction Reports: Contractor shall prepare a daily report recording events on the site. Submit duplicate copies to the Landscape Architect at weekly intervals. Include the following information:

1. Daily record showing work engaged, completed, and started
2. List of subcontractors at the site
2. High and low temperatures, general weather conditions.
3. Accidents and unusual events.
4. Stoppages, delays, shortages, and losses.
5. Meter readings and similar recordings.
6. Emergency procedures.
7. Orders and requests of governing authorities.
8. Services connected, disconnected.
9. Equipment or system tests and startups.
10. Substantial Completions authorized
11. Materials delivered or stored
12. Inspection or testing completed
13. Official visitors to the site

K. Construction Records: Contractor shall maintain the following reports and records for review at each Program Meeting. See Section 1300 submittals for more detail of each report.

1. As Built Field Set:
Set of plans kept inside for the purpose of updating and recording all changes and modifications. Update with red lines to record changes as they occur. S

2. Request for Information (RFI) Book:
Sequential record of all requests and their subsequent answers.

3. Change Orders:
   Sequential record of all accepted or pending change orders with backup data.

L. Documents and Samples at the Site:

In addition to instruments mentioned in this section, include copies of all Requests for Payment and correspondence between Landscape Architect and Contractor. Maintain all copies in orderly files in Contractor's job site office. Records shall be available for reference during all on-site project meetings.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION (Not Applicable)

END OF SECTION 01200

SECTION 01300

SUBMITTALS

1.1 GENERAL

A. Submittal Procedures: Coordinate submittal preparation with construction, fabrication, other submittals, and activities that require sequential operations. Transmit in advance of construction operations to avoid delay.

1. Coordinate submittals for related operations to avoid delay because of the need to review submittals concurrently for coordination. The Landscape Architect reserves the right to withhold action on a submittal requiring coordination until related submittals are received.
2. Processing: Allow 2 weeks for initial review. Allow more time if the Landscape Architect must delay processing to permit coordination. Allow 2 weeks for reprocessing.

    a. No extension of Contract Time will be authorized because of failure to transmit submittals sufficiently in advance of the Work to permit processing.

3. Submittal Preparation: Place a permanent label on each submittal for identification. Provide a 4- by 5-inch (100- by 125-mm) space on the label or beside title block to record review and approval markings and action taken. Include the following information on the label for processing and recording action taken.

    a. Project name.
    b. Date.
    c. Name and address of the Architect/Landscape Architect.
    d. Name and address of the Contractor.
    e. Name and address of the subcontractor.
    f. Name and address of the supplier.
    g. Name of the manufacturer.
    h. Number and title of appropriate Specification Section.
    i. Drawing number and detail references, as appropriate.

4. Submittal Transmittal: Package each submittal appropriately. Transmit with a transmittal form. The Architect will not accept submittals from sources other than the Contractor.

5. Transmittal Form: Use AIA Document G810. On the form, record requests for information and deviations from requirements. Include Contractor's certification that information complies with requirements.

B. Contractor's Construction Schedule: Prepare a horizontal bar-chart-type, contractor's construction schedule. Provide a separate time bar for each activity and a vertical line to identify the first working day of each week. Use the same breakdown of Work indicated in the "Schedule of Values." See Section 01026 Indicate estimated completion in 10 percent increments. As Work progresses, mark each bar to indicate actual completion.

1. Submit on date of Pre-Construction Meeting.
2. Prepare the schedule on stable transparency, or other reproducible media, of width to show data for the entire construction period.
3. Secure performance commitments from parties involved. Coordinate each element with other activities; include minor elements involved in the Work. Show each activity in proper sequence. Indicate sequences necessary for completion of related Work.
4. Coordinate with the Schedule of Payment, list of subcontracts, Submittal Schedule, payment requests, and other schedules.
5. Indicate completion in advance of Substantial Completion. Indicate Substantial Completion to allow time for the Architect's procedures necessary for certification of Substantial Completion.
6. Phasing: Show how phased completion affects the Work.
7. Work Stages: Indicate important stages for each portion of the Work.
8. Area Separations: Provide a separate time bar to identify each construction area for each portion of the Work. Indicate where each element must be sequenced with other activities.

C. Submittal Schedule: After developing the Contractor's Construction Schedule, prepare a schedule of submittals. Submit within 10 days of submittal of the Construction Schedule.

1. Coordinate with list of subcontracts, Schedule of Values, list of products, and the Contractor's Construction Schedule.
2. Prepare the schedule in chronological order. Provide the following information:

    a. Date for first submittal.
    b. Related Section number.
    c. Submittal category (Shop Drawings, Product Data, or Samples).
    d. Name of the subcontractor.
    e. Description of the Work covered.
    f. Date for the Architect's final approval.

3. Schedule Distribution: Distribute copies of the Contractor's Construction Schedule and the Submittal Schedule to the Architect, Owner, subcontractors, and parties required to comply with submittal dates. Post copies in the field office.

a. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their Work and are no longer involved in construction activities.
b. Updating: Revise the schedule after each meeting or activity where revisions have been made. Issue the updated schedule concurrently with the report of each meeting.

D. Daily Construction Reports: See Section 1200 for more detail

E. Shop Drawings: See Section 01340 for more detail about Shop Drawings. See Shop Drawings in respective Technical Sections as identified.

Do not use Shop Drawings without an appropriate final stamp indicating action taken.

F. Product Data: Collect Product Data into a single submittal for each element of construction. Mark each copy to show applicable choices and options. Where Product Data includes information on several products, mark copies to indicate applicable information.

1. Include the following information:

a. Manufacturer's printed recommendations.
b. Compliance with trade association standards.
c. Compliance with recognized testing agency standards.
d. Application of testing agency labels and seals.
e. Notation of dimensions verified by field measurement.
f. Notation of coordination requirements.

2. Preliminary Submittal: Submit a preliminary single copy of Product Data where selection of options is required.

3. Submittals: Submit 2 copies; submit 4 copies where required for maintenance manuals. The Landscape Architect will retain one and return the other marked with action taken.

a. Unless noncompliance with Contract Documents is observed, the submittal serves as the final submittal.

4. Distribution: Furnish copies to installers, subcontractors, suppliers, and others required for performance of construction activities. Show distribution on transmittal forms. Do not proceed with installation until a copy of Product Data is in the Installer's possession.

a. Do not use unmarked Product Data for construction.

G. Samples: Submit full-size Samples cured and finished as specified and identical with the material proposed. Mount Samples to facilitate review of qualities.

1. Include the following:

   a. Specification Section number and reference.
   b. Generic description of the Sample.
   c. Sample source.
   d. Product name or name of the manufacturer.
   e. Compliance with recognized standards.
   f. Availability and delivery time.

2. Submit Samples for review of size, kind, color, pattern, and texture, for a check of these characteristics, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed. Where variations are inherent in the material, submit at least 3 units that show limits of the variations.

   a. Refer to other Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar characteristics.
   b. Refer to other Sections for Samples to be incorporated in the Work. Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample submittals.
   c. Samples not incorporated into the Work, or designated as the Owner's property, are the Contractor's property and shall be removed from the site.

3. Preliminary Submittals: Submit a full set of choices where Samples are submitted for selection of color, pattern, texture, or similar characteristics from standard choices. The Architect will review and return submittals indicating selection and other action.

4. Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation, and similar characteristics, submit 3 sets. One set will be returned marked with the action taken. Maintain sets of Samples, at the Project Site, for quality comparison.

   a. Unless noncompliance with Contract Documents is observed, the submittal may serve as the final submittal.
   b. Sample sets may be used to obtain final acceptance of the construction associated with each set.

5. Distribution of Samples: Distribute additional sets to subcontractors, manufacturers, and others as required for performance of the Work. Show distribution on transmittal forms.

H. Quality Assurance Submittals: Submit quality-control submittals, including design data, certifications, manufacturer's instructions, and manufacturer's field reports required under other Sections of the Specifications.

1. Certifications: Where certification that a product or installation complies with specified requirements is required, submit a notarized certification from the manufacturer certifying compliance.

a. Signature: Certification shall be signed by an officer authorized to sign documents on behalf of the company.

I. Sample Panels:

1. Contractor shall construct sample panels in accordance with the Technical Specifications for review and approval by Landscape Architect.
2. Samples shall be prepared in advance of construction sequencing to allow time for modifications and approvals.
3. Contractor shall allow Landscape Architect five days to respond to a request to see a sample.
4. Full scale construction of any work requiring a pre-approved sample shall not begin until after Landscape Architect issues a statement of approval.

J. Architect's Action: Except for submittals for the record or information, where action and return are required, the Architect will review each submittal, mark to indicate action taken, and return. Compliance with specified characteristics is the Contractor's responsibility.

1. Action Stamp: The Architect will stamp each submittal with an action stamp. The Architect will mark the stamp appropriately to indicate the action taken.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION (Not Applicable)

END OF SECTION 01300

SECTION 01400

QUALITY CONTROL

1.1 GENERAL

A. Quality control services include inspections, tests, and related actions, including reports performed by Contractor, by independent agencies, and by governing authorities. They do not include contract enforcement activities performed by the Landscape Architect.

B. Contractor Responsibilities: Unless they are the responsibility of another entity, Contractor shall provide inspections and tests specified elsewhere and required by authorities having jurisdiction. Costs for these services shall be included in the Contract Sum.

1. Where inspections and tests are the Contractor's responsibility, the Contractor shall employ and pay a qualified independent testing agency to perform these services. Costs for these services are included in the Contract Sum.

2. Where inspections and tests are the Owner's responsibility, the Owner will employ and pay a qualified independent testing agency to perform those services.

3. Where inspections and tests are the Owner's responsibility, the Owner will engage the services of a qualified independent testing agency to perform those services. Payment will be made from the Inspection and Testing Allowance, as authorized by Change Orders.

    a. Where the Owner engages an agency to test or inspect part of the Work and the Contractor is required to engage an entity to test or inspect the same or related element, the Contractor shall not employ the entity engaged by the Owner, unless the Owner agrees in writing.

C. Retesting: The Contractor is responsible for retesting where results of inspections and tests prove unsatisfactory and indicate noncompliance with requirements.

1. The cost of retesting is the Contractor's responsibility where tests performed indicated noncompliance with requirements.

D. Auxiliary Services: Cooperate with agencies performing inspections and tests. Provide auxiliary services as requested. Notify the agency in advance of operations to permit assignment of personnel. Auxiliary services include the following:

1. Providing access to the Work.
2. Furnishing incidental labor and facilities to assist inspections and tests.
3. Taking adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples.

4. Providing facilities for storage and curing of test samples.
5. Delivering samples to testing laboratories.
6. Providing preliminary design mix proposed for use for materials mixes that require control by the testing agency.
7. Providing security and protection of samples and test equipment.

E. Duties of the Testing Agency: The testing agency shall cooperate with the Landscape Architect and the Contractor in performing its duties. The agency shall provide qualified personnel to perform inspections and tests.

1. The agency shall notify the Landscape Architect and the Contractor of irregularities or deficiencies observed in the Work during performance of its services.
2. The agency shall not release, revoke, alter, or enlarge requirements or approve or accept any portion of the Work.
3. The agency shall not perform duties of the Contractor.

F. Coordination: Coordinate activities to accommodate services with a minimum of delay. Avoid removing and replacing construction to accommodate inspections and tests.

1. The Contractor is responsible for scheduling inspections, tests, taking samples, and similar activities.

G. Submittals: The testing agency shall submit a certified written report, in duplicate, of each inspection and test to the Landscape Architect. If the Contractor is responsible for the service, submit a certified written report, in duplicate, of each inspection or test through the Contractor.

1. Submit additional copies of each report to the governing authority, when the authority so directs.

2. Report Data: Reports of each inspection, test, or similar service include, but are not limited to, the following:

a. Date of issue.
b. Project title and number.
c. Name, address, and telephone number of testing agency.
d. Dates and locations of samples and tests or inspections.
e. Names of individuals making the inspection or test.
f. Designation of the Work and test method.
g. Identification of product and Specification Section.
h. Complete inspection or test data.
i. Test results and an interpretation of test results.
j. Ambient conditions at the time of sample taking and testing.
k. Comments or professional opinion on whether inspected or tested Work complies with requirements.

l. Name and signature of laboratory inspector.
m. Recommendations on retesting.

H. Qualifications for Service Agencies: Engage inspection and testing service agencies that are prequalified as complying with the American Council of Independent Laboratories' "Recommended Requirements for Independent Laboratory Qualification" and that specialize in the types of inspections and tests to be performed.

1. Each agency shall be authorized by authorities having jurisdiction to operate in the state where the Project is located.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION

A. Repair and Protection: Upon completion of inspection, testing, and sample taking, repair damaged construction. Restore substrates and finishes. Comply with Division 1 Section "Cutting and Patching."

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

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for inspection and testing.

END OF SECTION 01400

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

1.1 GENERAL

A. Summary: This Section specifies construction facilities and temporary controls including temporary utilities, support facilities, and security and protection facilities.

B. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:

1. Building code requirements.
2. Health and safety regulations.
3. Utility company regulations.
4. Police, fire department, and rescue squad rules.
5. Environmental protection regulations.

C. Standards: Comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations," ANSI A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities."

1. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 "National Electric Code."

D. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

E. Temporary Utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility. Submit reports of tests, inspections, meter readings, and procedures performed on temporary utilities. At the earliest time, change over from use of temporary service to use of permanent service.

1.2 PRODUCTS

A. Materials: Provide new materials. If acceptable to the Architect, the Contractor may use undamaged, previously used materials in serviceable condition. Provide materials suitable for use intended.

1. Lumber and Plywood: Comply with Division 6 Section "Rough Carpentry." Provide UL-labeled, fire-treated lumber and plywood for temporary offices and

sheds. Provide exterior, Grade B-B high-density concrete form overlay plywood for signs. Provide 5/8-inch- (16-mm-) thick exterior plywood for other uses.

2. Roofing Materials: UL Class A standard-weight asphalt shingles or UL Class C mineral-surfaced roll roofing on roofs of temporary offices, shops, and sheds.
3. Paint: Comply with Division 9 Section "Painting."

    a. For exposed lumber and plywood, provide exterior-grade acrylic-latex emulsion over exterior primer.
    b. For sign panels and applying graphics, provide exterior-grade alkyd gloss enamel over exterior primer.
    c. For interior walls of temporary offices, provide 2 coats interior latex-flat wall paint.

4. Tarpaulins: Waterproof, fire-resistant, UL-labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures, provide translucent, nylon-reinforced, laminated polyethylene or polyvinyl chloride, fire-retardant tarpaulins.
5. Water: Potable water approved by local health authorities.
6. Open-Mesh Fencing: 0.120-inch- (3-mm-) thick, galvanized 2-inch (50-mm) chain link fabric fencing 6 feet (2 m) high with galvanized barbed-wire top strand and galvanized steel pipe posts, 1-1/2 inches (38 mm) I.D. for line posts and 2-1/2 inches (64 mm) I.D. for corner posts.

B. Equipment: Provide new equipment. If acceptable to the Architect, the Contractor may use undamaged, previously used equipment in serviceable condition. Provide equipment suitable for use intended.

1. Water Hoses: 3/4-inch (19-mm), heavy-duty, abrasion-resistant, flexible rubber hoses 100 feet (30 m) long. Provide adjustable shutoff nozzles at hose discharge.
2. Electrical Outlets: Properly configured, NEMA-polarized outlets. Provide outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.
3. Electrical Power Cords: Grounded extension cords. Use hard-service cords where exposed to abrasion and traffic.
4. Lamps and Light Fixtures: General service incandescent lamps. Provide guard cages or tempered-glass enclosures where exposed to breakage. Provide exterior fixtures where exposed to moisture.
5. Heating Units: Temporary heating units that have been tested and labeled by UL, FM, or another recognized trade association related to the type of fuel being consumed.
6. Fire Extinguishers: Hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for the exposures.

    a. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

1.3 EXECUTION

A. Installation, General: Use qualified personnel to install temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

1. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.
2. Conditions of Use: Keep temporary facilities clean and neat in appearance. Operate safely and efficiently. Relocate as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.

B. Temporary Utility Installation: Engage the local utility company to install temporary service or connect to existing service. Where company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with company recommendations.

1. Arrange with company and existing users for a time when service can be interrupted to make connections for temporary services.
2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
3. Obtain easements to bring temporary utilities to the site where the Owner's easements cannot be used for that purpose.
4. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Architect. Neither the Owner nor Architect will accept cost or use charges as a basis of claims for Change Orders.
5. Temporary Water Service: Install temporary water service and distribution piping of sizes and pressures adequate for construction. Maintain service until permanent water service is in use. Sterilize piping prior to use.
6. Temporary Electric Power: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics. Include meters, transformers, overload-protected disconnects, automatic ground-fault interrupters, and main distribution switch gear. Install service underground.

    a. Power Distribution: Install wiring overhead and rise vertically where least exposed to damage.
    b. Temporary Lighting: Provide temporary lighting with local switching to fulfill security requirements and illumination for construction operations and traffic conditions.

7. Temporary Heat: Provide temporary heat for curing or drying of completed installations or for protection of installed construction from adverse effects of low

temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations. Coordinate ventilation requirements to produce ambient condition required and minimize consumption of energy.

a. Heating Facilities: Except where the Owner authorizes use of the permanent system, provide vented, self-contained, LP-gas or fuel oil heaters with individual space thermostatic control. Use of gasoline-burning space heaters, open flame, or salamander heating units is prohibited.

8. Temporary Telephones: Provide telephone service for each personnel engaged in construction. Provide a separate line for each temporary office and first aid station on site. Provide a dedicated telephone line for a fax machine in the field office. At each telephone, post a list of important telephone numbers.
9. Sanitary Facilities: Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs. Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Provide covered waste containers.

a. Toilets: Install self-contained, single-occupant toilet units of the chemical, aerated recirculation, or combustion type. Provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted.

1) Provide separate facilities for male and female personnel.

b. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up. Dispose of drainage properly. Supply cleaning compounds.

1) Provide safety showers, eyewash fountains, and similar facilities for safety, and sanitation of personnel.

c. Drinking-Water Facilities: Provide containerized, tap-dispenser, bottled drinking-water units.

10. Sewers and Drainage: If sewers are available, provide temporary connections to remove effluent. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds, and similar facilities. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off-site in a lawful manner.

a. Filter out soil, construction debris, chemicals, and similar contaminants that might clog sewers or pollute waterways.

b. Connect temporary sewers to the municipal system, as directed by sewer department officials. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. Following heavy use, restore normal conditions promptly.
c. Provide earthen embankments and similar barriers in and around excavations and subgrade construction to prevent flooding by runoff of storm water from heavy rains.

C. Support Facilities Installation: Locate field offices, storage sheds, and other construction and support facilities for easy access and in coordination with the Owner. Maintain facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.

1. Provide incombustible construction for offices, shops, and sheds located within the construction area or within 30 feet (9 m) of building lines. Comply with requirements of NFPA 241.
2. Field Offices: Provide heated and air-conditioned, insulated, weather tight temporary offices of size to accommodate personnel at the Project Site. Provide offices on foundations adequate for normal loading. Provide units with lockable entrances, operable windows, and serviceable finishes. Keep the office clean and orderly for use for small progress meetings. Furnish and equip offices as follows:

a. Furnish field offices with a desk and chairs, a 4-drawer file cabinet, plan table, plan rack, and a 6-shelf bookcase. Equip with a water cooler and toilet complete with water closet, lavatory, and medicine cabinet unit with a mirror.

3. Storage and Fabrication Sheds: Install sheds equipped to accommodate materials and equipment involved. Sheds may be open shelters or fully enclosed spaces within the building.

4. Temporary Paving: Construct temporary paving for roads, storage areas, and parking where the same permanent facilities will be located. Comply with Division 2 Section "Hot-Mixed Asphalt Paving."

a. Coordinate temporary paving development with subgrade grading, compaction, installation and stabilization of subbase, and installation of base and finish courses of permanent paving.

1) Install temporary paving to minimize the need to rework the installations and to result in permanent roads and paved areas without damage or deterioration when occupied by the Owner.

b. Delay installation of the final course of permanent paving until immediately before Substantial Completion. Coordinate with weather conditions to avoid unsatisfactory results.

c. Extend temporary paving in and around the construction area as necessary to accommodate delivery and storage of materials, equipment usage, administration, and supervision.

5. Dewatering Facilities and Drains: For temporary drainage and dewatering operations not directly associated with construction, comply with dewatering requirements of applicable Division 2 Sections. Where feasible, utilize the same facilities. Maintain excavations and construction free of water.
6. Temporary Enclosures: Provide temporary enclosures for protection of construction from exposure, foul weather, other construction operations, and similar activities. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions.

    a. Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 25 sq. ft. (2.3 sq. m) or less with plywood or similar materials.
    b. Close openings through floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.

7. Temporary Lifts and Hoists: Provide facilities for hoisting materials and employees.
8. Temporary Elevator Use: Refer to Division 14 Sections for elevators.
9. Project Signs: Install project identification and other signs where indicated to inform the public and persons seeking entrance to the Project. Support on framing of preservative-treated wood or steel. Do not permit installation of unauthorized signs. Engage an experienced sign painter to apply graphics. Comply with details indicated.
10. Temporary Exterior Lighting: Install exterior yard and sign lights so signs are visible when Work is being performed.
11. Waste Collection and Disposal: Collect waste daily. Comply with requirements of NFPA 241. Enforce requirements strictly. Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material lawfully.

    a. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80° F (27° C).

12. Pest Control: Retain an exterminator or pest control company to perform extermination and control procedures at regular intervals so the Project will be free of pests at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.
13. Stairs: Provide temporary stairs where ladders are not adequate. Cover finished, permanent stairs with a protective covering of plywood or similar material so finishes will be undamaged at the time of acceptance.

D. Security and Protection Facilities Installation: Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion.

1. Temporary Fire Protection: Until permanent facilities supply fire-protection needs, install and maintain temporary fire-protection facilities of types needed to protect against controllable fire losses. Comply with NFPA 10 and NFPA 241.

    a. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell. Maintain unobstructed access to fire extinguishers.
    b. Store combustible materials in containers in fire-safe locations.
    c. Prohibit smoking in hazardous fire-exposure areas.
    d. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.

2. Permanent Fire Protection: At the earliest date, complete installation of the permanent fire-protection facility and place into operation and use. Instruct key personnel on use of facilities.

3. Barricades, Warning Signs, and Lights: Comply with code requirements for erection of barricades. Paint with appropriate colors, graphics, and warning signs. Where appropriate and needed, provide lighting, including flashing red or amber lights.

4. Enclosure Fence: Before excavation begins, install an enclosure fence with lockable entrance gates to enclose the entire site or the portion sufficient to accommodate construction.

    a. Provide open-mesh, chain link fencing with posts set in a compacted mixture of gravel and earth.

    b. Provide plywood fence, 8 feet (2.5 m) high, framed with four 2-by-4-inch (50-by-100-mm) rails, and preservative-treated wood posts spaced not more than 8 feet (2.5 m) apart.

5. Covered Walkway: Erect a protective covered walkway along the adjacent public street. Coordinate with entrance gates. Comply with regulations of authorities having jurisdiction.

    a. Construct walkways, if needed, using wood plank overhead decking, protective plywood enclosure walls, handrails, barricades, warning signs, lights, safe and well-drained walkways, and similar provisions for protection. Extend back wall beyond the structure to complete the enclosure fence. Paint and maintain in a manner acceptable to the Owner.

6. Security Enclosure and Lockup: Install temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, and theft. Provide a secure lockup where materials and equipment are of value and must be stored.
7. Environmental Protection: Operate temporary facilities and conduct construction in ways that comply with environmental regulations and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted. Avoid use of tools and equipment that produce harmful noise. Restrict use of noise-making equipment to hours that will minimize complaints.

E. Operation: Enforce discipline in use of temporary facilities. Limit availability to intended uses to minimize waste and abuse.

F. Maintenance: Maintain facilities in operating condition until removal. Protect from damage by freezing temperatures and similar elements. Maintain temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid damage.

G. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect during excavation.

H. Termination and Removal: Remove each temporary facility when the need has ended, when replaced by a permanent facility, or no later than Substantial Completion. Complete or restore permanent construction delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and temporary facilities are the Contractor's property. The Owner reserves the right to take possession of project identification signs.

2. Remove temporary paving. Where the area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil in the area. Remove materials contaminated with oil, asphalt and other petrochemical compounds, and substances that might impair growth of plant materials or lawns. Repair or replace paving, curbs, and sidewalks at the temporary entrances, as required by the governing authority.
3. At Substantial Completion, clean and renovate permanent facilities used during the construction period.

    a. Replace air filters and clean inside of ductwork and housings.
    b. Replace worn parts and parts subject to unusual operating conditions.
    c. Replace burned out lamps.

END OF SECTION 01500

SECTION 01600

MATERIALS AND EQUIPMENT

1.1 GENERAL

A. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock.

1. "Named Products" are items identified by the manufacturer's product name, including make or model number or designation, shown or listed in the manufacturer's published product literature.

B. "Materials" are products substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.

C. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.

D. Product List: A list of products required is included at the end of this Section. Prepare a schedule in tabular form showing each product listed. Include the manufacturer's name and proprietary product names for each item listed. Coordinate product list with the Contractor's Construction Schedule and Submittal Schedule.

1. Form: Prepare product list with information on each item tabulated under the following column headings:

a. Related Specification Section number.
b. Generic name used in Contract Documents.
c. Proprietary name, model number, and similar designations.
d. Manufacturer's name and address.
e. Supplier's name and address.
f. Installer's name and address.
g. Projected delivery date or time span of delivery period.

2. Within 60 days after date of commencement of the Work, submit 3 copies of the product list. Provide a written explanation for omissions of data and variations from Contract requirements.
3. The Architect will respond within 2 weeks of receipt of the list. No response within this period constitutes no objection to listed manufacturers or products but does not waive the requirement that products comply with Contract Documents. The Architect's response will include a list of unacceptable products.

E. Source Limitations: To the fullest extent possible, provide products of the same kind from a single source.

1. When the Contractor is given the option of selecting between 2 or more products for use on the Project, the product selected shall be compatible with products previously selected.

F. Nameplates: Except for required labels and operating data, do not attach manufacturer's nameplates or trademarks on surfaces exposed to view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on concealed surfaces or, where required for observation after installation, on accessible surfaces that are not conspicuous.
2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface that is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data:

a. Name of product and manufacturer.
b. Model and serial number.
c. Capacity.
d. Speed.
e. Ratings.

G. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.

1. Schedule delivery to minimize long-term storage and to prevent overcrowding construction spaces. Coordinate with installation to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
2. Deliver products in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
3. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
4. Store products to facilitate inspection and measurement of quantity or counting of units. Store heavy materials away from the structure in a manner that will not endanger the supporting construction.
5. Store products subject to damage by the elements aboveground, under cover in a weather tight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

1.2 PRODUCTS

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, new at the time of installation.

1. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and the intended use and effect.
2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.

B. Product Selection Procedures: Procedures governing product selection include the following:

1. Proprietary Specification Requirements: Where Specifications name only a single product or manufacturer, provide the product indicated. No substitutions will be permitted.

2. Semiproprietary Specification Requirements: Where Specifications name 2 or more products or manufacturers, provide 1 of the products indicated. No substitutions will be permitted.

    a. Where products are specified by name, accompanied by the term "or equal," comply with provisions concerning "substitutions" to obtain approval for use of an unnamed product.

3. Nonproprietary Specifications: When Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
4. Descriptive Specification Requirements: Where Specifications describe a product, listing characteristics required, with or without use of a brand name, provide a product that provides the characteristics and otherwise complies with requirements.
5. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply and are recommended for the application. Manufacturer's recommendations may be contained in product literature or by the manufacturer's certification of performance.
6. Compliance with Standards, Codes, and Regulations: Where Specifications only require compliance with an imposed code, standard, or regulation, select a product that complies with the standards, codes, or regulations specified.
7. Visual Matching: Where Specifications require matching a Sample, the Architect's decision on whether a product matches will be final. Where no

product in the specified category matches and complies with other requirements, comply with provisions concerning "substitutions" for selection of a matching product in another category.

8. Visual Selection: Where requirements include the phrase "... as selected from manufacturer's standard colors, patterns, textures ..." or a similar phrase, select a product that complies with other requirements. The Architect will select the color, pattern, and texture from the product line selected.

1.3 EXECUTION

A. Comply with manufacturer's instructions for installation of products. Anchor each product securely in place, accurately located and aligned with other Work. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION 01600

SECTION 01631

SUBSTITUTIONS

1.1 GENERAL

A. Substitutions: Changes in products, materials, equipment, and methods of construction required by the Contract Documents proposed after award of the Contract are considered requests for substitutions. The following are not a request for substitutions:

1. Substitutions requested during the bidding period and accepted by Addendum prior to award of the Contract.
2. Revisions to the Contract Documents requested by the Owner.
3. Specified options included in the Contract Documents.
4. Contractor's compliance with regulations issued by governing authorities.

B. Substitution Request Submittal: The Architect/Engineer or Client Representative will consider requests for substitution received within 60 days after commencement of the Work.

1. Submit 3 copies of each request for substitution. Submit requests according to procedures required for change-order proposals.
2. Identify the product or method to be replaced in each request. Include related Specification Section and Drawing numbers.
3. Provide documentation showing compliance with the requirements for substitutions and the following information:

    a. Coordination information, including a list of changes needed to other Work that will be necessary to accommodate the substitution.
    b. A comparison of the substitution with the Work specified, including performance, weight, size, durability, and visual effect.
    c. Product Data, including Drawings and descriptions of products and installation procedures.
    d. Samples, where applicable or requested.
    e. A statement indicating the effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the substitution on Contract Time.
    f. Cost information, including a proposal of the net change, if any in the Contract Sum.
    g. Certification that the substitution conforms to the Contract Documents and is appropriate for the applications indicated.
    h. The Contractor's waiver of rights to additional payment or time that may become necessary because of the failure of the substitution to perform adequately.

4. Architect's Action: If necessary, the Architect will request additional information within one week of receipt of a request for substitution. The Architect will notify the Contractor of acceptance or rejection within 2 weeks of receipt of the request. Acceptance will be in the form of a change order.

    a. Use the product specified if the Architect cannot make a decision within the time allocated.

1.2 PRODUCTS

A. Conditions: The Architect will receive and consider a request for substitution when one or more of the following conditions are satisfied. Otherwise, the Architect will return the requests without action except to record noncompliance with these requirements.

1. Extensive revisions to the Contract Documents are not required.
2. Changes are in keeping with the intent of the Contract Documents.
3. The specified product cannot be provided within the Contract Time. The Architect will not consider the request if the specified product cannot be provided as a result of failure to pursue the Work promptly.
4. The request is related to an "or-equal" clause.
5. The substitution offers the Owner a substantial advantage, in cost, time, or other considerations, after deducting compensation to the Architect for redesign and increased cost of other construction.
6. The specified product cannot receive approval by a governing authority, and the substitution can be approved.

B. The Contractor's submittal and the Architect's acceptance of Shop Drawings, Product Data, or Samples for construction not complying with the Contract Documents do not constitute an acceptable request for substitution, nor do they constitute approval.

1.3 EXECUTION (Not Applicable)

END OF SECTION 01631

SECTION 01700

CONTRACT CLOSEOUT

1.1 GENERAL

A. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions 2 through 16.

B. Substantial Completion: Before requesting inspection for certification of Substantial Completion, complete the following:

1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the Work claimed as substantially complete.

    a. Include supporting documentation for completion and an accounting of changes to the Contract Sum.

2. Advise the Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
4. Submit record drawings, maintenance manuals, final project photographs, damage or settlement surveys, property surveys, and similar final record information.
5. Deliver tools, spare parts, extra stock, and similar items.
6. Changeover locks and transmit keys to the Owner.
7. Complete startup testing of systems and instruction of operation and maintenance personnel. Remove temporary facilities, mockups, construction tools, and similar elements.
8. Complete final cleanup requirements, including touchup painting.
9. Touch up and repair and restore marred, exposed finishes.

C. Inspection Procedures: On receipt of a Request for Inspection, the Landscape Architect will proceed or advise the Contractor of unfilled requirements. The Landscape Architect will prepare the Certificate of Substantial Completion following inspection or prepare a Punch List to advise the Contractor of construction items that must be completed or corrected before the certificate will be issued.

1. The Landscape Architect will repeat inspection when requested and assured that the Work is substantially complete.
2. Results of the completed inspection will form the basis of requirements for final acceptance.

D. Final Acceptance: Before requesting inspection for certification of final acceptance and final payment, complete the following:

1. Final payment request with releases and supporting documentation. Include insurance certificates where required.
2. Submit a statement, accounting for changes to the Contract Sum.
3. Submit a copy of the final inspection list stating that each item has been completed or otherwise resolved for acceptance.
4. Submit final meter readings for utilities, a record of stored fuel, and similar data as of the date of Substantial Completion.
5. Submit consent of surety to final payment.
6. Submit a final settlement statement.
7. Submit evidence of continuing insurance coverage complying with insurance requirements.

E. Re-inspection Procedure: The Landscape Architect will re-inspect the Work upon receipt of notice that the Work has been completed, except for items whose completion is delayed under circumstances acceptable to the Architect.

1. Upon completion of re-inspection, the Landscape Architect will prepare a certificate of final acceptance. If the Work is incomplete, the Landscape Architect will advise the Contractor of Work that is incomplete or obligations that have not been fulfilled but are required in the form of a Punch List.
2. If necessary, re-inspection will be repeated.

F. Record Document Submittals: Do not use record documents for construction. Protect from loss in a secure location. Provide access to record documents for the Landscape Architect's reference.

G. Record Drawings: Maintain a set of prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark the drawing most capable of showing conditions fully and accurately. Give attention to concealed elements.

1. Mark sets with red pencil. Use other colors to distinguish between variations in separate categories of the Work.
2. Organize record drawing sheets into manageable sets. Bind with durable-paper cover sheets; print titles, dates, and other identification on the cover of each set.
3. Upon completion of the work, submit one reproducible copy of the Record Drawings to the Owner.

H. Record Specifications: Maintain one copy of the Project Manual, including addenda. Mark to show variations in Work performed in comparison with the text of the Specifications and modifications. Give attention to substitutions and selection of options and information on concealed construction. Note related record drawing information and Product Data.

1. Upon completion of the Work, submit record Specifications to the Landscape Architect for the Owner's records.

2. Submit complete copies of all testing data and shop drawings to the Owner.

I. Maintenance Manuals: Organize operation and maintenance data into sets of manageable size. Bind in individual, heavy-duty, 2-inch (51-mm), 3-ring, binders, with pocket folders for folded sheet information. Mark identification on front and spine of each binder. Include the following information:

1. Emergency instructions.
2. Spare parts list.
3. Copies of warranties.
4. Wiring diagrams.
5. Shop Drawings and Product Data.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION

A. Operation and Maintenance Instructions: Arrange for each Installer of equipment that requires maintenance to provide instruction in proper operation and maintenance. Include a detailed review of the following items:

1. Maintenance manuals.
2. Spare parts, tools, and materials.
3. Lubricants and fuels.
4. Identification systems.
5. Control sequences.
6. Hazards.
7. Warranties and bonds.
8. Maintenance agreements and similar continuing commitments.

B. As part of instruction for operating equipment, demonstrate the following:

1. Startup and shutdown.
2. Emergency operations and safety procedures.
3. Noise and vibration adjustments.

C. Final Cleaning: Employ experienced cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Complete the following operations before requesting inspection for certification of Substantial Completion.

1. Remove labels that are not permanent labels.
2. Clean transparent materials, including mirrors and glass. Remove glazing compounds. Replace chipped or broken glass.

3. Clean exposed finishes to a dust-free condition, free of stains, films, and foreign substances. Leave concrete floors broom clean. Vacuum carpeted surfaces.
4. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication. Clean plumbing fixtures. Clean light fixtures and lamps.
5. Clean the site of rubbish, litter, and foreign substances. Sweep paved areas; remove stains, spills, and foreign deposits. Rake grounds to a smooth, even- textured surface.

D. Pest Control: Engage a licensed exterminator to make a final inspection and rid the Project of rodents, insects, and other pests.

E. Removal of Protection: Remove temporary protection and facilities.

F. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Remove waste materials and dispose of lawfully.

END OF SECTION 01700

SECTION 01740

WARRANTIES

1.1 GENERAL

A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1. Refer to the General Conditions for terms of the Contractor's period for correction of the Work.
2. Refer to Section 02900 for plant material warranties.
3. All conditions of this Section shall also apply to warranties stated in other sections.

C. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

D. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.

E. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

F. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

G. Owner's Recourse: Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as

limitations on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.

1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
2. Where the Contract Documents require a special warranty, or similar commitment, the Owner reserves the right to refuse to accept the Work, until the Contractor presents evidence that entities required to countersign such commitments are willing to do so.

H. Submit written warranties to the Architect prior to the date certified for Substantial Completion. If the Architect's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion, submit written warranties upon request of the Architect.

1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Architect within 15 days of completion of that designated portion of the Work.

I. When the Contract Documents require the Contractor, or the Contractor and a subcontractor, supplier or manufacturer to execute a special warranty, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner, through the Architect, for approval prior to final execution.

1. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.

J. Bind warranties and bonds in heavy-duty, commercial-quality, durable 3-ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (115-by-280-mm) paper.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the Installer.
2. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project title or name, and name of the Contractor.
3. When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION

A. List of Warranties: As follows:
Irrigation, Planting, Fountain, Lighting, Electrical and any other products under warranty.

B. Schedule: Provide warranties on products and installations as specified in the following Sections: Division 2, Division 3, Division 4, Division 5, Division 6, Division 15, Division 16.

END OF SECTION 01740

CONTRACTOR WARRANTY FORM

PROJECT: CITY OF BROOKHAVEN – BLACKBURN PARK PARKING LOT IMPROVEMENTS

LOCATION: BROOKHAVEN, GEORGIA

OWNER: CITY OF BROOKHAVEN

GENERAL CONTRACTOR:

We _____, contractor
(Company Name)

for _____, as described in Specification Section (s)
(list trade)

_____ do hereby warrant
(list appropriate sections of specifications)

that all labor and materials furnished and work performed in conjunction with the above referenced project are in accordance with the Contract Documents and authorized modifications thereto, and will be free from defects due to defective materials or workmanship for a period of one year from Date of Substantial Completion and that all street signs will be free from defects due to defective materials or workmanship for a period of seven years from Date of Substantial Completion.

This warranty commences at 12:00 noon on _____

and expires at 12:00 noon on _____. Should any defect develop during the warranty period due to improper materials, workmanship or arrangement, the defect shall, upon written notice by the Owner, be repaired or replaced by the undersigned at no expense to the Owner.

Nothing in the above shall be deemed to apply to work which has been abused or neglected by the Owner.

DATE: _____ FOR: _____
(COMPANY NAME)

BY: _____

TITLE: _____

END OF SECTION 01740A

SUBCONTRACTOR WARRANTY FORM

PROJECT: CITY OF BROOKHAVEN – BLACKBURN PARK PARKING LOT IMPROVEMENTS

LOCATION: BROOKHAVEN, GEORGIA

OWNER: CITY OF BROOKHAVEN

SUBCCONTRACTOR:

We_____, subcontractor

(Company Name)

for_____, as described in Specification Section (s)

(list trade)

_____ do hereby warrant

(list appropriate sections of specifications)

that all labor and materials furnished and work performed in conjunction with the above referenced project are in accordance with the Contract Documents and authorized modifications thereto, and will be free from defects due to defective materials or workmanship for a period of one year from Date of Substantial Completion and that all street signs will be free from defects due to defective materials or workmanship for a period of seven years from Date of Substantial Completion.

This warranty commences at 12:00 noon on _____

_____ and expires at 12:00 noon on_____. Should by any defect develop during the warranty period due to improper materials, workmanship or arrangement, the defect shall, upon written notice by the Owner, be repaired or replaced by the undersigned at no expense to the Owner.

Nothing in the above shall be deemed to apply to work which has been abused or neglected by the Owner.

DATE: _____ FOR:_____

(COMPANY NAME)

BY: _____

TITLE: _____

END OF SECTION 01741

SECTION 015639

TREE CARE AND PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.

B. Related Sections.

1. Section 02060 "Site Demolition" for temporary site fencing.
2. Section 02100 "Site Preparation" Clearing" for removing existing trees and shrubs.
3. Appendix A; Blackburn Tree Conservation Instructions.

C. Caliper: Diameter of a trunk measured by a diameter tape at 48 inches above the ground for trees larger than 4-inch size.

D. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.

E. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line, unless otherwise indicated.

F. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.2 ACTION SUBMITTALS

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

B. Samples for Verification: For each type of the following:

1. Organic Mulch: 1-pint volume of organic mulch; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch.
2. Protection-Zone Fencing: Assembled Samples of manufacturer's standard size made from full-size components.
3. Protection-Zone Signage: Full-size Samples of each size and text, ready for installation.

C. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.

1. Species and size of tree. Large 50" Oak
2. Location on site plan. Along entrance road adjacent to playfield.
3. Reason for pruning. Preserve the life of the tree
4. Description of pruning to be performed. See Appendix A *Blackburn Tree Instructions*.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified arborist and tree service firm.

B. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

C. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.

D. Existing Conditions: Tree is currently in the edge of the entrance road of the park and its roots spread out under the existing asphalt. Pavement has been lifted by the root growth.

1. Contractor shall carefully document the existing conditions by photo or video.
2. Contractor must identify any existing wounds or damage to the tree or root system that is visible or discovered during the process.

1.4 QUALITY ASSURANCE

A. Arborist Qualifications. Licensed arborist in jurisdiction where Project is located.

B. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed prescriptive tree care and protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.

C. Pre-prescription Care Conference: Conduct conference at Project site with arborist and landscape architect.

1. Review methods and procedures related to prescriptive tree care and protection including, but not limited to, the following:

a. Construction schedule. Verify availability of materials, personnel, and equipment needed to make progress and avoid delays.
b. Enforcing requirements for protection zones.
c. Arborist's responsibilities.
d. Field quality control.

1.5 PROJECT CONDITIONS

A. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

B. Do not direct vehicle or equipment exhaust toward protection zones.

C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch..

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil: Natural or cultivated top layer of the soil profile or manufactured topsoil; containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and

other objects more than 1 inch in diameter; and free of weeds, roots, and toxic and other non-soil materials.

1. Obtain topsoil only from well-drained sites where topsoil is 4 inches deep or more; do not obtain from bogs or marshes.

B. Topsoil: Imported or manufactured topsoil complying with ASTM D 5268.

C. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:

1. Type: Wood and bark chips.
2. Size Range: 3 inches maximum, 1/2 inch minimum.
3. Color: Natural.

D. Protection-Zone Fencing: Fencing fixed in position and meeting the following requirements. Previously used materials may be used when approved by Architect.

1. Plastic Protection-Zone Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch maximum opening in pattern and weighing a minimum of 0.4 lb/ft.; remaining flexible from minus 60 to plus 200 deg F; inert to most chemicals and acids; minimum tensile yield strength of 2000 psi and ultimate tensile strength of 2680 psi; secured with plastic bands or galvanized-steel or stainless-steel wire ties; and supported by tubular or T-shape galvanized-steel posts spaced not more than 8 feet apart.

a. Height: 4 feet.
b. Color: High-visibility orange, nonfading.

2. Gates: Single or Double swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones; leaf width 36 inches.

E. Protection-Zone Signage: Shop-fabricated, rigid plastic or metal sheet with attachment holes pre-punched and reinforced; legibly printed with nonfading lettering and as follows:

1. Size and Text: As shown on Drawings.
2. Lettering: 3-inch-high minimum, black characters on white background.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

B. For the record, prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

3.2 PREPARATION.

A. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated. Flag each tree trunk at 27 inches above the ground.

B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

C. Tree-Protection Zones: Mulch areas inside tree-protection zones and other areas indicated.

1. Apply 3-inch average thickness of organic mulch. Do not place mulch within 6 inches of tree trunks.

3.3 TREE- AND PLANT-PROTECTION ZONES

A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people from easily entering protected area except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.

B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Architect. Install one sign spaced approximately every 50 feet on protection-zone fencing, but no fewer than four signs with each facing a different direction.

C. Maintain protection zones free of weeds and trash.

D. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.

E. Maintain protection-zone fencing and signage in good condition as acceptable to Architect and remove when construction operations are complete and equipment has been removed from the site.

1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.4 EXCAVATION

A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Section 02200 "Earthwork."

B. Trenching near Trees: Where utility trenches are required within protection zones, hand excavate under or around tree roots or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning.

C. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches back from new construction and as required for root pruning.

D. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

3.5 CROWN PRUNING

A. Prune branches that are affected by temporary and permanent construction. Prune branches as follows:
   1. Prune trees to remain to compensate for root loss caused by damaging or cutting root system. Provide subsequent maintenance during Contract period as recommended by arborist.
   2. Pruning Standards: Prune trees according to ANSI A300 (Part 1).
   3. Cut branches with sharp pruning instruments; do not break or chop.
   4. Do not apply pruning paint to wounds.

B. Chip removed branches and spread or stock pile over areas identified by Landscape Architect or dispose of off-site. Add nitrogen to all fresh mulch to accelerate decomposition.

3.6 REGRADING

A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

B. Lowering Grade within Protection Zone: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by arborist unless otherwise indicated.

C. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

D. Minor Fill within Protection Zone: Where existing grade is 2 inches or less below elevation of finish grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations.

3.7 FIELD QUALITY CONTROL

A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.8 REPAIR AND REPLACEMENT

A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.

   1. Submit details of proposed root cutting and tree and shrub repairs.
   2. Have arborist perform the root cutting, branch pruning, and damage repair of trees and shrubs.
   3. Treat damaged trunks, limbs, and roots according to arborist's written instructions.
   4. Perform repairs within 24 hours.
   5. Replace vegetation that cannot be repaired and restored to full-growth status, as determined by Architect.

B. Trees: Remove and replace trees indicated to remain that are more than 25 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Architect determines are incapable of restoring to normal growth pattern.

   1. Plant and maintain new trees as specified in Section 02900 "Plants."

C. Soil Aeration: Where directed by Architect, aerate surface soil compacted during construction. Aerate 10 feet beyond drip line and no closer than 36 inches to tree trunk. Drill 2-inch-diameter

holes a minimum of 12 inches deep at 24 inches oc. Backfill holes with an equal mix of augured soil and sand.

3.9 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove excess excavated material, displaced trees, trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 015639

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous demolition and construction waste.
2. Recycling nonhazardous demolition and construction waste.
3. Disposing of nonhazardous demolition and construction waste.

B. Related Requirements:

1. Section 02060 Demolition" for disposition of waste resulting from partial demolition of, structures, and site improvements, and for disposition of hazardous waste.
2. Section 02100 "Site Preparation" for disposition of waste resulting from site clearing and removal of above and below grade improvements.

1.2 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 PERFORMANCE REQUIREMENTS

A. General: Achieve end-of-Project rates for salvage/recycling of 50 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including but not limited to the following:

1. Demolition Waste:

a. Asphalt paving.
b. Concrete.
c. Concrete reinforcing steel.
d. Brick.
e. Concrete masonry units.
f. Wood studs.

g. Wood joists.
h. Plywood and oriented strand board.
i. Structural and miscellaneous steel.
j. Rough hardware.
k. Metal studs.
l. Gypsum board.
m. Equipment.
n. Piping.
o. Supports and hangers.
p. Valves.
q. Sprinklers.
r. Mechanical equipment.
s. Electrical conduit.
t. Copper wiring.
u. Lighting fixtures.
v. Lamps.
w. Ballasts.
x. Electrical devices.
y. Switchgear and panelboards.
z. Transformers.

2. Construction Waste:

a. Masonry and CMU.
b. Lumber.
c. Wood sheet materials.
d. Metals.
e. Piping.
f. Electrical conduit.
g. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:

1) Paper.
2) Cardboard.
3) Boxes.
4) Plastic sheet and film.
5) Polystyrene packaging.
6) Wood crates.
7) Plastic pails.

1.4 INFORMATIONAL SUBMITTALS

A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Use Form CWM-7 for construction waste and Form CWM-8 for demolition waste. Include the following information:

1. Material category.
2. Generation point of waste.

3. Total quantity of waste in tons.
4. Quantity of waste salvaged, both estimated and actual in tons.
5. Quantity of waste recycled, both estimated and actual in tons.
6. Total quantity of waste recovered (salvaged plus recycled) in tons.
7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

G. Qualification Data: For waste management coordinator and refrigerant recovery technician.

H. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.5 QUALITY ASSURANCE

A. Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste management coordination of projects with similar requirements, that employs a LEED-Accredited Professional, certified by the USGBC, as waste management coordinator.

B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

D. Waste Management Conference: Conduct conference at Project site. Review methods and procedures related to waste management including, but not limited to, the following:

1. Review and discuss waste management plan including responsibilities of waste management coordinator.
2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

1.6 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing and construction waste generated by the Work. Use Form CWM-1 for construction waste and Form CWM-2 for demolition waste. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled or disposed of in landfill or incinerator. Use Form CWM-3 for construction waste and Form CWM-4 for demolition waste. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Use Form CWM-5 for construction waste and Form CWM-6 for demolition waste. Include the following:

1. Total quantity of waste.
2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
3. Total cost of disposal (with no waste management).
4. Revenue from salvaged materials.
5. Revenue from recycled materials.
6. Savings in hauling and tipping fees by donating materials.
7. Savings in hauling and tipping fees that are avoided.
8. Handling and transportation costs. Include cost of collection containers for each type of waste.
9. Net additional cost or net savings from waste management plan.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with operation, termination, and removal requirements in Section 015000 "Temporary Facilities and Controls."

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

E. Waste Management in Historic Zones or Areas: Hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, by 12 inches or more.

3.2 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
3. Store items in a secure area until installation.
4. Protect items from damage during transport and storage.
5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

B. Salvaged Items for Sale and Donation: Not permitted on Project site.

C. Salvaged Items for Owner's Use: Salvage items for Owner's use and handle as follows:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.

E. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.

F. Plumbing Fixtures: Separate by type and size.

G. Lighting Fixtures: Separate lamps by type and protect from breakage.

H. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

3.3 RECYCLING WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

    a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.4 RECYCLING DEMOLITION WASTE

A. Asphalt Paving: Grind asphalt to maximum 1-1/2-inch size.

B. Asphalt Paving: Break up and transport paving to asphalt-recycling facility.

C. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.

1. Pulverize concrete to maximum 4-inch size.

D. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.

1. Clean and stack undamaged, whole masonry units on wood pallets.

E. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.

F. Metals: Separate metals by type.

1. Structural Steel: Stack members according to size, type of member, and length.
2. Remove and dispose of bolts, nuts, washers, and other rough hardware.

G. Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts. Remove and dispose of nails, staples, and accessories.

H. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.

I. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.

J. Metal Suspension System: Separate metal members including trim, and other metals from acoustical panels and tile and sort with other metals.

K. Carpet: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.

1. Store clean, dry carpet in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.

L. Carpet Tile: Remove debris, trash, and adhesive.

1. Stack tile on pallet and store clean, dry carpet in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.

M. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.

N. Conduit: Reduce conduit to straight lengths and store by type and size.

3.5 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

a. Comply with requirements in Section 329300 "Plants" for use of clean sawdust as organic mulch.

C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

a. Comply with requirements in Section 329300 "Plants" for use of clean ground gypsum board as inorganic soil amendment.

3.6 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Burning: Burning of waste materials is permitted only at designated areas on Owner's property, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.

D. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION 017419

SECTION 02060

SITE DEMOLITION

PART 1 GENERAL

1.01 SCOPE

The work in this Section consists of furnishing all material and equipment and performing all labor necessary for demolishing and disposing of designated elements indicated on the Drawings.

Due to close proximity of utilities on the roadside, some of the demolition should be performed by small lightweight equipment.

Contractor shall secure permission of Dekalb County DOT before working in the ROW of Ashford Dunwoody Road or crossing the right-of-way.

Demolition items shall consist of the removal of curb, asphalt, shelter, trees, drainage structures, and other items within the limits of construction. Relocation items shall consist of signs, fire hydrants, utility poles, and any other element within the limits of construction.

Utilities: Contractor shall notify and secure permission from utility companies effected by the demolition.

Code Compliance: Contractor shall comply with all applicable codes, ordinances, rates, regulations, and laws of local, municipal, state, or federal authorities having jurisdiction over the project.

Demolition process and construction procedures shall not interfere with traffic on Ashford Dunwoody Road or endanger vehicles or drivers on the street or within the park.

1.02 SUBMITTALS

The Contractor shall submit a written traffic control and safety plan, to include a detailed demolition procedure, to the Owner's Representative and Landscape Architect for approval at least ten (10) days before demolition begins. The demolition procedure shall include a detailed description of the methods and equipment to be used for each operation and the sequence of work. The demolition procedures shall provide for safe conduct of the work, and protection of the property, which is to remain undisturbed and coordination with other work or operations, which may be in progress.

1.03 PERMITS

Contractor is responsible for securing all permits necessary to demolish and dispose of all demolition items and to use local roadways for access and egress. Contractor shall secure any and all permits to allow work to be executed in the ROW of Ashford Dunwoody Road.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.01 EXPLORITORY TRENCHING:

A. In all locations where, underground utilities may exist or are known to exist, the Contractor shall dig exploratory trenches in line with proposed new utilities to discover true depth, size, and location of existing utilities before beginning utility construction.
B. Contractor shall notify all utility companies of their excavation schedule prior to actual excavation.

3.02 DEMOLITION

A. All site material shall be removed as necessary for construction.

B. Utilities: The location of existing utilities is approximate and shall be field verified prior to beginning demolition. If the elevation or location is substantially different from that shown on the plans or if a conflict exists, the Landscape Architect shall be notified. Any damage or unauthorized interruption of existing utilities shall be the sole responsibility of the Contractor and shall be repaired at contractor's expense.

C. Any element, or part thereof, remaining below grade shall be mechanically fractured so that subsurface water will freely pass through the slab or floor of the structure, and so that no void will remain after backfilling the work site to grade as shown on the Drawings.

D. The Contractor shall be responsible for removing all existing service connections to the site and permanently plugging the pipes where required in accordance with requirements of the utility companies concerned. The Contractor shall contact all utility companies prior to beginning work to coordinate disconnection of active utilities, removal or relocation of meters and marking existing underground utilities.

E. The Contractor will be responsible for any damage caused to other site elements and shall be held liable for any and all repairs, replacement of parts or renovations required to restore any structure, portion of structure, equipment or items, not intended for demolition. The Contractor shall restore any damaged elements to their condition prior to demolition provided the damage was result of the demolition. If the Contractor does not repair any such damage immediately, or if the repairs are not suitable to the Owner, the Owner reserves the right to have such repairs made by another party and deduct the cost of required repairs from money due Contractor.

F. All salvageable materials shall remain the property of the Brookhaven Parks Department and shall be cleaned and stored on the Owner's property as directed by the Owner's Representative.

G. Any underground fuel, storage, septic or other tanks encountered shall be demolished according to the most recent environmental standards.

H. Any contaminated soils discovered on site shall be removed at owners' expense. Contractor shall report such conditions to the Landscape Architect immediately.

I. Any materials left on the site by other construction crews shall be brought to the attention of the Owners Representative and removed per his instructions.

J. Demolition along Ashford Dunwoody ROW lines must be performed carefully and meticulously. Contractor shall protect the existing service utilities from damage.

K. Demolition of the asphalt under the Oak trees designated to be saved shall be done in accordance with Section 015639.

3.03 DISPOSAL

A. All materials, which are not delivered to the Owner as specified above, shall become the property of the Contractor, and shall be demolished, moved or otherwise disposed of at the option of the Contractor by a method approved by the Owner. All debris shall be disposed of off-site by the Contractor. No burial, salvage or sale of demolished materials on site will be allowed.

B. All demolished elements and materials shall be removed from the work site by the Contractor.

C. All demolished elements and materials, which are either left in place or removed to the disposal site shall be in a non-hazardous condition.

D. Manhole frames and covers to be removed are the property of the Owner and shall be delivered to a place designated by the Owner's Representative.

E. Poles, transformers, equipment that belongs to respective utility companies and designated for removal or salvage shall be delivered to the respective utility company.

F. All items marked salvage shall be removed and delivered to the county parks maintenance facility for storage.

G. All unusable rock excavated on the site shall be removed and disposed of according to local codes and regulations.

3.04 COORDINATION:

A. Demolition of curbs and asphalt on Ashford Dunwoody shall be carefully coordinated to avoid danger for vehicles on the street.

B. Traffic Control and Safety: Contractor shall work with Dekalb County DOT and local Police officials to prepare a traffic control and safety plan and process for the execution of work along Ashford Dunwoody Road. Traffic Control plan may be provided to the Owner after the contractor is selected.

END OF SECTION 02060

SECTION 02100

SITE PREPARATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

Conditions of Section 02112 Tree Protection and Clean Up shall apply to this section. Related Sections 02060 Demolition, 02540 Erosion and Sediment Control,

1.2 SCOPE:

A. This Section describes materials and equipment to be utilized and requirements for their use in preparing the work site for construction. The Contractor shall furnish all materials, equipment and labor necessary to complete the work. Precautionary measures that prevent damage to existing trees and other site features to remain are part of the Work.

B. Comply with applicable codes, ordinances, rules, regulations and laws of local, municipal, state or federal authorities having jurisdiction. All required permits of a temporary nature shall be obtained for construction operations by the Contractor.

C. Clearing and grubbing operations shall be coordinated with temporary and permanent erosion and sedimentation control procedures.

D. Construction Access shall conform to all erosion control protection requirements.

E. Contractor shall always maintain reasonable access to the park for use of the citizens.

F. Contractor shall coordinate with the Owner’s Representative to be aware of special events taking place in the park and to take reasonable measures to accommodate the events.

1.3 CLEARNG AND GRUBBING:

A. Within the limits schematically identified on the Drawings, the site will be cleared and grubbed to prepare for construction.

B. The Contractor shall verify existing conditions on the site, and examine all adjoining roadways to the site, which in any way may affect completion of the work. Report to the Landscape Architect or Owner’s Representative in writing any condition which will prevent the proper performance of the proposed site construction work. The site premises shall be accepted as found. The Landscape Architect and Project Engineer assume no responsibility for conditions of the site.

C. Clearing:

1. All vegetable growth such as trees, shrubs, brush, logs, upturned stumps and roots of down trees, and all other similar debris shall be removed where shown on the Drawings and disposed of properly by the Contractor as specified below. Cultivated growth shall be removed and trees felled as necessary within the limits of construction work site and as indicated on the drawings.

2. Any construction activities, including trench excavation and fill compaction, which could detrimentally impact existing trees larger than 10- inch diameter (defined as DBH) or their root systems shall be reviewed by and coordinated with the Landscape Architect and City Arborist.

3. Where the tree limb structure interferes with utility wires, or where the trees to be felled are in close proximity to utility wires, the tree shall be taken down in sections to eliminate the possibility of damage to the appropriate utility
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4. All buildings, fences, lumber piles, trash and obstructions, except utility poles, shall be removed as noted on the Drawings and disposed of by the Contractor. Any work pertaining to utility poles shall comply with the requirements of the appropriate utility.
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4. All paving and curbs adjoining any excavation area or embankment that may be damaged or buried shall be carefully removed, stored and replaced.

5. All trees that are designated to be saved but the roots have been damaged shall have their exposed roots carefully cut using a hand-held saw. The exposed end of the roots shall be coated with Orange Shellac and covered with aged hardwood mulch.

D. Grubbing:
Remove all stumps, roots and root clusters having a diameter of one inch or larger to a depth of at least two feet below subgrade elevation for concrete structures and at lease one foot below the subgrade under walks, paving and in areas to receive landscape planting.

E. All stumps, roots, foundations and planking embedded in the ground shall be removed and disposed of properly by the Contractor as specified below. Piling and butts of utility poles shall be removed to a minimum depth of two feet below the limits of excavation for structures, trenches and walkways or two feet below

finish grade, whichever is lower. Refer to Section 02112 of the specifications for additional requirements.

F. Tree Protection fencing shall be kept in good order. See detail on drawings.

1.4 TESTING AND INSPECTION SERVICES:

A. Soil testing will be performed by an independent testing laboratory approved by the Owner. Payment for soil testing shall be made by the Owner.

B. The soils testing laboratory is responsible for the following:
1. Compaction tests in accordance with ASTM D 698.
2. Field density tests for each one-foot of lift; one test for each 2,500 square feet of fill.
3. Inspecting and testing stripped site, subgrades and proposed fill materials.

C. The Contractor's duties relative to testing include:
1. Notifying the laboratory of conditions requiring testing.
2. Coordinating with the laboratory for field-testing.
3. Providing representative fill soil samples to laboratory for test purposes. Provide 50-pound samples of each fill soil.
4. Paying costs for additional testing performed beyond the scope of that required and for re-testing where initial tests reveals non-conformance with specified requirements.

D. Inspection:
1. Earthwork operations, suitability of excavated materials for fill and backfill, and placing and compaction of fill and backfill is subject to inspection. The Geo-Technical Engineer will observe earthwork operations and provide recommendations as necessary for subgrade improvement.
2. Foundations and shallow spread footing foundations are required to be inspected by a geotechnical engineer to verify suitable bearing and construction.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 PREPARATION:
A. Maintain benchmarks, monuments and other reference points. Re-establish, at no cost to the Owner, any such reference points if disturbed or destroyed.

B. Maintain tree protection fencing and erosion control fencing.

3.2 CLEARING:
A. Clear areas required for access to site and execution of the work.

B. Remove trees and shrubs within the area to be cleared. All trees to be saved within the grading limits are shown on the Drawings. Coordinate removal of trees and shrubs with the Landscape Architect or Owner's Representative.

3.3 STAKING:

A. The Contractor shall stake the entire site, both as to location of major construction items as well as finish grades. This stakeout may be accurate or rough, depending on the Contractor's preference. See Paragraph 1.6 of Section 01010 Supplemental Conditions.

B. The purpose of the staking, with inspection and adjustment by the Landscape Architect, is to adapt the design to the site rather than allow the design to be forced upon the site. Staking is subject to various degrees of adaptation, which can only be determined by the Landscape Architect. This variation is an aesthetic decision; the amount of adjustment most often is determined by the existing trees, terrain, and soil conditions sub-surface water and by other intangibles, which are impractical to survey in absolute accuracy.

C. The Contractor shall notify the Landscape Architect and Owners Representative at least three (3) working days before inspection of the stakeout must be made. During the inspection the Landscape Architect will adjust the stakeout as necessary to fit the trees, topography and all other objects and conditions on the site. At this time, the Landscape Architect will clearly mark all perimeter trees and other vegetation to be removed. This staking-inspection process must take place prior to any tree removal, grading, construction, or any other work on the site.

D. During the inspection, the Contractor shall be at the site along with the person who will superintend the work under this contract.

E. The staking-inspection process shall be repeated for any work not staked and approved or adjusted during the first site visit. No work shall ever be done without the stakeout first being adjusted and approved by the Landscape Architect. All alignment, dimensions and elevation of any grading, excavation, construction and planting is subject to adjustment to save trees and other vegetation.

3.4 TOPSOIL REMOVAL:

A. Topsoil is defined as a friable sandy loam surface soil found at a depth of not less than 4". Satisfactory topsoil is reasonable free of subsoil, clay lumps, stones, roots, debris, and other objects over 2" in diameter.

B. Topsoil of reusable quality shall be stripped from the site to be cleared, cleaned of objectionable materials and stockpiled on site for reuse in turf and plant bed areas.

C. Where trees are to remain standing, stop topsoil stripping a sufficient distance from such trees to prevent damage to the main root system.

D. Topsoil shall be stockpiled in storage piles where directed by the Owner and Landscape Architect. It shall not be stockpiled under trees or over constructed elements. Construct piles to drain freely of surface water. Cover piles, if necessary, to prevent erosion and dust.

3.5 DISPOSAL OF REFUSE:

A. The refuse resulting from the clearing and grubbing operation shall be hauled to a disposal site secured by the Contractor and shall be disposed of in accordance with all requirements of federal, state, county and municipal regulations. No debris of any kind shall be deposited in any stream, body of water, or in any street or ditch. In no case shall any material be left on the site, shoved onto abutting private properties, or be buried in the embankments or trenches on the site.

B. Contractor may not dispose of refuse by burning or burial on site. All refuse must be removed and properly disposed of offsite.

C. This is an historic site and the contractor shall take great care to not damage any of the site outside the construction limits nor dispose of refuse materials on the site.

3.6 STAGING AREA:

Several site locations may be available to the Contractor for use in staging and storage within the Park. These sites must be pre-approved by the Owner prior to utilization.

END OF SECTION 02100

SECTION 02112

TREE PROTECTION AND CLEANUP

PART 1 GENERAL

1.01 SCOPE

A. Tree Protection, selective site clearing, and pruning shall be accomplished in all areas to be graded or covered by new construction. Operations include but are not limited to the following:
   1. Staking of the plan on the site, removal of existing vegetation, selective pruning as directed by the Landscape Architect or City Arborist in the field, removal of miscellaneous structures, topsoil stripping, protection of existing trees designated to remain, erosion control and facilities protection.
   2. Woodland pruning and clearing within the limits of work as defined on the construction documents and drawings.
   3. See Section 015639 – Tree Care and Protection for treating existing trees.
   4. See Appendix A of the Project Manual: Blackburn Tree Conservations Instructions.

1.02 QUALITY ASSURANCE

A. Code Compliance: The Contractor shall comply with applicable codes, ordinances, rules, regulations and laws of local, municipal, state or federal authorities having jurisdiction over the Project. All required permits of a temporary nature shall be obtained for construction operations by the Contractor.

B. Qualification of the Workmen: The Contractor shall provide at least one person who shall be present always during tree clearing and grubbing operations and who shall direct the trimming of roots and limbs where required. The Contractor shall provide at least one person who is qualified in the various other trades involved including demolition, protection of property and erosion control.

1.03 JOB CONDITIONS

A. Dust Control: Use all means necessary to prevent the spread of dust during performance of the work of this Section. Thoroughly moisten all surfaces as required to prevent dust being a nuisance to the work on the site and surrounding areas.

B. Erosion Control: Install and maintain berms, swales and bales as required to trap waterborne soil particles. As work progresses, relocate and/or add to erosion control system as necessary.

C. Protection: Use all means necessary to protect existing objects designated to remain and, in the event of damage, immediately make all repairs and replacements necessary to the approval of the Landscape Architect or Owner's Representative at no additional cost to the Owner..

D. Tree Protection: Protect existing trees and other vegetation indicated to remain in place with county approved tree protection fencing set to the critical root zone of trees to be saved. Protect existing trees against unnecessary cutting, breaking or skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide temporary fences, barricades, or guards as required to protect trees and vegetation to be left standing.

F. Water existing trees and other vegetation, which are to remain and are within the limits of the contract work as required to maintain their health during the course of construction operations. Trees should have a minimum of 1" of water per week under the drip line of the trees either by natural rainfall or supplemental watering by the Contractor.

G. Provide protection for roots over 1 1/2" diameter that are cut during construction operation. Coat any cut faces with emulsified asphalt, or other acceptable coating, especially formulated for horticultural use on cut or damaged plant tissues. Temporarily cover all exposed roots with wet burlap to prevent from drying out; provide earth cover as soon as possible.

H. Repair or replace trees and vegetation damaged by construction operations, in a manner acceptable to the Landscape Architect. Tree damage repair shall be performed by a qualified tree surgeon. Replace trees, which cannot be repaired and restored to full-growth status, as determined by the tree surgeon.

I. Protect tree root system from damage due to deleterious materials in solution caused by run-off or spillage during mixing of construction materials or drainage from stored materials. Protect root system from flooding, erosion or excessive wetting resulting from de-watering operations.

PART 2 PRODUCTS

2.01 TEMPORARY BARRICADES:

A. Unless otherwise approved by the Landscape Architect or City Arborist, use only new and solid lumber of utility grade or better to construct temporary barricades around trees and areas designated to remain undisturbed.

2.02 PRUNING PAINT:

A. Use only a pruning paint specifically formulated for horticultural application to cut or damaged plant tissue and approved by the Landscape Architect for use on this work. Preferably, use ‘Orange Shellac’ as pruning paint when available.

PART 3 EXECUTION

3.01 SITE INSPECTION:

A. Prior to any work of this section, carefully inspect the entire site and all objects designated to be removed and all objects to be preserved. Locate all existing utility lines traversing the site and determine the requirements for the protection of those designated to remain.

3.02 SCHEDULING:

A. Schedule all work in a careful manner with all consideration for neighbors and the general public, in conformance with local noise ordinances.

B. Notify the Landscape Architect at least five (5) full working days prior to commencing any work of this section.

3.03 DISCONNECTION OF UTILITIES:

A. Before starting site operations, disconnect or arrange for the disconnection of all utility services designated to be removed, performing all such work in accordance with the requirements of the utility company or agency involved.

3.04 STAKING: See Section 01010 Supplemental Conditions paragraph 1.6.

A. All lines, grades, levels and benchmarks shall be established and maintained by the Contractor.

B. Before commencing any work, the Contractor shall verify all grades, lines, levels and dimensions as indicated on the Drawings. He shall report any errors or inconsistencies to the Landscape Architect and Owner's Representative before commencing work.

C. The Contractor shall stake the entire site, both as to location of all construction items as well as finish grades. This stakeout may be accurate or rough, depending on the Contractor's preference. This stakeout may be made early in the construction process and preserved for reference during construction.

D. The purpose of the staking, with inspection and adjustment by the Landscape Architect, is to adapt the design to the site rather than allow the design to be forced upon the site. Staking is subject to various degrees of adaptation, which can only be determined by the Landscape Architect. This variation is an aesthetic decision, the amount of adjustment most often determined by the existing trees, terrain, soil conditions, sub-surface water and by other intangibles which are impractical to survey in absolute accuracy.

E. The Contractor shall notify the Landscape Architect at least five (5) working days before inspection of the stakeout must be made. During the inspection the Landscape Architect will adjust the stakeout as necessary to fit the trees, topography and all other objects and conditions on the site. At this time the Landscape Architect will clearly mark all trees and other

vegetation to be removed. This staking-inspection process must take place prior to any tree removal, grading, construction, or any other work on the site.

F. During the inspection, the Contractor shall be at the site along with the person who will superintend the work under this contract.

G. The staking-inspection process shall be repeated for any work not staked and approved or adjusted during the first site visit. No work shall ever be done without the stakeout first being adjusted and approved by the Landscape Architect. All alignment, dimensions and elevation of any grading, excavation, construction and planting is subject to adjustment to save trees and other vegetation.

3.05 DEMOLITION:
See Section 02060

3.06 MULCH:

A. 1" topping of pine straw shall be placed as mulch in all disturbed areas within the limits of the work without digging into or breaking up the surface roots of trees.

B. Trees to be protected shall have a 3” layer of aged hardwood mulch covering their root zones out to the driplines.

3.07 CLEARING:

A. Clear the site of brush, rubbish, grass, weeds and any other plants designated by the Landscape Architect to be removed. No trees shall be removed, or limbs and roots cut without prior approval of Landscape Architect or Owner’s Representative.

C. Remove all stumps, roots and root clusters having a diameter of one inch or larger to a depth of at least two feet below subgrade elevation for concrete structures and at least one foot below the subgrade under walks, asphalt roadway and in areas to receive heavy grading. Do not remove stumps in areas to remain natural.

3.08 GRADING:

A. Grading shall be kept at a minimum order to reduce the impact of the construction on the natural systems. All grading work shall be confined to the limits of construction work.

B. Contractor shall use equipment and tools that do not expand beyond the limits of construction.

C. Disruption of the existing grade should be kept at a minimum and fill used whenever possible to create uniform surfaces for paved surface materials. No form of root rake shall be used.

D. Near existing trees, grading work should be kept to hand labor and tools rather than heavy machinery.

E. Vehicles may not turn or park under the tree preservation areas.

F. Staging and operations may occur in the open areas where there are no trees. Any damage to existing lawn grasses as a result of construction operations shall be repaired.

3.09 FILL PLACEMENT OVER TREE ROOTS:

A. Where fill dirt is necessary to establish acceptable finished grades over tree roots, contractor shall use the following method:
1. Rake away the existing mulch and humus.
2. Cover the area with #57 stone to within 3" of finish grade.
3. Lay filter fabric over top of the #57 Stone
. 4. Lay 3" of Topsoil over the filter cloth.
5. Cover the topsoil with 3" of pine straw or aged hardwood mulch.

3.10 EROSION CONTROL:

A. Install erosion control measures (i.e. silt fencing, rip rap, straw bales, check dams) as necessary during construction to prevent erosion of disturbed areas and prevent damage to downstream property from runoff and silt.

3.11 SILT CONTROL:

A. Prior to any grading or on-site construction, the Contractor shall install silt barriers in all adjacent locations necessary to prevent eroded material from silting paved areas, creeks and adjacent lots.

3.12 CLEANUP:

A. Contractor shall be responsible for removing all rubbish, refuse, soil, waste, and other products or elements resulting from the construction effort.

B. All the natural mulch areas disturbed by the construction activity shall be repaired by raking back to natural grade and covering with 1"-layer pine straw mulch. All pruning rubbish shall be removed from the site or ground and spread as mulch in the natural areas.

END OF SECTION 02112

SECTION 02200

EARTHWORK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY OF WORK

A. This Section includes earthwork as shown on the drawings and specified herein. Included is:

1. Preparation of subgrade for walks and pavement.

2. Preparation of granular base for pavement.

3. Excavation and backfilling for utilities systems.

4. Excavation and backfilling for structure footings, foundations, and retaining walls.

5. Site grading and filling to indicated elevations.

1.03 SUBMITTALS

A. Test Reports: Submit copies of following reports directly to the Engineer

1. Test reports on borrow material.

2. Field density test reports.

3 One optimum moisture-maximum density curve for each type of soil encountered.

B. Based on testing service reports and inspection, subgrade or fills which have been placed at below specified density, provide additional compaction and testing at no additional expense to Owner.

1.04 QUALITY ASSURANCE

A. Codes and Standards: Perform earthwork and site grading in compliance with applicable requirements of governing authorities having jurisdiction.

B. Testing and Inspection Services: Owner will engage testing and inspection service, to include testing of soil materials proposed for use in work and field facilities for quality control testing during earthwork and site grading operations. All test reports must be signed by a licensed engineer.

C. Tests for Proposed Soil Materials: Test soil materials proposed for use in work and promptly submit test result reports. Provide one optimum moisture-maximum density curve for each type of soil encountered in subgrade fills. Determine the maximum densities in accordance with ASTM D 698. Testing service will determine suitability of materials to be used as fill. For borrow materials, perform a mechanical analysis (ASTM 422), plasticity index (ASTM 424), moisture-density curve (ASTM D 698).

1.05 PROJECT CONDITIONS

A. Subsoil: Promptly notify soil testing service of unsuitable sub-surface conditions.

B. Existing Utilities: Locate existing underground utilities in areas of work before starting earthwork operations. Where utilities are to remain in place, provide adequate means of protection during earthwork operations. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner, and public and private utility companies, in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner. Do not interrupt existing utilities serving facilities occupied and used by Owner or others, except when permitted in writing by Engineer and then only after acceptable temporary utilities services have been provided. Demolish and completely remove from site underground utilities indicated to be removed. Coordinate with local utility companies for shut-off of services if lines are active.

C. Use of Explosives: Use of explosives is not permitted.

D. Temporary Protection: Barricade open excavations made as part of earthwork operations and post with warning lights. Operate warning lights as recommended by authorities having jurisdiction. Protect bottoms of excavations and soil beneath and around foundations from frost and freezing. Protect excavations by shoring, bracing, sheeting, underpinning, or other methods, as required to prevent cave-ins or loose dirt from entering excavations.

PART 2 PRODUCTS

2.01 SOIL MATERIALS

A. Backfill and Fill Materials: Use satisfactory soil materials, complying with the American Association of State Highway and Transportation Officials (AASHTO) Designation M145, soil classification groups A-1, A-2-4, A-2-5, and A-3. Fill to be free of rock or gravel larger than 2" in any dimension, debris, waste, frozen materials, vegetable, and other deleterious matter, as determined by the soils testing service.

B. Granular Base: Properly graded mixture of natural or crushed gravel or crushed stone that will readily compact to required density. Use material complying with applicable sections of the current edition of "Georgia Department of Transportation Standard Specifications for Construction of Roads and Bridges".

PART 3 EXECUTION

3.01 EXCAVATION

A. General: Establish extent of grading and excavation by area and elevation. Designate and identify datum elevation and project engineering reference points. Set required lines, levels and elevations. Obtain approval from the Architect.

B. Excavation Classifications: The following classifications of excavation will be made when unanticipated rock excavation is encountered in work. Do not perform such work until material to be excavated has been cross-sectioned and classified by soils testing laboratory. Rock excavation will be paid for at established unit prices, upon approval of Architect.

C. Earth excavation includes removal and disposal of pavements and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, material of any classification indicated in data on subsurface conditions, and other materials encountered that are not classified as rock excavation or unauthorized excavation.

D. Rock excavation consists of removal and disposal of materials encountered that cannot be excavated with a 3/4 cubic yard capacity power shovel without drilling, or continuous use of a ripper or other special equipment, except such materials that are classified as earth excavation.

E. Trench rock excavation consists of removal and disposal of material classified as rock where the least horizontal dimension of required excavation is greater than three feet. Intermittent drilling that may be performed to increase production and is not necessary to permit excavation of material encountered will be classified as earth excavation.

F. Mass rock excavation consists of removal and disposal of material classified as rock where the least horizontal dimension of required excavation is greater than three feet. Intermittent drilling that may be performed to increase production and is not necessary to permit excavation of material encountered will be classified as earth excavation.

G. Rock payment lines are limited to the following:

1. Two feet outside of concrete work for which forms are required, except footings.

2. One foot outside perimeters of footings.

3. In pipe trenches, 6" below invert elevation of pipe and 2' wider than the outside diameter of pipe, but not less than 3' minimum trench width.

4. Near outside dimensions of concrete work where no forms are required.

5. Under slabs on grade, 6" below bottom of concrete slab.

H. Unauthorized excavation consists of removal of materials beyond indicated elevations or side dimensions without the specific direction of the Architect. Replace unauthorized excavation by backfilling and compacting as specified for authorized excavations of same classification, unless otherwise directed by Architect.

I. There will be no additional compensation for excavation, backfilling, concrete fill, or other cost due to unauthorized over-excavation in any direction. The Contractor is responsible for all additional testing costs associated with over-excavation.

J. Quoted unit prices shall include full compensation for labor, materials, tools, equipment, and incidentals required for excavation, trimming, shoring, de-watering, backfilling, compacting, and other necessary items for complete installation.

K. Unit prices for the following items, as set forth in the form of Proposal and as provided in the General Conditions, will apply in the event additions to

the work are required and authorized by a written order from the Architect to the Contractor.

1. Mass Rock Excavation (per cu. yd.)

2. Trenched Rock Excavation (per cu. yd.)

L. Additional Excavation: When excavation has reached required subgrade elevations, notify soil testing laboratory to allow for inspection of conditions. If unsuitable materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by soils testing laboratory.

M. De-watering: Prevent surface water and subsurface or ground water from flowing into excavations, and flooding project site and surrounding area. Do not allow water to accumulate in excavations. Remove water from excavations to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other de-watering system components necessary to convey water away from site. Convey water removed from excavations and rain water to collecting or run-off areas. Do not use trench excavations for site utilities as temporary drainage ditches.

N. Material Storage: Stockpile excavated materials classified as satisfactory oil material where directed, until required for fill. Place, grade and shape stockpiles for proper drainage. Maintain excavated soil materials separately from topsoil stockpile. Dispose of excess unsatisfactory soil material, trash and debris, as specified.

O. Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations, and grades as shown.

P. Excavation for Trenches: Dig trenches to uniform width required for particular item to be installed, sufficiently wide to provide working room. Excavate trenches to depth indicated or required. Carry depth of trenches for piping to establish indicated flow lines and invert elevations.

3.02 COMPACTION

A. General: Control soil compaction during construction, providing the minimum percentage of density specified for each area classification.

B. Percentage of Maximum Density Requirements: Compact soil to not less than following percentages of maximum dry density for soils which exhibit a well-defined moisture density relationship determined in accordance with

ASTM D 698; and not less than following percentages of relative density, determined in accordance with ANSI/ASTM D 4318, D 4253 AND D 4254, for soils which will not exhibit well-defined moisture-density relationship:

1. Unpaved Areas: Compact top 6" of subgrade and each layer of backfill or fill material to not less than 90% of the maximum dry density.

2. Pavements: Compact top 12" of subgrade and each layer of backfill or fill material to not less than 95% of the maximum dry density.

C. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

3.03 BACKFILL AND FILL

A. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break-up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

B. Placement and Compaction: Place backfill and fill materials in layers not more than 8" in loose depth for material compacted by heavy compaction equipment, and not more than 4" loose depth for material compacted by hand-operated equipment. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content of soil material. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice. Backfill excavations as promptly as work permits, but not until completion of inspection, testing, approval, and recording location of underground utilities, as required.

3.04 GRADING

A. General: Uniformly grade areas within limits of site grading under this section, including adjacent transition areas. Smooth finished surfaces within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades. Degree of finish required will be that ordinarily obtainable from either blade-grader or scraper operations.

B. Grading Around Trees: Where excavating, filling, or grading is required within branch spread of trees that are to remain, perform work as follows:

When trenching occurs around trees that are to remain, the tree roots shall not be cut but the trench shall be tunneled under or around the roots by careful hand digging and without injury to the roots.

C. Unpaved Areas: Finish areas to receive topsoil to within not more than 1" above or below required subgrade elevations, compacted as specified, and free from irregular surface changes.

E. Pavements: Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than 1/2" above or below required subgrade elevation, compacted as specified, and graded to prevent ponding of water after rains. Include such operations as plowing, dicing, and any moisture or aerating required to provide optimum moisture content for compaction. Fill low areas resulting from removal of unsatisfactory soil materials, obstructions, and other deleterious materials, using satisfactory soil material. Shape to line, grade, and cross-section as indicated.

3.05 PAVEMENT SUBBASE COURSE

A. General: Subbase course consists of placing subbase course material, in layers of specified thickness, over subgrade surface to support a pavement base or surface course. See other Division - 2 sections for paving specifications.

B. Grade Control: During construction, maintain lines and grades including crown and cross-slope of subbase course.

C. Placing: Place subbase course material on prepared subgrade conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting subbase material during placement operations.

3.06 MAINTENANCE

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

B. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.

3.07 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Removal from Owner's Property: Remove waste materials, including excavated material classified as unsatisfactory soil material, trash and debris, and dispose of it off Owner's property.

END OF SECTION 02 200

SECTION 02511

ASPHALT PAVING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Furnish labor, materials and equipment required to complete all patching, crack sealing, overlaying and preparation of subgrade for all areas to receive paving and other items necessary to complete the work.

B. Streets to be worked on are as shown on the Drawings.

1.02 REFERENCE STANDARDS

A. Materials and methods of construction of base and pavement shall conform to the requirements of State of Georgia *Standard Specifications Construction of Transportation Systems,* latest edition.

1.03 JOB CONDITIONS

A. Store materials only in areas designated for Contractor's use.

B. Paving operations shall not begin until all underground work of other grades has been completed and all storm drainage structures raised as required in areas which are to be paved.

C. Asphalt paving shall be done in dry weather when subgrade is sufficiently stable to be properly compacted. Ground moisture shall not be sealed under paving. All work shall be in accordance with applicable section of the Reference Standards.

1.04 SUBMITTALS

A. Contractor shall submit design mix specification sheet for shop drawing review by the engineer.

PART 2 - MATERIALS

2.01 ASPHALTIC CONCRETE MIXTURES

A. Asphaltic concrete mixtures shall conform to section 828 – Hot Mix Asphaltic Concrete Mixtures, of the State of Georgia *Standard Specifications Construction of Transportation Systems,* latest edition.

2.02 GRADED AGGREGATE BASE (NOT USED IN THIS PROJECT)

A. Graded aggregate base shall conform to section 815 – Graded Aggregate, of the State of Georgia *Standard Specifications Construction of Transportation Systems*, latest edition.

2.03 PAVEMENT DESIGN

A. Road Resurfacing - Superpave HMA, measured after compaction. (Per Plan)

B. Road Patching – One and a half (1.5) inches of 9.5mm Superpave HMA; one (1) inch or more (up to 6 inches, maximum), depending on the depth of the existing pavement section, of 19mm Superpave HMA, measured after compaction

2.04 ROAD STRIPING PAINT

A. Road striping line paint shall be in accordance with the State of Georgia *Standard Specifications Construction of Transportation Systems,* latest edition. The color shall be yellow or white to match existing color.

2.05 CRACK SEALING

A. Crack sealing shall be in accordance with Georgia DOT Standard Specifications, Section 407 of the State of Georgia *Standard Specifications Construction of Transportation Systems*, latest edition, and any other sections of the State of Georgia *Standard Specifications Construction of Transportation Systems,* that may be referenced in Section 407.

PART 3 - INSTALLATION

3.01 INSPECTION

A. The paving sub-contractor shall examine all areas to be repaired. Any defects which may adversely affect proper installation of this work shall be reported to the City Engineer in writing and shall have been corrected before start of this work. Beginning of work shall signify acceptance of surfaces by the paving sub-contractor.

3.02 SUBGRADE STABILIZATION

A. The subgrade in areas receiving patching and/or edge repair shall be proof rolled as specified in Section 221, of the State of Georgia *Standard Specifications Construction of Transportation Systems,* latest edition. All defective areas that pump or shove, or are found to be soft, shall be removed and satisfactorily repaired, as specified below, and test rolled again as specified in Section 221 of the State of Georgia *Standard Specifications*

Construction of Transportation Systems, latest edition. Subgrade shall be stabilized by removing soft soil and replacing with graded aggregate base.

3.03 BASE

A. Graded aggregate base, after compaction, shall be smooth and true to established profiles and sections and shall be of the average thickness of six eight (8) inches, varying at no point by no more than three-eighths (3/8) inch.

3.04 PATCH AND EDGE REPAIR

A. After removing damaged existing asphalt, a course of 19mm Superpave HMA shall be constructed to a minimum of the greater of one (1) inch thick or as thick as the depth of existing pavement, but in no case more than 6 inches thick, as identified above. A coarse of 9.5mm Superpave HMA shall constructed at the top of the patch to a thickness of one and a half (1.5) inches. Thickness shall be measured after compaction. Top of patch shall be flush with existing pavement before milling.

3.05 BINDER COURSE (NOT USED IN THIS PROJECT)

A. After removing damaged existing asphalt by milling operation, a binder course of 9.5mm Superpave HMA shall be constructed a minimum of one (1) inch thick or as thick as the depth of existing pavement, but in no case more than 8 inches thick, as identified above. Thickness shall be measured after compaction.

3.06 CRACK SEALING

A. Crack Seal all longitudinal and transverse cracks.

B. Crack Sealing shall be performed for the segment(s) of road shown on the Drawings.

C. Crack Sealing quantities are expressed in road linear feet. Each road has two lanes. Where a road has more than two lanes, an adjustment will be made to the estimated quantity.

3.07 TACK COAT AND PRIMER COAT

A. The area to be repaired shall be swept clean of all debris. Apply a primer or tack coat of hot tar at the rate of four tenths (0.4) gallon per square yard. Primer coat (RC70) shall be applied to graded aggregate base and tack coat (AC30) shall be applied to existing asphalt.

3.08 TOP COURSE

A. Following the binder course, and after sufficient time has passed to determine that the binder course and road base are performing properly, apply Superpave HMA, measured after compaction, as identified above and thoroughly roll evenly in place. Thickness shall be measured after compaction. Type and thickness per plan.

3.09 TESTING THICKNESS

A. The Contractor, at his expense, will core the asphalt every 1,000 linear feet with a minimum of two (2) cores per road to determine the average thickness of the surface course. The core locations shall be approved by the City Engineer after paving prior to coring.

B. The average thickness of all specimens shall be at least the specified thickness of the surface course. The average thickness of the cores per road shall be within three sixteenths (3/16) inches of the required thickness. No one core shall have a deficiency of one quarter (1/4) inch.

C. If the core thickness or average thickness is outside the range stated in 3.08.B, the contractor shall pay the Owner Liquidated Damages in the amount using the following formula:

Liquated Damages ($) = (LxWxD) x (148/2000) x **($75/**ton), where

L= road length, feet
W= road width, feet
D= depth of deficiency, feet

3.10 CLEAN UP

A. At the completion of the work, the Contractor shall clean up all scraps, rubbish and surplus materials caused by this work and haul them away from the site.

B. Remove all asphaltic materials from adjacent surfaces and leave in neat, clean and orderly condition.

3.11 GUARANTEE

A. Contractor shall provide the Owner with a one (1) year guarantee and maintenance agreement on all asphalt paving.

END OF SECTION 02511

SECTION 02513

PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

B. Related Requirements:
1. Section 071800 "Traffic Coatings" for painting whole areas of building floors and pavements with coatings having an integral wearing surface.
2. Section 099113 "Exterior Painting" for painting exterior concrete surfaces other than pavement.
3. Section 099123 "Interior Painting" for painting interior concrete surfaces other than pavement.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site during regular project meeting.
1. Review methods and procedures related to marking pavement including, but not limited to, the following:
a. Pavement aging period before application of pavement markings.
b. Review requirements for protecting pavement markings, including restriction of traffic during installation period.

1.4 ACTION SUBMITTALS

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

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

C. Samples: For each exposed product and for each color and texture specified; on rigid backing, 8 inches square.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of Sections 652, 653, and 657 of the Georgia Department of Transportation for pavement-marking work within a State or County ROW.

B.

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

1.6 FIELD CONDITIONS

A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for alkyd materials, 55 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" the ABA standards of the Federal agency having jurisdiction and ICC A117.1.

2.2 PAVEMENT-MARKING PAINT.

A. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with AASHTO M 248; colors complying with FS TT-P-1952.

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1. Color: As indicated. – White

B. Pavement-Marking Paint: MPI #32, solvent-borne traffic-marking paint.

1. Color: As indicated. - White

C. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, Type II, with drying time of less than 45 minutes.

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1. Color: As indicated. – White

D. Pavement-Marking Paint: MPI #97, latex traffic-marking paint.

1. Color: As indicated. - White

E. Thermoplastic Pavement Marking: In accord with GDOT Standard 653.

F. Preformed Plastic Pavement Markings: In accord with GDOT Standard 657.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that pavement is dry and in suitable condition to begin pavement marking according to manufacturer's written instructions.

B. Proceed with pavement marking only after unsatisfactory conditions have been corrected.

3.2 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

B. Allow paving to age for a minimum of 30 days before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum

1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to pavement. Mask an extended area beyond edges of each stencil to prevent paint application beyond stencil. Apply paint so that it cannot run beneath stencil.

3.3 PROTECTING AND CLEANING

A. Protect pavement markings from damage and wear during remainder of construction period.

B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 02513

PART 1 - GENERAL

1.01 SCOPE:

A. This work shall consist of furnishing all labor, materials and equipment necessary for the construction of concrete curb and concrete combined curb and gutter which shall consist of straight curb and monolithic curb and gutter respectively, constructed of Portland cement concrete, at the locations, and to the lines, grades, cross-section, form and dimensions indicated on the Drawings or as directed by the Owner and in conformity with the provisions and requirements set out in these Specifications.

B. Concrete curb and combined curb and gutter shall include all necessary excavation, unless otherwise indicated, and subgrade preparation; backfilling, and final clearing up; and completion of all incidentals thereto, as indicated on the Drawings or as directed by the Landscape Architect.

C. Staking requirements outlined in Supplemental Conditions shall apply to this section.

1.02 PRODUCT HANDLING:

A. Protection: Use all means necessary to protect concrete materials before, during and after installation and to protect the installed work and materials of all other trades.

B. Replacement: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 CONCRETE REINFORCEMENT:

A. Concrete reinforcement shall conform to the requirements of ASTM A 615, (Grade 60) and applicable criteria within Section 03300 of these specifications.

2.02 CONCRETE AND RELATED MATERIALS:

A. General: Concrete and related materials including, but not necessarily limited to, joint materials, membranes and curing compounds shall conform to Section 03300 of these Specifications.

B. Class: All concrete shall be Class "A" (compressive strength at 28 days = 4,000 psi) conforming to applicable requirements of Section 03300 of these specifications.

C. Water used in mixing concrete shall be fresh, clean, potable water free from injurious amounts of oil, acid, alkali, vegetable, wastewater and/or organic matter. Water shall be considered as weighing 8.33 pounds per gallon.

D. Admixtures shall meet the following requirements:
1. Except as herein specified, no curative or hardening admixtures shall be used.
2. An air entrainment agent capable of providing three to six percent air shall be used. Air entraining admixtures, which are added to concrete mixtures, shall conform to ASTM C 260 for Air Entraining Admixtures for Concrete.

E. Sub-base shall be constructed of durable material such as crushed stone, crushed limestone, bank-run gravel, blast furnace slag or steam-boiler cinders. Minimum depth of sub-base below curbing shall be 2-inches.

F. Joint filler shall be a non-extruding joint material conforming to AASHTO M213 for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (non- extruding and resilient bituminous types). The filler for each joint shall be furnished in a single piece for the full depth and width required for the joint unless otherwise specified by the Owner.

2.03 OTHER MATERIALS:

All other materials, not specifically described, but required for complete and proper installation of the work of this Section shall be as selected by the Contractor subject to the approval of the Project Landscape Architect.

PART 3 - EXECUTION

3.01 EARTHWORK:

A. General: All earthwork shall be performed in accordance with Section 02200 of these Specifications and as specified in this Section.

B. Backfilling:
1. After the concrete has set sufficiently, the spaces on both sides of the gutter and combined curb and gutter shall be backfilled, and the materials compacted and left in a neat condition.
2. Curbs to be used in the construction of asphalt pavements shall be backfilled prior to placement of base material.

3.02 INSTALLATION:

A. Concrete Reinforcement: All concrete reinforcement shall be installed in accordance with ASTM A615.

B. Forming:
1. Forms shall be metal and of an approved section. They shall be straight, free from distortions, and shall show no vertical variation greater than 1/8-inch in 10 feet, and shall show no lateral variation greater than 1/4-inch in 10 feet from the true plane surface on the vertical face of the form.
2. Forms shall be of the full depth of the structure and be so constructed as to permit the inside forms to be securely fastened to the outside forms.
3. Securely hold forms in place true to the lines and grades indicated on the Drawings.
4. Wood forms may be used on sharp turns and for special sections as approved by the Owner.
5. Where wooden forms are used, they shall be free from warp and the nominal depth of the structure.
6. All mortar and dirt shall be removed from forms and all forms shall be thoroughly oiled or wetted before any concrete is deposited.

7. The supply of forms shall be sufficient to permit their remaining in place at least 12 hours after the concrete has been placed.

C. Concrete: Concrete shall be placed in accordance with Section 03300 of these Specifications.

D. Joints:
1. Joints shall be constructed as indicated on the Drawings and as specified.
2. Construct joints true to line with their faces perpendicular to the surface of the structure and within 1/4-inch of their designated position.
3. Thoroughly spade and compact the concrete at the faces of all joints to fill all voids.
4. Install expansion joint materials at the point of curve at all street returns.
5. Install expansion joint material behind the curb at abutment to sidewalks and adjacent structures.
6. Place contraction joints every 10 feet along the length of the curbs and gutters.
7. Form contraction joints using steel templates or division plates which conform to the cross section of the structure. Leave the templates in place until the concrete has set sufficiently to hold its shape, but remove them while the forms are still in place.
8. Contraction joint templates or plates shall not extend below the top of the steel reinforcement or shall be notched to permit the reinforcement to be continuous through the joint.
9. Contraction joints shall be a minimum of 1-1/2-inches deep.

E. Finishing:
1. Strike off the surface with a template and finish the surface with a wood float using heavy pressure, after which contraction joints shall be made and the surface finished with a wood float or steel trowel.
2. Finish the face of the curbs at the top and bottom with an approved finishing tool of the radius indicated on the Drawings.
3. Finish edges with an approved finishing tool having a 1/4-inch radius.
4. Provide a final broom finish by lightly combing with a stiff broom after troweling is complete.
5. The finished surface shall not vary more than 1/8-inch in 10 feet from the established grade.

F. Concrete Curing:
1. After finishing operations have been completed and immediately after the free water has left the surface, the surface of the structure shall be completely coated and sealed with a uniform layer of curing compound.
2. The compound shall be applied in one or two applications as directed by the Owner. When the compound is applied in two increments, the second application shall follow the first application within 30 minutes.
3. The compound shall be applied continuously by means of an automatic self- propelled, pressure sprayer as approved by the Owner at the rate directed by the Owner, but not less than one gallon per 200 square feet of surface.
4. The equipment shall provide adequate stirring of the compound during application.
5. Should the method of applying the compound not produce uniform coverage, its use shall be discontinued, and the curing shall be by another method approved by the Owner.

G. Protection:

1. Provide and use sufficient coverings for the protection of the concrete in case of rain or breakdown of curing equipment.
2. Provide necessary barricades and lights to protect the work and rebuild or repair to the approval of the Owner. All damage caused by people, vehicles, animals, rain, the Contractor's operations and the like shall be repaired by the Contractor at no additional expense to the Owner.

H. Driveway and Sidewalk Ramp Openings:
1. Provide driveway openings of the widths and at locations as indicated on the Drawings and directed by the Project Landscape Architect.
2. Provide sidewalk ramp openings as indicated on the Drawings in conformance with the applicable regulations and as directed by the Project Landscape Architect.

3.03 PATCHING:

A. Inspect, patch and repair all concrete in accordance with the requirements of these Specifications.

3.04 ROAD AND DRAINAGE EXCAVATION:

A. Site excavation, as indicated on the Drawings or as directed by the Owner, shall be performed in accordance with the requirements of Section 02200 of these Specifications.

3.05 SUBGRADE PREPARATION:

A. The subgrade shall be formed by excavating to the required depth below the finished surface of the respective types, in accordance with the dimensions and designs indicated on the Drawings or as directed by the Owner, and shall be of such width as to permit the proper installation and bracing of forms. The subgrade shall be compacted by hand tamping and all soft, yielding or unsuitable material shall be removed and backfilled with satisfactory material and again compacted thoroughly and finished to a smooth and unyielding surface. The finished grade shall be to the dimensions and design indicated on the Drawings or as directed by the Owner for the bottom of the proposed construction.

3.06 CLEANING:

A. All excess or unsuitable material shall be disposed of in a manner satisfactory to the Owner.

B. Final clean up shall be performed in accordance with the requirements of these Specifications.

C. All material becoming the property of the Owner shall be stored in a manner and at locations near or on the Project as directed by the Owner.

END OF SECTION

SECTION 02540

EROSION, SEDIMENT & POLLUTION CONTROL

PART 1 – GENERAL

1.1 SCOPE

A. Work described in this section includes the containment of sediment transport, control of erosion and treatment of pollutants prior to, during and throughout all construction operations; establishment of permanent vegetative cover and continued maintenance of said measures in accordance with Part III, paragraph 3.4 of this section.

B. Contractor is solely responsible for protection of downstream properties from encroachment or damage from soil erosion and/or the discharge of pollutants by water or air to any areas off the Project site.

C. All control measures shown on the Drawings are to be considered the minimum required; additional measures may be required. Provide same as required.

1.2 SUBMITTALS

A. Schedule of operations: Submit schedule of exact dates operations including program of erosion, sediment and pollution control measures, maintenance of all said measures including control facilities, structures and devices and vegetative practices. Show anticipated starting and completion dates for land-disturbing activities including excavation, filling and rough grading, finished grading, construction of temporary and permanent control measures, and disposition of temporary erosion sediment and pollution control measures.

1.3 PROJECT CONDITIONS

A. Furnish and install all control measures prior to or concurrent with any land disturbance activity. The Contractor is responsible for the initial provision and installation all control measures and then the continued provision and installation of all measures throughout all construction operations and all sequences of construction operations.

B. Schedule grading operations to allow permanent erosion control to take place in the same construction season. Avoid or minimize exposure of soils to winter weather. Maintain all controls until vegetative cover has been established.

C. Construct and maintain temporary control measures until such time as permanent measures are effective in control of erosion, sediment and pollution from the site. Extent of measures shall be responsibility of Contractor.

D. Stop all erosion, sediment or pollution from leaving the site and encroaching on downstream or surrounding properties.

E. Temporary grassing shall be applied to all disturbed areas left idle for 72 hours.

F. Contractor is responsible for all quantities of all control measures regardless if shown on the Drawings. The extent of soil erosion control measures shown on the Drawings should be considered minimum.

G. All expenses related to the removal, relocation, replacement and/or rerouting of any and all existing utilities or other built, stored, stockpiled items of any kind, surface or subsurface is the responsibility of the contractor and will be included in the Contract Sum.

1.4 QUALITY CRITERIA

A. Procedures shall comply with "Manual for Erosion and Sediment Control in Georgia", latest edition published by the Georgia Soil and Water Conservation Committee." Contractor is required to keep a log book on site documenting his inspection of all control devices (minimum once/week and within 24 hours of any storm event) and noting any corrections or modifications. General Contractor must also file a "Notice of Termination" when the site is finally stabilized and all stormwater management systems have been constructed and have been proven to be functioning in accordance with the Design Concept(s).

B. Reference the Drawings for any other procedural manuals, publications, permits or other field guidelines required for the Contractor to obtain, understand and utilize in the performance of his work. Be reference of same, said materials are made a part of these Specifications.

PART 2 – PRODUCTS

2.1 FILTER FABRIC

A. Filter fabric for silt fences shall be a 36" Georgia DOT approved pervious sheet of synthetic polymer filaments non-woven from continuous filaments with wire fence backing. Filter fabric shall be of type recommended by its manufacturer for the intended application. The filter fabric shall meet the following requirements:
   1. APS 600 Series Silt Stop, as manufactured by Applied Polymer Systems, Woodstock, Georgia, Contact Steve Iwinski (678) 494-5998.
   2. GeoPolymer as manufactured by GeoStop.

3. Soil Mulch Polymer as manufactured by Soil Mulch.

B. Polymer shall be applied utilizing a hydro seeder mix of appropriate seed, fertilizer, lime and mulch for the same acre or without seed/fertilizer/lime/mulch mix.

C. Follow all manufacturers' instructions and recommendations. Do not mechanically disturb treated areas after application. (This does not include foot traffic as necessary to install erosion control blanket).

D. Contractor shall furnish and install as necessary a minimum 200 lbs. of erosion control polymer for incidental "touch-up" or "point source erosion areas".

E. Furnish two forms of synthetic polymer:
1. Emulsion polymer for hydro seeder application with an active strength of 30%.
2. Powder polymer for hand spreading with an active strength of 95%.

PART 3 – EXECUTION

3.1 TEMPORARY EROSION CONTROL DEVICES

A. Construct temporary sediment barriers of silt fence at all points where surface water flows from construction area bypassing a temporary sediment traps if the area is subject to soil erosion; or as otherwise indicated on Drawings or as deemed necessary by inspectors.

B. Install temporary sediment traps and temporary sediment basins in accordance with the location and details shown on the Drawings. Remove accumulated sediment when they are one-third full of silt continually until permanent vegetative cover is established.

C. Install construction exit as indicated on Drawings. Maintain to prevent tracking and flow of mud onto public roads.

D. Construct diversion berms, dikes (2'-0" wide x 1'-6" tall) or ditches at the tops of all slopes or otherwise indicated on the Drawings. Machine compact these elements and plant temporary seed until permanent vegetative cover can be established.

E. Maintain temporary barriers until permanent erosion control measures are established. Repair and replace barriers damaged or displaced by construction activity.

3.2 SEDIMENTATION FACILITIES

A. Flush drainage lines between manholes and drainage structures as required during construction and after establishment of permanent erosion control measures to remove collected debris.

B. Install rip rap at all locations indicated on Drawings as soon as feasible. It shall be reasonably well-graded granite stone sized from smallest to maximum size specified. Stones smaller than smallest size specified are not permitted. Control gradation of rip rap by visual inspection to assure thickness of rip rap conforms with contract document requirements. Provide geotextile filter fabric under rip rap.

3.3 GROUND COVER

A. Protect all exposed soils with mulching (temporary measure) and vegetative ground cover (permanent measure).

B. Ground cover consists of temporary seeding on all graded areas which will not receive final grading or permanent planting within three (3) days.

C. All grassing or planting operations shall include mulching as stabilization until ground cover by planting is effective.

D. Reseed as required until full vegetative coverage is established.

3.4 MAINTENANCE

A. Inspect all control elements after each rainfall event and a minimum of every two (1) weeks when no rainfall event(s) occur. Clear all debris and accumulated sediment from behind barriers when half full so their functional capacity is not reduced. Repair and replace any and all damaged measures of any kind.

B. Maintain all erosion, sedimentation, pollution control measures for delivery of correct pond volume for a period of thirty (30) calendar days.

3.5 REMOVAL OF TEMPORARY EROSION CONTROL DEVICES

A. Remove all debris resulting from temporary erosion control from Project site.

B. Control dust from disturbed areas by means of mulching, irrigation, calcium chloride or other method subject to the Engineer's review.

END OF SECTION 02540

SECTION 02630

STORM DRAINAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes storm drainage on the site.

B. Related Sections include the following:

1. Division 3 Section "Cast-in-Place Concrete" for concrete structures.

1.3 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene plastic.a

B. EPDM: Ethylene-propylene-diene-monomer rubber.

C. PE: Polyethylene plastic.

D. PVC: Polyvinyl chloride plastic.

E. RCP: Reinforced Concrete Pipe

1.4 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Nonpressure-Piping Pressure Ratings: At least equal to system test pressure.

B. Force-Main Pressure Ratings: At least equal to system operating pressure, but not less than 150 psig (1035 kPa).

1.5 SUBMITTALS

A. Product Data: For the following:

1. Polymer-concrete, channel drainage systems.

2. Plastic, channel drainage systems.
3. Stainless-steel drainage systems.
4. Backwater valves, cleanouts, and drains.
5. Plastic dry wells.
6. Stormwater disposal systems.

B. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic structures, pipe, and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

C. Handle precast concrete manholes and other structures according to manufacturer's written rigging instructions.

1.7 PROJECT CONDITIONS

A. Site Information: Perform site survey, research public utility records, and verify existing utility locations.

B. Locate existing structures and piping to be closed and abandoned.

C. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Architect not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's written permission.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products meeting the specifications.

See Editing Instruction No. 1 in the Evaluations for cautions about naming products and manufacturers.

2.2 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe and fitting materials.

2.3 PIPES AND FITTINGS

A. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76, Wall C, for gasketed joints.

1. Gaskets: ASTM C 443, rubber.

2.4 SPECIAL PIPE COUPLINGS AND FITTINGS

A. Sleeve-Type Pipe Couplings: ASTM C 1173, rubber or elastomeric sleeve and band assembly fabricated to mate with OD of pipes to be joined, for nonpressure joints.

1. Sleeve Material for Concrete Pipe: ASTM C 443, rubber.

B. Bushing-Type Pipe Couplings: ASTM C 1173, rubber or elastomeric bushing fabricated to mate with OD of smaller pipe and ID of adjoining larger pipe, for nonpressure joints.

1. Material for Concrete Pipe: ASTM C 443, rubber.

2.6 MANHOLES

A. Normal-Traffic Precast Concrete Manholes: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for rubber gasketed joints.

1. Diameter: 48 inches minimum, unless otherwise indicated.
2. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
3. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.

4. Riser Sections: 4-inch minimum thickness, and lengths to provide depth indicated.
5. Top Section: Eccentric-cone type, unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
6. Gaskets: ASTM C 443, rubber.
7. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch- diameter frame and cover.
8. Steps: Fiberglass, individual steps or ladder. Include width that allows worker to place both feet on one step and is designed to prevent lateral slippage off step. Cast or anchor into base, riser, and top section sidewalls with steps at 12- to 16- inch intervals. Omit steps for manholes less than 60 inches deep.
9. Steps: ASTM C 478, individual steps or ladder. Omit steps for manholes less than 60 inches deep.
10. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

B. Heavy-Traffic Precast Concrete Manholes: ASTM C 913; designed according to ASTM C 890 for A-16, heavy-traffic, structural loading; of depth, shape, and dimensions indicated, with provision for rubber gasketed joints.

1. Ballast: Increase thickness of one or more precast concrete sections or add concrete to structure, as required to prevent flotation.
2. Gaskets: Rubber.
3. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch-diameter frame and cover.
4. Steps: Fiberglass, individual steps or ladder. Include width that allows worker to place both feet on one step and is designed to prevent lateral slippage off step. Cast or anchor into base, riser, and top section sidewalls with steps at 12- to 16- inch intervals. Omit steps for manholes less than 60 inches deep.
5. Steps: Manufactured from deformed, 1/2-inch steel reinforcement rod complying with ASTM A 615/A 615M and encased in polypropylene complying with ASTM D 4101. Include pattern designed to prevent lateral slippage off step. Cast or anchor into sidewalls with steps at 12- to 16-inch intervals. Omit steps for manholes less than 60 inches deep.
6. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

C. Cast-in-Place Concrete Manholes: Construct of reinforced-concrete bottom, walls, and top; designed according to ASTM C 890 for A-16, heavy-traffic, structural loading; of depth, shape, dimensions, and appurtenances indicated.

1. Ballast: Increase thickness of concrete, as required to prevent flotation.
2. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch- diameter frame and cover.

3. Steps: Fiberglass, individual steps or ladder. Include width that allows worker to place both feet on one step and is designed to prevent lateral slippage off step. Cast or anchor into sidewalls with steps at 12- to 16-inch intervals. Omit steps for manholes less than 60 inches deep.
4. Steps: Manufactured from deformed, 1/2-inch steel reinforcement rod complying with ASTM A 615/A 615M and encased in polypropylene complying with ASTM D 4101. Include pattern designed to prevent lateral slippage off step. Cast or anchor into sidewalls with steps at 12- to 16-inch intervals. Omit steps for manholes less than 60 inches deep.

E. Manhole Frames and Covers: ASTM A 536, Grade 60-40-18, ductile-iron castings designed for heavy-duty service. Include 24-inch ID by 7- to 9-inch riser with 4-inch minimum width flange, and 26-inch-diameter cover. Include indented top design with lettering "STORM SEWER" cast into cover.

2.7 CATCH BASINS

A. Normal-Traffic, Precast Concrete Catch Basins: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for rubber gasketed joints.

1. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.
2. Riser Sections: 4-inch minimum thickness, 48-inch diameter, and lengths to provide depth indicated.
3. Top Section: Eccentric-cone type, unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
4. Gaskets: ASTM C 443, rubber.
5. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch-diameter frame and grate.
6. Steps: Fiberglass, individual steps or ladder. Include width that allows worker to place both feet on one step and is designed to prevent lateral slippage off step. Cast steps or anchor ladder into base, riser, and top section sidewalls at 12- to 16- inch intervals. Omit steps for catch basins less than 60 inches deep.
7. Steps: ASTM C 478, individual steps or ladder. Omit steps for catch basins less than 60 inches deep.
8. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

B. Heavy-Traffic, Precast Concrete Catch Basins: ASTM C 913, precast, reinforced concrete; designed according to ASTM C 890 for A-16, heavy-traffic, structural loading; of depth, shape, and dimensions indicated, with provision for rubber gasketed joints.

1. Gaskets: Rubber.

2. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch-diameter frame and grate.
3. Steps: Fiberglass, individual steps or ladder. Include width that allows worker to place both feet on one step and is designed to prevent lateral slippage off step. Cast steps or anchor ladder into base, riser, and top section sidewalls at 12- to 16- inch intervals. Omit steps for catch basins less than 60 inches deep.
4. Steps: Manufactured from deformed, 1/2-inch steel reinforcement rod complying with ASTM A 615/A 615M and encased in polypropylene complying with ASTM D 4101. Include pattern designed to prevent lateral slippage off step. Cast or anchor into sidewalls with steps at 12- to 16-inch intervals. Omit steps for manholes less than 60 inches deep.
5. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

C. Cast-in-Place Concrete, Catch Basins: Construct of reinforced concrete; designed according to ASTM C 890 for structural loading; of depth, shape, dimensions, and appurtenances indicated.

1. Bottom, Walls, and Top: Reinforced concrete.
2. Channels and Benches: Concrete.
3. Steps: Fiberglass, individual steps or ladder. Include width that allows worker to place both feet on one step and is designed to prevent lateral slippage off step. Cast steps or anchor ladder into sidewalls at 12- to 16-inch intervals. Omit steps for catch basins less than 60 inches deep.
4. Steps: Manufactured from deformed, 1/2-inch steel reinforcement rod complying with ASTM A 615/A 615M and encased in polypropylene complying with ASTM D 4101. Include pattern designed to prevent lateral slippage off step. Cast or anchor into sidewalls with steps at 12- to 16-inch intervals. Omit steps for manholes less than 60 inches deep.

D. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for heavy- duty service. Include flat grate with small square or short-slotted drainage openings.

1. Size: 24 by 24 inches minimum, unless otherwise indicated.
2. Grate Free Area: Approximately 50 percent, unless otherwise indicated.

E. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for heavy- duty service. Include 24-inch ID by 7- to 9-inch riser with 4-inch minimum width flange, and 26-inch-diameter flat grate with small square or short-slotted drainage openings.

1. Grate Free Area: Approximately 50 percent, unless otherwise indicated.

2.8 STORMWATER INLETS

A. Curb Inlets: Made with vertical curb opening, of materials and dimensions according to utility standards.

B. Gutter Inlets: Made with horizontal gutter opening, of materials and dimensions according to utility standards. Include heavy-duty frames and grates.

C. Combination Inlets: Made with vertical curb and horizontal gutter openings, of materials and dimensions according to utility standards. Include heavy-duty frames and grates.

D. Frames and Grates: Heavy-duty frames and grates according to utility standards.

E. Curb Inlets: Vertical curb opening, of materials and dimensions indicated.

F. Gutter Inlets: Horizontal gutter opening, of materials and dimensions indicated. Include heavy-duty frames and grates.

G. Combination Inlets: Vertical curb and horizontal gutter openings, of materials and dimensions indicated. Include heavy-duty frames and grates.

H. Frames and Grates: Dimensions, opening pattern, free area, and other attributes indicated.

1. Material: ASTM A 536, Grade 60-40-18 minimum, ductile-iron casting.
2. Material: ASTM A 48, Class 30 minimum, gray-iron casting.
3. Grate Free Area: Approximately 50 percent, unless otherwise indicated.

2.10 CONCRETE

A. General: Cast-in-place concrete according to ACI 318, ACI 350R, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Portland Cement Design Mix: 3000 psi minimum, with 0.45 maximum water-cementitious ratio.

1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.

C. Structure Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 3000 psi minimum, with 0.45 maximum water-cementitious ratio.

1. Include channels and benches in manholes.

   a. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.

      1) Invert Slope: 1 percent through manhole.
      2) Invert Slope: 2 percent through manhole.
      3) Invert Slope: None.

   b. Benches: Concrete, sloped to drain into channel.

      1) Slope: 8 percent.
      2) Slope: 4 percent.

2. Include channels in catch basins.

   a. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.

      1) Invert Slope: 1 percent through catch basin.
      2) Invert Slope: 2 percent through catch basin.
      3) Invert Slope: None.

D. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water-cementitious ratio.

1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.

2.11 PIPE OUTLETS

A. Head Walls: Cast-in-place reinforced concrete, with apron and tapered sides.

B. Riprap Basins: Broken, irregular size and shape, graded stone.

1. Average Size: NSA No. R-5, screen opening 5 inches.

C. Filter Stone: NSA No. FS-2, No. 4 screen opening, average-size, graded stone.

D. Energy Dissipators: NSA No. A-1, 3-ton average weight armor stone, unless otherwise indicated.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Division 2 Section "Earthwork."

3.2 IDENTIFICATION

A. Materials and their installation are specified in Division 2 Section "Earthwork." Arrange for installing green warning tapes directly over piping and at outside edges of underground structures.

1. Use warning tape or detectable warning tape over ferrous piping.
2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.3 PIPING APPLICATIONS

A. General: Include watertight, silttight, or soiltight joints, unless watertight or silttight joints are indicated.

B. Refer to Part 2 of this Section for detailed specifications for pipe and fitting products listed below. Use pipe, fittings, and joining methods according to applications indicated.

C. Gravity-Flow Piping: Use the following:

12. NPS 4 and NPS 6: High Density Polyethelene pipe and fittings, connecting bands, and banded joints.
25. NPS 8 to NPS 15: High Density Polyethelene pipe and fittings, connecting bands, and banded joints.
34. NPS 18 to NPS 36: High Density Polyethelene pipe and fittings, connecting bands, and banded joints.

3.4 SPECIAL PIPE COUPLING AND FITTING APPLICATIONS

A. Special Pipe Couplings: Use where required to join piping and no other appropriate method is specified. Do not use instead of specified joining methods.

1. Use the following pipe couplings for nonpressure applications:

a. Sleeve type to join piping, of same size, or with small difference in OD.
b. Increaser/reducer-pattern, sleeve type to join piping of different sizes.

c. Bushing type to join piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

2. Use pressure-type pipe couplings for force-main joints. Include PE film, pipe encasement.

B. Special Pipe Fittings: Use where indicated. Include PE film, pipe encasement.

3.5 INSTALLATION, GENERAL

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab or drag in line, and pull past each joint as it is completed.

C. Use manholes for changes in direction, unless fittings are indicated. Use fittings for branch connections, unless direct tap into existing sewer is indicated.

D. Use proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

E. Install gravity-flow piping and connect to building's storm drains, of sizes and in locations indicated. Terminate piping as indicated.

1. Install piping pitched down in direction of flow, at minimum slope of 1 percent, unless otherwise indicated.
2. Install piping with 12-inch minimum cover.

F. Extend storm drainage piping and connect to building's storm drains, of sizes and in locations indicated. Terminate piping as indicated.

K. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or a combination of both.

3.6 PIPE JOINT CONSTRUCTION AND INSTALLATION

A. General: Join and install pipe and fittings according to installations indicated.

B. Refer to Division 2 Section "Utility Materials" for basic piping joint construction and installation

C. Concrete Pipe and Fittings: Install according to ACPA's "Concrete Pipe Installation Manual." Use the following seals:

1. Round Pipe and Fittings: ASTM C 443, rubber gaskets.

D. System Piping Joints: Make joints using system manufacturer's couplings, unless otherwise indicated.

E. Join piping made of different materials or dimensions with couplings made for this application. Use couplings that are compatible with and that fit both systems' materials and dimensions.

3.7 MANHOLE INSTALLATION

A. General: Install manholes, complete with appurtenances and accessories indicated.

B. Form continuous concrete channels and benches between inlets and outlet.

C. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 24 inches above finished surface elsewhere, unless otherwise indicated.

D. Install precast concrete manhole sections with gaskets according to ASTM C 891.

E. Construct cast-in-place manholes as indicated.

F. Install fiberglass manholes according to manufacturer's written instructions.

3.8 CATCH-BASIN INSTALLATION

A. Construct catch basins to sizes and shapes indicated.

B. Set frames and grates to elevations indicated.

3.9 STORM DRAINAGE INLET AND OUTLET INSTALLATION

A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.

B. Construct riprap of broken stone, as indicated.

C. Install outlets that spill onto grade, anchored with concrete, where indicated.

D. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.

E. Construct energy dissipators at outlets, as indicated.

3.10 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318 and ACI 350R.

3.11 DRAINAGE SYSTEM INSTALLATION

A. Assemble and install components according to manufacturer's written instructions.

B. Assemble and install stainless-steel drainage systems according to ASME A112.3.1 and manufacturer's written instructions.

C. Install with top surfaces of components, except piping, flush with finished surface.

D. Assemble channel sections to form slope down toward drain outlets. Use sealants, adhesives, fasteners, and other materials recommended by system manufacturer.

E. Embed channel sections and drainage specialties in 4-inch (100-mm) minimum concrete around bottom and sides.

F. Fasten grates to channel sections if indicated.

G. Assemble trench sections with flanged joints.

H. Embed trench sections and drainage specialties in 4-inch (100-mm) minimum concrete around bottom and sides.

I. Make piping connections and install stainless-steel piping with gasketed joints between system components.

3.12 DRAIN INSTALLATION

A. Install type of drains in locations indicated.

B. Embed drains in 4-inch minimum depth of concrete around bottom and sides.

C. Fasten grates to drains if indicated.

D. Set drain frames and covers with tops flush with pavement surface.

3.14 CLOSING ABANDONED STORM DRAINAGE SYSTEMS

A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:

1. Close open ends of piping with at least 8-inch-thick, brick masonry bulkheads.
2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
3. Pump remaining pipe full of grout.

B. Abandoned Structures: Excavate around structure as required and use one procedure below:

1. Remove structure and close open ends of remaining piping.
2. Remove top of structure down to at least 36 inches (1000 mm) below final grade. Fill to within 12 inches (300 mm) of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.
3. Backfill to grade according to Division 2 Section "Earthwork."

3.15 FIELD QUALITY CONTROL

A. Clear interior of piping and structures of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed.

1. In large, accessible piping, brushes and brooms may be used for cleaning.
2. Place plug in end of incomplete piping at end of day and when work stops.
3. Flush piping between manholes and other structures to remove collected debris, if required by authorities having jurisdiction.

B. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches (600 mm) of backfill is in place, and again at completion of Project.

1. Submit separate reports for each system inspection.
2. Defects requiring correction include the following:

    a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.

c. Crushed, broken, cracked, or otherwise damaged piping.
d. Infiltration: Water leakage into piping.
e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
4. Reinspect and repeat procedure until results are satisfactory.

END OF SECTION 02630

SECTION 02700

GROUTING OF SANITARY AND STORM SEWER LINES

PART 1 - GENERAL

1.1 CLEANING

A. The term "cleaned" shall mean the removal of all sand, dirt, roots, grease and all other solids or semi-solid materials from the sewer lines. Grouting repairs shall be conducted immediately following cleaning.

1. Cleaning Equipment
   a. The contractor shall provide all equipment necessary for cleaning the sanitary sewers. The equipment used shall be suitable for the sewer conditions and degree of cleaning necessary. The equipment shall meet the following criteria:
      1) Mechanically powered equipment:
         a) A heavy-duty power rodding machine shall be capable of rodding distances of up to 1,000 feet in one step-up. It shall have the ability to spin the rid either clockwise or counterclockwise, but able to be pushed straight out or pulled back without rotating the machine. It shall also be capable of pulling pipe-size swabs or brushed back through the pipeline for cleaning and flushing purposes. A heavy-duty bucket machine shall be used on dragline work to clean the pipeline with buckets, brushes, scrapers, swabs or other similar devices in order to effectively remove the debris and provide a clean sewer or service lateral.
      2) Hydro cleaning Equipment:
         a) Hydraulic high-pressure sewer cleaners used for sanitary and storm sewer cleaning shall be specifically designed and constructed for such cleaning. The sewer cleaner shall have a minimum usable water capacity of 600 gallons and pump capable of delivering at least 30 gallons per minute (GPM) at 1,000 psi. Pressure to the nozzle shall be regulated by a relief valve adjustable from 1-1,500 psi minimum.
   b. Satisfactory precautions shall be taken to protect the sewer from damage that might be inflicted by the improper use of cleaning equipment. Sewers or service laterals damaged, as a result of the Contractor's operations shall be promptly repaired by the Contractor at no cost to the City. This includes damage caused by any materials (liquid or solid) that are blown or pushed back in residents' home through the sewer laterals.
   c. All equipment, devices and tools required for this Contract shall be owned (or leased) and operated by the Contractor.

2. Cleaning Sewers
   a. Selection of sewer cleaning equipment shall be based on the conditions of the sewers at the time the work commences. If cleaning an entire reach of sewer cannot be completed from one manhole, the Contractor shall move to another manhole to complete the work. If the Contractor cannot successfully complete the work after relocating his equipment, the City shall be notified immediately.
   b. Remove all sludge, dirt, sand, grease, roots, and other materials from the pipe and collect and remove resulting debris from the downstream manhole of the sewer section being cleaned. Passing material from section to section which could be detrimental to pumping equipment or cause accumulations in wet wells will not be permitted. When necessary, an approved dam or weir shall be constructed in the downstream manhole in such a manner that construction debris and solids will be trapped and retained.
   c. All roots must be removed prior to grouting. If roots are detected during the sealing of joint/defects/service laterals in a reach, the Contractor will be required to remove his grouting equipment from the line, re-clean to effect root removal and reinsert the grouting equipment to the point where the grouting was stopped and continue the operation.
   d. Existing flows shall not be interrupted for periods longer than one hour without prior written approval from the City. Sewage diverted during cleaning operations shall be returned to the sanitary system and not discharged into the streams or storms drain system. Cleaning of these sewers by means of hydraulic high-pressure jetting will be permitted.

3. Disposal of Debris
   a. Under no circumstances shall sewage or solids be dumped onto the ground surface, streets or into ditches, catch basins or storm drains.
   b. All solids or semi-solids resulting from the operations shall be removed from the site by the Contractor. Trucks hauling solids or semi-solids from the site shall be watertight so that no leakage or spillage will occur.
   c. Disposal shall be at a suitable site selected by the Contractor and approved by the appropriate jurisdictional personnel.

4. Re-Cleaning
   a. If pipeline is found not to be properly cleaned in the opinion of the City, the television and grouting equipment shall be removed and the sewer re-cleaned at no additional expense to the City.

1.2 GROUTING

A. Prior to commencement of joint air testing, the test equipment shall be positioned on a section of sound sewer pipe between pipe joints, and a demonstration performed as described herein. The procedure will demonstrate the authenticity of the air test equipment, as no joint will test in excess of the pipe capability. Should it be found that the barrel of the sewer pipe will not meet the joint test requirements, then the

requirements will be modified to within the pipe integrity limits. If this test cannot be performed successfully, the Contractor shall be instructed to repair or otherwise modify his equipment and re-perform the test until the results are satisfactory to the City. This test may be required at any other time during the joint testing program if the City suspects the testing equipment is not functioning properly.

1. Pipe grouting equipment – general requirements
    a. The Contractor shall submit his equipment list to the City.
    b. The Contractor shall allow the City to inspect his equipment. It shall be approved prior to use in the field.
    c. The Contractor shall also demonstrate to the City the operation of and information provided by any gauges, motors or other readouts relating to the pipe and grouting work. This shall include the air test pressure gauge, the linear footage counter, volume of sealing material, etc.
    d. No work shall be considered for payment where measurement equipment and/or measuring techniques are unacceptable to the City at any time during the joint sealing program.
2. Chemical Grout Equipment
    a. Equipment shall be a remote-controlled grout injection rig type with inflatable diaphragms or packers at each end and other suitable approved devices which can be positioned to completely isolate each joint or break in the pipe and simultaneously permit sewage flow.
    b. Equipment shall consist of two (2) open chemical tanks as the chemicals reservoir, from which two (2) positive displacement electric pumps are fed for chemical injection with a combined discharge of no less than 5 GPM are pressures ranging from 1 to 800 psi.
    c. All components in the catalyst system shall be stainless steel, plastics or neoprene. Standard construction materials may be used for the components of the grout and inhibitor system.

3. Grouting materials for pipe
    a. The sealing materials shall be a chemical grout and catalyst system. The chemical grout used shall have a documented service of satisfactory performance in similar usage. The grout used shall be Avanti AV-100®, AV-118® or approved equal.
    b. All the materials shall be delivered to the site in undamaged, unopened containers bearing the manufacturer's original labels. Invoices or other means of providing delivery no more than three months prior to use shall be provided to the Engineer.
    c. Materials shall have the following minimum properties:
        1) A controllable reaction of from five (5) seconds to no more than six (6) hours, at a temperature from ambient to freezing.
        2) Viscosity of approximately 2.0 centipoise water which can be increased with additives.
        3) Viscosity to remain constant throughout the reaction period.
        4) The ability to tolerate some dilution and react in moving water.

5) The final reaction shall produce a continuous, irreversible, impermeable, nonporous still gel in pure form, or a stabilized soil in the ground that will not become rigid or brittle.
6) Root inhibitors, such as dichlobenil, shall be incorporated in the mix when roots are present in the joints. If a root inhibiting grout is unavailable from the grout manufacturer, the Contractor shall incorporate Casoron W50, dichlobenil or equal, at no cost to the City, into the grout mix in a quantity and manner recommended by the manufacturer. In so doing, the Contractor specifically covenants and agrees with the City that it shall make no claim against the City for any damages that it may incur as a result of any adverse effect the chemical Casoron W50, dichlobenil or equal may have upon the Contractor's equipment.
7) Use of catalyst containing dimethyl propionitrile (DMAPN) is prohibited.
8) Sealing materials, in place, shall contain no less than 10% of the acrylic base material by volume.

d. The specified materials are considered toxic and irritants to skin and eyes. Therefore, personnel thoroughly familiar with the handling of the chemicals involved shall do the mixing, handling, and pumping of the chemicals. Proper protection outerwear, including eye protection and respirators for dust inhalation protection, shall be used while mixing or when otherwise exposed to by close contact.
1) Chemical Grout
a) The chemical grout shall consist of an intimate mixture of dry Acrylamide and dry N.N. – Methylene-biscrylamide, in such proportions that dilute aqueous solutions, when properly catalyzed, will form still gels.
b) The grout must make a true solution at concentrations as high as the pounds per gallon water.
c) The chemical solution shall have the ability to tolerate groundwater dilution, and to react in moving water.
d) The solution shall have the ability to tolerate groundwater dilution, and to react in moving water.
e) The solution shall have a viscosity of less than 2 cps which remains constant until gelatin occurs.
f) The reaction time shall be controllable from 5 seconds to 6 hours, at temperatures from ambient to freezing.
2) Catalyst
a) The catalyst for the chemical grout shall be Ammonium Persulfate
3) Activator
a) The activator shall be Triethanolamine (T). Activators shall be used with catalyst for all applications at ambient temperature or below.
4) Dye Tracers

a) Dyes may be added to the chemical grout solution for ease in identification. Fluorescein, at concentrations of less than 20 ppm, may be used for this purpose. All other dyes must be checked for possible undesirable prior to use.

5) Insoluble (particulate) Additives
   a) Any inactive solid such as clay or diatomaceous earth may be mixed with the grout as a filler, in any amounts compatible with pumpability and does not affect the quality of the grout. Bentonite may be used to increase the viscosity and strengthen the gel.

6) Other Additives
   a) The effects of additives not specifically mentioned above must be determined by test, prior to approval for field use.

4. Joint Air Tests

a. The Contractor shall be required to air test all sanitary sewer line joints prior to any grouting to determine if the potential for joint leakage exists. The air testing procedures will be as described herein.

b. Joint air testing shall be performed by a void pressure monitoring system. This shall be accomplished by applying a positive air pressure to the joint, allowing time for the system to stabilize and measure the amount of pressure drop over a given length of time.

c. Testing shall be accomplished by isolating the area to be tested with the packer of grouting rig and applying a positive pressure into the void area. Continuous monitoring of the void pressures shall be maintained at all times by means of a pressure testing unit. The pressure meter sensing device shall be located within the void area and accurately transmit this pressure to a readout device located at the technicians TV monitor control panel. The system shall display gauge pressure to the nearest tenth ($1/10^{th}$) psi and shall respond to and record any change on the void pressure instantly. All pressure measurements shall be made at the void area.

d. Testing procedures shall generally consist of applying pressure of ½ psi per foot of depth plus one to two psi or a maximum of 10 psi onto each void area created by the testing device. Where sewers are extremely shallow, deep or in poor condition, the City will adjust the required pressure accordingly. Once the specified pressure in the void area has been displayed on the meter above ground, the application of pressure shall be stopped, and a five-second stabilization period shall commence. The meter shall be observed for 20 seconds and should the pressure in the void area drop more than ½ psi, the joint will have failed the test.

e. Upon completing the air testing of each joint, the packer shall be deflated. Should the void pressure meter fail to drop to zero, the Contractor shall be instructed to clean his equipment, or make the necessary repairs to provide for an accurate Void Pressure reading.

f. Any joint failing the air test prior to grouting shall be sealed as specified herein and retested by the same void pressure method and procedures following sealing to verify the effectiveness of the sealing. This procedure will be repeated until the joint passes the test. Additional sealing and retesting after the initial sealing and retesting shall be at no cost to the City.

5. Sealing Joints

a. The Contractor shall be required to seal any or all pipe joints, leaks, breaks, holes and other sources of possible groundwater infiltration within a sewer line or service lateral as may be observed on recorded television inspection, and as described herein. Any joint that is sealed shall subsequently be tested by air testing procedures described herein. Costs related to the air test following the sealing will not be measured for payment nor constitute additional cost to the Contract Price, but will be considered as incidental to the Contract.

b. All pipe joints and breaks shall be sealed by an internal, chemical grouting method. The method used shall not damage, break, move or cause settlement of sewer pipe or manhole structures, and shall be such that the original cross-sectional area and shape of the interior of the sewer shall not be permanently reduced or changed. Any sewer that the City may deem damaged as a result of the Contractor's operations shall be promptly repaired to the City's satisfaction at no expense.

c. Sealing materials that set to be hard, rigid product capable of intrusion into the sewer line will not be acceptable.

d. If roots were detected during the television inspection, these roots shall be removed immediately prior to any grouting operations. Costs related thereto will not be measured for payment nor constitute additional cost to the Contract Price, but will be considered as incidental to the Contract, unless chemical root removal is recommended by the City.

e. If, as determined by the City, concrete sewer pipe had become corroded to the degree that a positive air test cannot be achieved, the Contractor shall direct the back-pressure gaging be monitored to determine a proper seal.

6. Application of Chemical Grout

a. Provide chemical grouting of sewer joints, leaks, and breaks in the pipe by forcing sealing materials into and through any or all pipe line joints, leaks, or beaks, from within the sewer pipe. If grouting operations restrict or prevent simultaneous sewage flow passage, approved plug or by-pass pumping will be required. Maximum interruption of existing flows shall be limited to one hour unless the City gives prior written approval.

b. The grouting injection rig shall be positioned over the sewer joint, leak, or break in the pipe by means of a closed-circuit television camera in the line. Accurate measurement of the location of the joint to be sealed shall be made, using a portion of the grouting rig as "Datum" or measurement

point shall also be measurement point. Such measurement or point shall also be used to record measurement of the repaired joint. The grouting device shall be an open-ended cylindrical casing type of a size less than the pipe diameter with two cables connected to both ends to pull it back and forth or positioning it in the line. Any inflatable sleeves that require extreme pressure to "seat" against the periphery of the pipe causing pipe fracture will not be allowed. The sleeves shall be pneumatically expanded from the center to both ends. When in an inflated state, two widely spaced annular bladders shall have been formed, each of elongated shape and producing an annular void around the center portion of the casing. Expansion shall be regulated by precise pressure gages and control. No device which is expanded mechanically will be allowed. The pneumatically expanded sleeves shall seat against the inside periphery of the pipe in such a way as to form a voided area completely isolated from the remainder of the line. Two conduits shall pass through one end of the casing and shall be adapted to supply the sealing material, under pressure, to the space at the center of the casing. Into the isolated area, through hose lines leading from above ground, the chemical sealant shall be pumped with instant reading, metered flow controlled, proportioning pumps with pressure in excess of groundwater pressures.

c. The television, pumping, grouting and air pressure monitoring equipment shall be integrated so that proportions, quantities, and void pressure for materials and sealing can be instantly monitored and regulated in accordance with the type and size of the joint, break in the pipe or leak, void pressure changes and the rate of flow of the sealing solution in relation to the back pressures in order to effect a seal with a minimum amount of material.

d. In the event that large voids are encountered on the outside of the sewer, including the possibility of "piping" holes to the ground surface which could cause excessive use of grout, a change in operating pressures and pumping rates shall be made so as to avoid excessive use of grout. In such instances, changes in operating procedure shall be accomplished by reducing pressures and pumping rates followed by a termination of pumping until a temporary "set" of the gel is obtained on the outside of the pipe, and then, after sufficient lapse of time, followed by an increase in pressure and resumption of pumping until a proper seal of joint or break in the pipe is obtained.

e. Upon completion if the injection, the grouting rig shall be moved forward, wiping away the excess grout and allowing the television camera to move to a suitable position for inspection and/or air test. Each joint, cracks or holes shall then be again air tested as specified hereinbefore. Should any joint fail to pass the air test, it shall be released and retested until the test requirements can be met. If the repair or the other break in the pipe or

groundwater leak is deemed to defective by the Owner, the rig shall be moved back into position and the grouting process repeated, with possible modification of the grout composition, until proper sealing of the joint or break in the pipe has been obtained.

f. The excess grouting material removed from the joint or break by the grouting equipment shall be flushed or pushed forward to the next downstream manhole, removed from the sewer system and disposed of by the Contractor, as specified for disposal of debris resulting from cleaning operations. In no case shall excess grout material from succeeding sections be allowed to accumulate and be flushed down the sewer. The Contractor shall make a tight seal with his equipment at each joint or break to be grouted. If a tight seal is not secured, the Contractor shall remove the equipment and make such adjustments as are necessary to make a tight seal.

7. Monitoring Operations
   a. The Contractor shall provide for monitoring by closed circuit television in a manner which shall provide clear and visible pictures of the positioning of group equipment as well as the finished joint.
   b. Suitable metering devices shall be attached to the internal inspection equipment so that the exact location of the equipment with in the pipeline can be noted at all times.

8. Records
   a. For each section of sewer grouted, complete, accurate videotape and typed records shall be kept of joint sealing performed in each manhole section. The records shall include:
      1) Identification of the manhole section sealed.
      2) The location of each joint sealed.
      3) Sealing pressure used.
      4) Number of gallons of sealant used.
      5) A statement indicated the sealing results (passed or failed) for each joint sealed.
   b. A copy of the typewritten records shall be given to the Owner upon completion of the project.
   c. Title of the video tape records shall be given to the Owner upon completion of the project.
   d. These records shall show the location of each operation or point on information relative to the centerline distance from adjacent manholes clearly defined. Measurement of location shall be readable at ground level by means of a measuring device. Marking on cable or the like will not be allowed. As each repair is accomplished, notations shall be made on a pertinent location record showing amount to the repair or directed by the City.

9. Obstructions

a. Obstructions may be encountered during the course of the sealing operations that prevent the travel of the packer and camera. Should an obstruction not be passable, the Contractor shall withdraw the equipment and begin sealing operations from the opposite end. Of the sewer each. Should additional obstructions be encountered after the reemployment and no means are available for passing the obstructions without damage to the equipment, then the remaining sections of the sewer not sealed shall be excluded from the work requirements of the Contract. Costs related to difficulties encountered during sealing operations will not be measured for payment nor constitute any additional costs to the Contract Price, but will be considered as incidental to the Contract.

10. Supervision

a. Supervision of grouting shall be under the responsibility of a person with a minimum of five (5) years of experience in the application of chemical grout for infiltration control. This person shall be present at all times chemicals are mixed and applied, have overall responsibility for record keeping, and responsibility for safety procedures for protecting all personnel involved with the grouting operation. The name of this person shall be given to the City prior to beginning the grouting work.

11. Guarantee

a. All work performed by the Contractor shall be guaranteed for a period of one year after the completion and acceptance of the Contract. After a section between manholes has been leak-sealed and accepted by the Engineer, any and all sewer lines joints which develop renewed leakage during the guarantee period shall be resealed by the Contractor at no cost to the Owner. However, the Contractor will not be held responsible for leaks which develop in sewer line joints and are due to structural failure of pipeline or settlement not attributable to his operations.

b. Prior to expiration of the one-year guarantee period, the Owner may select several sewer sections for an initial retest. The manhole sections selected shall be representative of the majority of the grouting work originally performed. The initial re-test area shall consist of no more than 15% of the lineal feet contained in the original report.

c. Within the initial re-test area the Contractor shall re-test all previously grouted joints. Any joint failing the re-test shall be re-grouted. If the failure rate of the re-tested joints is 5% or less of the total joints re-tested, the work shall be considered satisfactory and no further re-testing will be necessary. However, if in the initial re-test area, the number of joints to fail exceeds 5% of the total joints re-tested, then all previously grouted joints shall be re-tested. All joints which fail shall be re-grouted.

d. In order to ensure that re-testing and any necessary re-grouting will be performed, 2% of the total Contract in cost will be retained in escrow until the re-testing has been satisfactorily completed.

END OF SECTION 02700

SECTION 02723

INLETS

PART 1 - GENERAL

1.1 SCOPE:

A. The work covered by this Section shall consist of furnishing all materials for and constructing complete, all curb type inlets at the locations shown on the Drawings or designated by the Engineer.

B. Curb type inlets shall be constructed to the size, shape and dimensions and at the locations shown on the Drawings or as directed by the Engineer. Inlets may be constructed either of brick or concrete masonry at the option of the Contractor. They shall be provided with cast iron frames and gratings as specified herein and shown on the Drawings.

C. Each inlet shall be connected to a nearby storm sewer as indicated on the Drawings by means of appropriate storm sewer and suitable fittings.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Concrete shall be 4,000 psi concrete conforming to the applicable requirements of Section 03300 of these Specifications.

B. Steel reinforcement shall conform to the requirements of Section 03300 of these Specifications.

C. Brick shall conform to ASTM C 32, Grade SM. Sand for mortar shall conform to ASTM C 144. Hydrated lime shall conform to ASTM C 206.

D. Frames and gratings shall be of the type shown on the Drawings. Iron castings shall conform to ASTM A 48, Class 30. All castings shall be true to pattern in form and dimensions, free from faults, sponginess, cracks, blowholes and other defects affecting their strength. Bearing surfaces between cast frames and gratings shall be machined, fitted together and match marked to prevent rocking. All castings shall be thoroughly cleaned and painted or coated with a coal tar pitch varnish.

E. All reinforced concrete pipe and special fittings shall be reinforced concrete culvert, storm drain, and sewer pipe conforming to the latest requirements of ASTM C 76. Pipe shall be of the Class III and shall have circular reinforcement for circular pipe. All applicable subsections of Section 02720 of these Specifications shall apply to the work of connecting the inlet to the sewer.

F. Precast Concrete Sections:

1. Precast concrete sections shall consist of a flat slab top section, and a base section conforming with the typical details as shown on the Drawings.
2. Precast concrete sections shall be manufactured, tested and marked in accordance with the latest provisions of ASTM C 478.
3. The minimum compressive strength of the concrete for all sections shall be 4,000 psi.
4. The maximum allowable absorption of the concrete shall not exceed eight percent of the dry weight.
5. The circumferential reinforcement in the riser sections and base wall sections shall consists of one line of steel and shall be not less than 0.17 square inch per lineal foot.
6. The ends of each reinforced concrete riser section and the bottom end of the top section shall be so formed that when the risers and the top are assembled, they will make a continuous and uniform structure.
7. Joints of the sections shall be of the tongue and groove type. Sections shall be joined using O-ring rubber gaskets conforming to the applicable provisions of ASTM C 443, latest revision, or filled with an approved preformed plastic gasket meeting the requirements of Federal Specifications SS-S-00210, "Sealing Compound, Preformed Plastic for Pipe Joints", Type 1, Rope Form.
8. Each section shall have not more than two holes for the purpose of handling and laying. These holes shall be tapered and shall be plugged with rubber stoppers or mortar after installation.
9. Cast iron manhole steps shall be installed in each section in accordance with the details on the Drawings.

G. Joint materials for concrete pipe shall be in accordance with the requirements of Section 02720 of these Specifications.

PART 3 - EXECUTION

3.01 EXCAVATION:

A. Excavation shall be in accordance with the requirements of Section 02200 of these Specifications.

3.02 CAST-IN-PLACE CONCRETE CONSTRUCTION:

A. Forms for concrete shall be constructed of such materials and in a manner meeting the requirements of Section 03300 of these Specifications.

B. Cast-in-place inlets shall be constructed in place with the base, walls and top all monolithically cast using removable forms of a material and design approved by the Engineer.

C. The vertical forms, vertical and horizontal wall spacers, steps and placing cone must be carefully positioned and firmly clamped in place before any placement is made. The wall spacers must be located 90 degrees from each other. The forms shall be firmly supported

with bottom of forms at the proper elevation to permit the base to be deposited through the vertical forms.

D. The base shall be deposited down through the wall forms onto undisturbed earth or rock bearing. It shall be evenly distributed around the walls and vibrated both inside and outside the forms until there is a minimum slope of 60 degrees from the bottom of the forms to the bearing surface both inside and outside of the inlet. When this is complete and before additional concrete is added, the concrete must be carefully vibrated on each side of each pipe.

E. The base shall be concentric with the inlet and have a minimum diameter of 16-inches greater than the outside diameter of the inlet, and 10-inch minimum thickness under the lowest pipe. Minimum wall thickness shall be 6-inches.

F. Additional concrete must be deposited in evenly distributed layers of approximately 18-inches with each layer vibrated to bond it to the preceding layer. The wall spacers must be raised as the placements are made. The concrete in the area from which the spacer is withdrawn shall be carefully vibrated. Excessive vibration shall be avoided.

G. If adjustment of the frame elevation is called for, concrete "do-nut" sections or brick shall be used.

H. Form marks and offsets shall not exceed 1-inch on the outside surface of the inlet. Form marks and offsets shall not exceed 1/2-inch inside of the inlet. All offsets on the inside surface shall be smoothed and rubbed so there is no projection or irregularity capable of scratching a worker or catching and holding water or solid materials. Honeycombed areas shall be completely removed immediately upon removal of the forms and replaced with a Class "A" concrete as directed by the Engineer.

I. Should circumstances make a joint necessary, a formed groove or reinforcing dowels shall be required in the top of the first placement for shear protection. Immediately before the second placement is made, the surface of the cold joint shall be thoroughly cleaned and wetted with a layer of mortar being deposited on the surface.

3.03 BRICK CONSTRUCTION:

A. Brickwork shall be constructed using one part Portland cement to two parts clean sand, thoroughly mixed to workable plastic mixture. Not over 20 pounds of hydrated lime per sack of cement may be added. No retempered mortar shall be used. Brick shall be laid with mortar joints 3/8-inch thick. The inside of the inlet shall be neatly finished with cement mortar 1/2-inch thick.

B. Each sixth brick course shall be a "Stretcher" course. Inside joints shall be trowel struck flush joints to provide smooth, clean surfaces. Joints shall be broken in successive

layers. Wall thickness for inlets 12 feet and less deep shall be 8-inches. Wall thickness for the portion of inlets over 12 feet deep shall be 12-inches.

C. After the foundation has been prepared and has been approved by the Engineer, the bottom shall be constructed to the required line and grade. After the bottom has been allowed to set for a period of not less than 24 hours, the inlet shall be constructed thereon, care being exercised to form the incoming and outgoing sewer pipe into the wall of the inlet at the required elevation.

D. Manhole steps shall be inserted into the wall of the manhole at the proper locations and elevations as the work progresses and shall be securely embedded in the masonry.

3.04 PRECAST CONCRETE CONSTRUCTION:

A. After the base section has been set, and inverts formed, the precast sections shall be placed thereon, care being exercised to form the incoming and outgoing pipes into the wall of the inlet at the required elevations.

B. Masonry work shall be allowed to set for a period of not less than 24 hours. Outside forms, if any, then shall be removed and the inlet backfilled and compacted. All loose or waste material shall be removed from the interior of the inlet. The inlet grate then shall be placed and the surface in the vicinity of the work cleaned off and left in a neat and orderly condition.

3.05 INVERTS:

A. All inverts shall be of 3,000 psi concrete meeting the requirements of Section 03300 of these Specifications, and shall conform to the shape indicated on the Drawings or as directed by the Engineer. The invert shall be carefully formed to the required size and grade by gradual and even changes in sections. Changes in directions of flow through the inlet shall be made to a true curve with as large a radius as the size of the inlet will permit.

3.06 INLET AND OUTLET PIPE:

A. Each piece of pipe and special fitting shall be carefully inspected before it is placed and no defective pipe shall be placed in an inlet. Pipe laying shall proceed upgrade, starting at the lower end of the grade and with the groove uphill. Trench bottoms found to be unsuitable for foundations shall be corrected in accordance with Section 02200 of these Specifications prior to installation of pipe in inlets.

B. Pipe placed in the walls for outlet connections shall extend through the wall and beyond the outside surface of the walls to allow for connections, the end of the pipe being placed flush with the inside face of the wall. Masonry shall be carefully constructed around the pipe for the full wall thickness so there will be no leakage around the outer surface.

3.07 CASTINGS:

A. Cast iron frames shall be set accurately to line and finished elevation so that subsequent adjustments will not be necessary.

B. Where inlets are constructed in paved areas or integral with curb and gutter, the top surface of the frame and grate shall be tilted to conform to the exact slope, crown and grade of the existing adjacent pavement or curb and gutter.

C. Frames shall be set in full cement mortar beds as shown on the Drawings set in place to match the finished concrete surface.

3.08 CLEANING:

A. After completion of the inlet, the interior shall be thoroughly cleaned of all excess materials, the grating placed and all unused materials, tools, equipment and debris removed from the area.

B. After the masonry and frames have had sufficient time to set, but in no case less than 24 hours after placement, the space around the inlet shall be backfilled and tamped to the required grade.

C. Final cleaning shall be performed in accordance with the requirements of the General Conditions of these Specifications.

END OF SECTION

SECTION 02900

LANDSCAPE MATERIALS

PART 1 GENERAL

1.01 SCOPE

1.02 QUALITY OF WORK AND MATERIALS

The Contractor shall have minimum five years successful experience in the field and shall furnish all materials and perform all work in accordance with these specifications, drawings, and instructions provided by the Landscape Architect or Owner's representative hereafter also referred to as Landscape Architect. The work shall include everything shown on the drawings and required by the specifications and everything to which in the judgment of the Landscape Architect is incidental to what is shown on the drawings or required by the specifications. Workmanship and materials shall be of the best quality and shall be in strict accordance with the intention of the drawings, specifications and samples. The Contractor shall cooperate with the Landscape Architect so that no error or discrepancy in the drawings or specifications shall cause defective or inappropriate materials to be used or poor workmanship to be allowed and so that the work may proceed in the most efficient and effective manner.

1.03 WEATHER

Plant only during weather conditions favorable to landscape construction and to the health and welfare of plants. Contractor to notify Landscape Architect immediately if directed to commence planting operations in conditions detrimental to plant health.

1.04 PROTECTION

A. Before commencing work, all trees and shrubs which are to be saved must be protected from damage by the placement of fencing flagged for visibility or some other suitable protective procedure approved by the Owner. No work may begin until this requirement is fulfilled.

B. In order to avoid damage to roots, bark or lower branches, no truck or other equipment shall be driven or parked within the drip line of any tree, unless the tree overspreads a paved way.

C. The contractor shall use any and all precautionary measures when performing work around trees, walks, pavements, utilities, and any other features either existing or previously installed under this Contract.

D. The Contractor shall adjust depth of earthwork and loaming when working immediately adjacent to any of the aforementioned features in order to prevent disturbing tree roots, undermining walks and pavements, and damage in general to any existing or newly incorporated item.

E. Plants transported to the project in open vehicles shall be covered with tarpaulins or other suitable covers securely fastened to the body of the vehicle to prevent injury to the plants. Closed vehicles shall be adequately ventilated to prevent overheating of the plants. Evidence of inadequate protection following digging, carelessness while in transit, or improper handling or storage shall be cause for rejection. All plants shall be kept moist, fresh, and

protected. Such protection shall encompass the entire period during which the plants are in transit, being handled, or are in temporary storage.

1.05 PERCOLATION TEST

A. The Contractor shall be responsible for determining existing sub-surface drainage conditions for areas to be planted or sodded. The Contractor shall include as a part of his proposal the cost for making the following percolation tests in any area where he is uncertain about adequate sub-surface drainage. Report unacceptable areas to Landscape Architect/Owner's Representative for instructions.

B. Percolation tests shall be made as follows:

1. Wait at least 24 hours after rain and dig test pit 12 inches square or 13 1/2 inches in diameter to depth of bottom of plant bed and remove all loose soil. (If standing water is visible, notify Landscape Architect).

2. Quickly fill pit bottom with 6 inches (approximately 3 1/4 gallons) of water.

3. Record length of time from filling until disappearance of water and divide number of minutes by 6 to give average time of 1 inch fall.

4. Compare 1-inch time with following table:

1 inch in 0 - 3 minutes indicates rapid absorption
1 inch in 3 - 5 minutes indicates medium absorption
1 inch in 5 - 30 minutes indicates slow absorption
1 inch in over 60 minutes indicates impervious soil

5. In plant bed areas where sub-soil conditions do not percolate or the bed is enclosed by pavement, curbs, walks or other hard construction, the contractor shall install a 4" drain line that allows the sub-surface of the bed to drain to the storm system or out to day light on the nearest slope.

C. Planting shall not begin until planting area drainage has been approved by owner's representative.

1.06 SUBMITTALS

A. It is the responsibility of the Contractor, before ordering or purchasing materials, to provide (2) photographs of each tree type with description to the Landscape Architect for review and approval. Contractor shall tag and deliver palms and trees that match approved sample photographs. Landscape Architect will decide final approval of all plant material on site.

B. The Contractor is to submit certification tags from trees, shrubs, seed, and sod verifying type and purity.

C. Materials: Samples of materials as listed below shall be submitted for inspection on the job site, or as otherwise determined by the Landscape Architect.

Material	Sample

Mulch	1 Bag
Peat Moss	1 Bale
Pine Straw	1 Bale
Top Dressing Sand	1 Cup

D. Plants shall be subject to inspection and approval at the place of growth, or upon delivery to the site, as determined by the Landscape Architect, for quality, size and variety. Such prior approval will not impair the right of inspection and rejection at the site during progress of the work or after completion, for size and conditions of balls or roots, latent defects or injuries. Rejected plants shall be removed immediately from the site. Notice requesting inspection should be submitted by the Contractor at least one week prior to anticipated date.

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

F. Upon approval of samples by the Landscape Architect, delivery of materials may begin.

1.07 QUALITY OF PLANTS

A. Plants shall in all cases conform with requirements of the following:

1. Georgia State Plant Board Codes and Standards.
2. Georgia Nurseryman and Grower's Association Approved Planting Practices.
3. Bailey, Hortus III
4. American Standard for Nursery Stock with the latest versions of rules and grading adopted by the American Association of Nurserymen, Inc.

B. Unless specifically noted otherwise, all plants shall be of selected specimen quality, exceptionally heavy, symmetrical, tightly knit, so trained or favored in their development and appearance as to be superior in form, number of branches, compactness and symmetry. All plants shall have a normal growth habit, be free of disease, show vigorous health and have a well developed root system.

C. Plants shall be free of disease, insect pests, eggs or larvae.

D. Plants shall not be pruned before delivery.

E. Trees with abrasion of the bark, sunscalds, disfiguring knots or fresh cuts of limbs over one and one-fourth inches (1-1/4") which have not completely callused shall be rejected.

F. All plants shall be typical of their species or variety and shall have a normal habit of growth and be legibly tagged with the proper name. All plants shall have been grown under climatic conditions similar to those in the locality of the site of the project under construction or have been acclimated to such condition for at least two (2) years.

G. The root system of each shall be well provided with fibrous roots. All parts shall be sound, healthy, vigorous, well branched and densely foliated when in leaf.

H. Container stock shall be delivered to the site in first class condition. Plants shall have stakes in containers where required to support the plants. Plants furnished in containers shall not be

handled by the stem, but only by the containers. Plants that are root bound by their containers shall not be accepted.

I. Balled and burlapped plants (BB) shall be dug with firm, natural balls of soil and of sufficient size to encompass the fibrous and feeding roots of the plants. No plants moved with a ball shall be planted if the ball is cracked or broken, except upon special approval. Plants balled and burlapped shall be handled by the stems.

J. Plants marked "BR" in the Plant List shall be dug with bare roots. The roots shall not be cut within the minimum spread specified in the Plant List. Care shall be exercised that the roots do not dry out in moving.

1.08 PLANT MATERIAL SIZE AND MEASUREMENT

A. Plants shall be measured when branches are in their normal position.

B. Shrubs shall meet the size requirements stated in the Plant List. The measurements are to be taken from the ground level to the average height of the shrub and not to the longest branch. Height and spread dimensions specified refer to the main body of the trees (measured from the crown of the roots to the tip of the top branch) and shall be not less than the minimum size designated.

C. Caliper measurements shall be taken at a point on the trunk six inches (6") above natural ground line for trees up to four inches (4") in caliper, and at a point 12 inches (12") above the natural ground line for trees exceeding four inches (4") in caliper.

D. If a range of size is given, no plant shall be less than the minimum size, and not less than 50% of the plants shall be as large as the upper half of the range specified.

E. The measurements specified are the minimum size acceptable and, where pruning is required, are the measurements after pruning.

F. All dimensions on Schedule shall be the minimum acceptable size. Plants larger in size than specified in the Plant List may be used if approved by the Landscape Architect. If the use of larger plants is approved, the ball of earth or spread of roots shall be increased in proportion to the size of the plant.

G. The minimum acceptable ball size for trees shall be 11" diameter per 1" caliper taken 6" above the ground for trees up to and including 4" caliper. Caliper shall be measured 12" above the ground for trees larger than 4" caliper. In special cases the ball size may be reduced as directed or approved by the Landscape Architect.

1.09 NOTIFICATION OF DELIVERY

Unless otherwise authorized by the Landscape Architect, the Contractor shall notify the Landscape Architect at least 48 hours in advance of the anticipated delivery date of any plant materials.

1.10 RIGHT OF REJECTION

The Landscape Architect reserves the right to inspect and reject plants at any time and at any place. Plants held on site for longer than 2 months must be approved by Landscape Architect before installation

1.11 MAINTENANCE

All planting shall be protected and maintained by the Contractor until time of final acceptance as defined in the guarantee. Maintenance shall include but is not limited to watering, weeding, cultivating, removal of dead material, resetting plants to proper grades or upright position, lawn mowing, fertilizing, and other necessary operations. The Contractor will be responsible for maintenance until 90 days after the time of acceptance. The Contractor shall submit, in writing, maintenance instructions for use by the Owner in caring for the plants.

1.12 PLANT GUARANTEE

A. All plants, grass and trees shall be guaranteed to be alive and healthy one year after the date of final acceptance. Contractor shall be responsible for maintaining the plant installations for 30 days after final acceptance. The Contractor is responsible for providing adequate maintenance for one year to any plant, including grass, or tree that is dead or not showing satisfactory growth. After a 90-day period, it shall be replaced, or conditions contributing to unsatisfactory growth corrected. All replacements shall be of the original quality and shall be of a size equal to that attained by adjacent plants or trees of the same species. Replacement plant material shall be guaranteed to be alive at the beginning of the following growing season. Only one replacement will be required for each dead grass area. The number of replacements for other plant materials is not limited.

B. The guarantee may become void if it is determined that plant material kill or unsatisfactory growth results from Owner negligence. The decision for determination of responsibility for damage shall rest solely with the owner’s representative.

1.13 FINAL GRADING AND CLEAN UP

After all work has been completed and all soil settled and final finished grading completed, clean-up and adjustments shall be made to insure proper depth of topsoil, proper drainage, proper grades adjacent to walks and curbs, proper slope of plant beds, etc. Remove any soil, peat moss, mulch or plant materials from walks and paving, leaving the areas broom clean.

1.14 DAMAGED/DISTURBED AREAS

A. Plant or grassed areas damaged during the process of work by other contractors shall be called to the attention of the General Contractor and Landscape Architect in writing within one week of the occurrence, to settle disputes over party responsible for damages.

B. Damaged areas will be repaired within a timely period to Landscape Architect's satisfaction.

1.15 FINAL APPROVAL

The Landscape Architect shall have the final approval for acceptance of the landscaping.

PART 2 - PRODUCTS:

2.01 GENERAL:

A. Water: All water necessary for planting and maintenance shall be of satisfactory quality to sustain the growth of plants and shall not contain harmful, natural or man-made elements detrimental to plants. Water meeting the above standard shall be furnished by the Contractor and all arrangements for securing water and any expenses of transporting to the site and dispersal on the site shall be the responsibility of the Contractor.

B. Commercial Fertilizer: Provide a complete fertilizer, uniform in composition, dry and free flowing, delivered to the site in the original unopened containers, each bearing the manufacturer's statement of analysis, meeting the following requirements:

12% nitrogen, 5% phosphoric acid, 8% potash; with nitrogen derived from 6.6% uramite, 3% sewage sludge and 2.4% ammonium nitrate or approximate equal.

C. Lime: Shall be agricultural grade high calcium ground limestone and shall be of such fineness that 90% will pass through a No. 10 sieve and not less than 50% through a No. 50 sieve.

D. Soil Test: Revise fertilizer analysis, quantities of fertilizer and lime as dictated by soil tests made prior to planting.

E. Hardwood Mulch: Shall be aged for a minimum of three years and ground to a fine texture. Mulch shall be fresh, clean, free from sticks, cones, leaves and other debris.

F. Pine Straw Mulch: Shall be fresh, clean, free from sticks, cones, leaves and other debris. Pine straw mulch shall be used and maintained as a two inch (2") top dressing in all plant beds and around all trees planted by the Landscape Contractor. Single trees or shrubs shall be mulched to the outside edge of the saucer. Depth to be minimum three inches (3") at final acceptance.

G. Topsoil: Where required shall be a natural, fertile, friable soil, possessing characteristics of representative productive soils in the vicinity. It shall be obtained from naturally well- drained areas, free from substances harmful to plant growth, and free from clay lumps, stones, stumps, roots, or similar substances two inches or more in diameter. The source and material shall be approved by the Landscape Architect before placing on site. Topsoil shall be free from noxious grass and weeds.

H. Fertilizer: For grass areas: See planting details for specific requirements.

I. Pre and Post emergent Herbicide: Contractor to have a licensed herbicide applicator with a minimum three years experience performing all herbicide applications to lawns, trees and shrubs. Herbicides shall be utilized as necessary to control weeds in bed, tree plantings and turf areas unless applicable codes or ordinances stipulate otherwise. Contractor is responsible to be familiar with all applicable local, state and federal codes, ordinances and regulations.

J. Staking Material:

1. Trees: Stakes for guying trees under shall be No. 2 Southern Pine, 2 x 2, 36", pressure treated with waterborne preservatives complying with AWPB LP-22.

L. Guying: Galvanized Steel Turnbuckles with #12 gauge, multi-strand galvanized steel wire.

2.02 GENERAL:

A. See Planting Plan and schedule for plants required. Quantities necessary to complete the work shown on the drawings shall be furnished. Although quantity estimates have been carefully made, the Landscape Architect assumes no liability for omissions or errors.

B. All plants shall conform to the measurements specified on the Plant List. Such measurements shall be made in accordance with methods stated in section 02900, #1.08. Plants that meet the requirements specified on the Plant List, but which do not possess a normal balance between height and spread will not be accepted. All plants shall be fresh dug, sound, healthy, vigorous, well branched and free of disease and insect egg and larvae and shall have adequate root systems. Trees for planting in rows shall be uniform in size and shape. All materials shall be subject to approval by the Landscape Architect. Where any requirements are omitted from the Plant List, the plants furnished shall be normal for the variety. Plants shall be pruned prior to delivery only upon the approval of the Landscape Architect.

C. Container Grown Material: All container grown materials shall be healthy, vigorous, well-rooted and established in the containers in which they are sold. They shall have tops which are of good quality and are in a healthy growing condition.

D. An established container grown plant shall be transplanted into a container and grown in that container sufficiently long for the new fibrous roots to have developed so that the root mass will retain its shape and hold together when removed from the container.

E. The container shall be sufficiently rigid to hold the ball shape protecting the root mass during shipping.

F. Container stock shall be delivered to the site in first class condition. Plants shall have stakes in containers where required to support the plants. Plants furnished in containers shall not be handled by the stems, but only by the containers. Plants root bound in containers shall not be accepted.

F. Sod: Sod shall be a species recommended by an experienced local A.N.A.-certified nursery, grown in a nursery equipped for the production of such sod and capable of meeting the published State Standards for Certification. It shall have been mowed regularly, fertilized and fumigated and shall be free of diseases and harmful insects at the time of delivery. Sod shall be delivered in strips one foot wide and two feet or longer as soil and species permit or in rolls not over six feet long. Sod shall have a minimum of one-inch thickness including roots and soil. Sod bearing holes or thinned root pad, i.e. less than ½" shall be rejected. Sod shall be free of weeds, nut grass, crab grass and other invasive plants.

1. Sprigs: It shall be alive and viable at time of planting.

2. Seeds: All seed shall be certified stock and appropriately labeled. Contractor shall deliver empty seed bags to Landscape Architect on site.

PART 3 - EXECUTION

3.01 GENERAL

A. Planting operations shall be conducted under favorable weather conditions preferably during the period from October 1 to April 1. The Contractor has the option and assumes full responsibility for planting in unseasonable conditions.

B. Planting of grass shall be accomplished during recommended season dependent on specified grass and planting method.

C. Protect roots or balls of plants at all times from sun and drying winds, water and freezing, as necessary until planting.

3.02 PLANTING PROCEDURE:

A. Cleaning up before commencing work: The Contractor shall clean up work and surrounding areas of all rubbish or objectionable matter. All mortar, cement and toxic material shall be removed from the surface of all plant beds. They must not be stirred with the soil. Extensive clean up work will not be required under this contract. Should the Contractor find such conditions beneath the soil which shall in any way adversely affect the plant growth, he shall immediately call it to the attention of the Landscape Architect. Failure to do so before planting shall render the Landscape Contractor liable for subsequent problems arising from unacceptable subsoil conditions. Use approved herbicide to eliminate temporary plant material as directed.

B. Stake Out: Stake tree or plant locations and secure approval of them from the Landscape Architect before digging pits, and make adjustments as directed. Locate no tree closer than two feet from pavement or structures.

C. Planting soil mixture: for trees shall consist of 1/3 topsoil, 2/3 thoroughly pulverized existing soil mixed with 1 1/2 pounds of fertilizer per inch of tree caliper or 10 pounds per cubic yard or 7 1/2 oz. per bushel; and five pounds lime per cubic yard.

D. Planting Hole: for ball up to two feet in diameter shall be twice the diameter of the ball. Diameter of hole for ball two feet and greater shall be two feet larger in diameter than diameter of ball. Excavate pits with vertical sides.

E. Large Plastic Containers: Cut off bottom of containers over 5 gallons, place plant and containers in planting hole, cut the container on two sides, removing the remaining part of the container. Examine roots to insure that roots have not begun to circle the container. If roots have begun to circle the plant, Contractor may realign the roots in the hole. If root circling is too severe, plant must be rejected and returned to supplier.

F. Baskets: Remove rim and handles after placing in the hole. Break or slit sides in several places.

G. Wire Baskets: After placing in planting hole, remove all twine and rope used to secure wire basket and burlap. Bend or cut the wire and pull away from the root ball. Slit and remove all

burlap from the top of the ball at least 1/3 of the way down sides or further as possible. Backfill and cover top of ball with mulch.

H. Trees and Shrubs: Trees shall be set straight and at such level that after settlement the plant crown shall be 8" above grade; shrubs shall stand 1" - 2" above grade mounded. Each plant shall be set in the center of the pit. Backfill mixture shall be thoroughly tamped around the ball and shall be settled by water after tamping. A water holding saucer shall be formed with extra soil. Do not handle the tree by the trunk or use the trunk to straighten or adjust the location. (See Details)

I. Fill: Fill hole with soil mixture and fertilizer as required. Pack lightly with feet. Add more wet soil. Do not cover top of ball with soil, only with mulch. Make sure no burlap is exposed since exposed burlap acts as a wick causing excessive loss of water.

J. Water Basin: Build basin around all plants or trees which stand alone and are not in larger mulched beds. A water holding earth dam shall be built on the outside of the hole to form a basin to hold water, it shall be 4 - 6" high of soil firm enough to remain in place. If necessary, bring in soil. See Detail.

K. Pruning: Each tree shall be pruned to preserve the natural character of the plant as directed by the Landscape Architect. All soft wood or sucker growth and all broken or badly damaged branches shall be removed with a clean cut. All pruning cuts over 1/2" in diameter shall be painted over with an approved tree paint.

L. Guying or Staking: Shall be done immediately after planting. Trees shall stand plumb after staking or guying in accordance with the drawings.

3.03 FINISH GRADING

Prior to applying mulch, plant beds and pine straw covered areas shall be stirred 4" deep to loosen soil mixture. Fine grade areas until all bumps and depressions are removed and until the grade conforms to requirements of the grading plan. Eliminate any water pockets and verify surfaces drain away from all buildings. The minimum surface slope of plant beds shall be four percent. Minimum surface slope in lawn areas shall be two percent.

3.04 MULCHING

On completion of planting, all ground cover areas shall be covered with 3" layer of pine straw. All annual bed areas shall be covered with 2" depth of mini-nuggets manufactured by Joe K. Smith or approved equal (phone 524-4286).

3.05 WEED CONTROL (HERBICIDE)

Immediately after planting and applying the mulch, apply 2% granular "Chipco" Ronstar at the rate of 3 pounds per 1,000 square feet. This is slightly more than 2 1/2 pounds of active ingredient per acre. Apply to all plant beds, ground cover and pine straw ground cover. Protect lawns and any susceptible plants.

3.06 GRASSING

A. General: Includes soil preparation, applying fertilizer, planting and maintenance as required to produce an acceptable stand of grass on areas shown on planting plan.

1. Any damage to planting soil by erosion, construction equipment, construction operations, or other damage shall be repaired prior to application of fertilizer. Finished surface shall be smooth and even.

B. Soil Preparation: After the area to be grassed has been brought to finished grade, prepare the soil by thoroughly loosening the area by plowing, discing, harrowing, or scarifying until these areas are friable, well pulverized and acceptable to the Landscape Architect. Any irregularities in the surface resulting from the above operation or from other operations by the contractor, shall be smoothed out before any subsequent operations are begun. All roots and stones larger than 1 1/2" in any dimension, stumps and other foreign material detrimental to final grading, proper bonding, the rise of capillary moisture, or the proper growth of the desired plantings shall be removed.

1. The completed surface shall conform to the finished grades or subgrades shown and shall have a smooth pulverized surface at the time of planting. Any irregularities shall be corrected before the lime and fertilizer are placed.

2. Spread lime and fertilizer over the prepared surface before turning. Fertilizer and lime shall be sufficient to correct irregularities in the soil based on soil tests for the specified turf. Turn the soil one last time the day before planting or placing sod.

C. Sodding: (When required by the Construction Schedule)

1. Prepare planting bed as described for seeded areas except that fine graded soil shall be 1 inch below finished grade established by the grading plan.

2. Stored sod of the species required in the schedule shall be kept moist prior to laying. Wet all areas prior to sodding.

3. Wet all areas immediately prior to sodding.

4. Unroll the sod on the prepared soil. Lay the strips parallel with the strip ends staggered as in bricklayers' running bond pattern. Press each successively laid strip snugly up against the one next to it. Fill cracks, holes, joints with clean, loose sand, free of all grass and plant seeds.

5. Watering, fertilizing and rolling shall be done by the Contractor as described under "Maintenance of Sodded Areas" below.

D. Maintenance of Sodded Areas: The Contractor shall be responsible for maintaining sodded areas by properly watering, weeding and mowing the grass until an acceptable stand has been produced, and been accepted by the Owner and a minimum of 30 days thereafter.

1 A stand shall be considered acceptable when 95% of the total sodded area has been covered with grass and no bare areas greater than one square foot exist. All cracks, joints, dips, pits and other irregularities in the surface must have been corrected by top dressing with sand.

2. The Contractor shall be responsible for re-sodding all bare areas greater than one square foot with the specified mixture and for repairing and re-sodding wash-outs and eroded areas to the original finished grade.

3. Sodded areas shall be mowed when the grass attains a height of 2 inches and as required thereafter until the acceptance of the stand. Reel type mowers, kept well sharpened, shall be used. Turf shall not be accepted until all sod has knitted together and tacked to the soil.

4. All lawn areas shall be given a top dressing of fertilizer to provide 100 pounds available nitrogen per acre when the grass has attained a satisfactory growth and the first mowing has been performed. Nitrogen shall be derived from Ammonium Nitrate or Nitrate of Soda.

5. Contractor shall be responsible to administer a final top dressing of sand to the turf to fix all dips, pits, cracks, etc., for up to 6 months after final acceptance of a lawn field of play.

3.07 SEEDING

A. Area: All exterior ground within the limit of contract, except surfaces occupied by buildings, structures, paving, and except areas indicated to be undisturbed or mulched, shall be seeded or planted as shown on drawings.

1. Furnish topsoil
2. Finish grading
3. Prepare seedbed
4. Seed and maintain areas as indicated on the drawings.

B. Seed Bed Preparation: Grade areas to finish grades, filling as needed or removing surplus dirt and floating areas to a smooth, uniform grade as indicated on grading plans. All lawn areas shall slope to drain. Where no grades are shown, areas shall have a smooth and continual grade between existing or fixed controls (such as walks, curbs, catch basin, elevational steps or building) and elevations shown on plans. Roll, scarify, rake and level as necessary to obtain true, even lawn surfaces. All finish grades shall meet approval of the Landscape Architect, before grass seed is sown. Loosen soil to a depth of six inches (6") in lawn areas by approved method in the specifications and grade to remove ridges and depressions. Remove stones or foreign matter over two inches (2") in diameter from the top two inches (2") of soil. Float lawn areas to approximately finish grades.

C. Seed beds should be permitted to settle or should be firmed by rolling before seeds are broadcast.

D. Seeding should not be performed in windy weather.

E. Seeding shall be done in two (2) directions at right angles to each other.

F. Lawn areas shall be seeded by sowing evenly with an approved mechanical seeder at the rate of a minimum of three (3) pounds per 1,000 square feet. Culti-packer or approved similar equipment may be used to cover the seed and to form the seedbed in one operation. In areas inaccessible to culti-packer, the seeded ground shall be lightly raked with flexible rakes and

rolled with a water ballast roller. After rolling, seeded areas are to be lightly mulched with wheat straw.

G. If the project completion date prohibits in-season planting, the Contractor shall prepare for out-of-season seeding or sodding so that all lawns shall be completed and ready for acceptance at time of project completion, without additional cost to the Owner. Lawn maintenance shall be the same as for other planting.

H. Lawns shall be maintained by the Contractor for at least 30 days after sodding and 60 days after seeding, or as long as is necessary to establish a uniform stand of the specified grasses, or until substantial completion of the project or until acceptance of lawns, whichever is later.

I. In the event that lawn operations are completed too late in the Fall for adequate germination and/or growth, maintenance shall continue into the following growing season or until a uniform stand of the specified grasses has been established.

J. Water seeded areas twice the first week to a minimum depth of six inches (6") with a fine spray and once per week thereafter as necessary to supplement natural rain to the equivalent of one inch (1") or to a six inch (6") depth.

K. The surface layer of soil for seeded areas must be kept moist during the germination period. After first cutting, water as specified above.

L. Make weekly inspections to determine the moisture content of the soil and adjust the watering schedule established by the irrigation system installer to fit conditions.

M. After grass growth has started, all areas or parts of areas which fail to show a uniform stand of grass for any reason whatsoever shall be reseeded in accordance with the plans and as specified herein. Such areas and parts of areas shall be reseeded repeatedly until all areas are covered with a satisfactory growth of grass at no additional cost to the Owner.

N. Watering shall be done in such a manner and as frequently as is deemed necessary by the Landscape Architect to assure continued growth of healthy grass. All areas of the site shall be watered in such a way as to prevent erosion due to excessive quantities applied over small areas and to avoid damage to the finished surface due to the watering equipment.

O. Water for the execution and maintenance of this work shall be provided by the Owner at no expense to the Contractor. The Contractor shall, however, furnish his own portable tanks, pumps, hose, pipe, connections, nozzles, and any other equipment required to transport the water from the available outlets and apply it to the seeded areas in an approved manner.

P. Mowing of the seeded areas shall be initiated when the grass has attained a height of one and one-half to two inches (1-1/2" to 2"). Grass height shall be maintained between one and one-half inches (1" to 1-1/2") at subsequent cuttings depending on the time of year. Not more than one third (1/3) of the grass leaf shall be removed at any cutting and cutting shall not occur more often than ten (10) days apart.

Q. When the amount of invading grass is heavy, it shall be removed to prevent destruction of the underlying turf. If weeds or other undesirable vegetation threaten to smother the planted species, such vegetation shall be mowed or, in the case of rank growths, shall be uprooted, raked and removed from the area by methods approved by the Landscape Architect.

R. Protect seeded areas against trespassing while the grass is germinating. Furnish and install fences, signs, barriers or any other necessary temporary protective devices. Damage resulting from trespass, erosion, washout, settlement or other causes shall be repaired by the Contractor at his expense.

S. Remove all fences, signs, barriers or other temporary protective devices after final acceptance.

END OF SECTION 02900

SECTION 02921

TOPSOIL

PART 1 - GENERAL

1.01 SCOPE

A. Topsoil for planting shall consist of a rich, friable soil conforming to the requirements and provisions set out in these Specifications, or as approved by the Project Landscape Architect and obtained from locations indicated on the Construction Drawings. Topsoil shall be placed at the locations indicated on the Construction Drawings, set out in the Specifications or as directed by the Project Landscape Architect and in conformity with the provisions and requirements set out in the Specifications.

B. Suitable topsoil which has been stripped from the project site shall be stockpiled as directed by the Project Landscape Architect. Stockpiled topsoil shall be redistributed in areas indicated on the Construction Drawings and later used before additional topsoil is hauled to the site. Unsuitable material shall not be included in these stockpiles and shall be removed from the project site. The amount of stockpiled topsoil obtained from the site shall be measured by the Project Landscape Architect using the cross-section method and this material shall be excluded from that quantity of material paid for under the of Section 02200 of these Specifications.

PART 2 - MATERIAL

2.01 MATERIAL

A. Topsoil for planting shall be a rich, friable loam containing a large amount of humus obtained from natural north Georgia woodlands, (the purpose of this is to assure a natural "A" soil horizon with adequate michorizal content). Topsoil shall be original surface sandy loam, topsoil of good, rich, uniform quality, free from any material such as hard clods, stiff clay, hardpan, partially disintegrated stone, pebbles larger than 1/2-inch in diameter, lime, cement, bricks, ashes, cinders, slag, concrete, bitumen or its residue, boards, sticks, chips or other undesirable or harmful material to plant growth. Topsoil shall be reasonably free from perennial weeds and shall not contain objectionable plant material, toxic amounts of either acid or alkaline elements or vegetable debris undesirable or harmful to plant life.

B. Topsoil shall be natural topsoil without admixture of subsoil material, and shall be classified as a loam, silt loam, clay loam or a combination thereof. The pH shall range from 5.5 to 6.0. Topsoil shall contain not less than two percent by weight, of organic matter as determined by the Wakley-Black Method as described in Soil Chemical Analysis, 1958, Prentice-Hall, Inc.

C. The area or areas from which topsoil is secured shall possess such uniformity of soil depth, color, texture, drainage and other characteristics as to offer assurance that, when removed in commercial quantities, the product will be homogeneous in nature and will conform to the requirements of these Specifications, and as required by the Project Landscape Architect.

D. Topsoil may not be secured from areas which are, or have been, in cultivation within the past five years.

PART 3 - EXECUTION

3.01 EQUIPMENT

A. All equipment necessary for the proper removal, transportation, protection and maintenance of topsoil must be available, when required, in first class working condition and shall have been approved by the Project Landscape Architect before construction will be permitted to begin.

3.02 MAINTENANCE

A. The Contractor shall maintain all topsoil areas, at Contractor's own expense, in connection with any seeding or planting, or otherwise, until Final Acceptance of the Project. Maintenance shall consist of preserving, protecting, replacing and such other work as may be necessary to keep the Project in a satisfactory condition.

3.03 CLEANING

A. Final cleaning shall consist of completely removing all equipment, rubbish, excess material and unused materials from the project site.

B. All pavements and structures shall be swept clean of all dirt or rubbish which may have become deposited upon them during construction.

C. All pavements and structures shall be cleared of any stains that may have become deposited upon them during construction.

D. Final Cleaning shall be performed in accordance with the requirements of Section 01710 of these Specifications.

END OF SECTION 02921

SECTION 02930

LAWNS AND GRASSES

PART 1 – GENERAL

1.1 DESCRIPTION

A. Work described in this section consists of the establishment of grassing of 100% of all areas indicated to receive seeding and of all of the area on the Project site disturbed by cut or fill, except the area covered by paving or those areas designated for other plant materials. Consult with the Owner to coordinate placement of landscaping materials. Provide clean pine straw instead of grass in areas determined by Owner.

1.2 SOIL SAMPLES

A. The Contractor shall take soil samples from several areas of the site to be grassed and have them analyzed by the Agricultural Extension Service. The results of the analysis shall determine the fertilizer to be used on the site. Copies of the soil analysis shall be submitted to the Engineer and the Owner no later than ten (10) days prior to anticipated date of fertilization of grassed areas.

PART 2 – PRODUCT

2.1 FERTILIZER

A. Commercial Fertilizer: For lawns, the fertilizer shall be a complete, slow-release type. The nitrogen content shall be derived from either organic or inorganic sources and meeting the following minimum requirements of plant food by weight, unless the soil analysis and report indicates a need for a different fertilizer mixture in which case the recommended mixture shall be furnished and applied. Compliance with all State and Federal laws relative to fertilizer is required.
1. Minimum requirements: 19% Phosphoric Acid – 19% Potash

B. Ammonium Nitrate: Ammonium nitrate shall be a commercial product in dry granular form of recent manufacture and shall be delivered in the original, unopened containers each bearing the manufacturer's guaranteed statement of analysis, it shall contain not less than 33.5% Nitrogen.

C. Ground Limestone: Lime shall be ground dolomitic limestone containing not less than 85% of total carbonates and shall be ground to such a fineness that 50% will pass through a 100-mesh sieve and 90% will pass through a 20-mesh sieve. Coarser material will be acceptable, provided the specified rates of application are increased proportionately on the basis of quantities passing the 100-mesh sieve.

2.2 GRASS SEED

A. Shall be labeled in accordance with U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act in effect on the date of Invitation of Bids. Seed shall be furnished in sealed standard containers, unless exception is granted in writing by

the Engineer. Seed which has become wet, moldy, or otherwise damaged in transit or in storage will not be acceptable. Seed shall be guaranteed 92% germination.

1. Kentucky 31 Fescue (Fescuta Elatior) Seed: Fresh, clean, new seed testing 98% for purity and 85% for germination. September 15 – May 15.
2. Common Bermuda (Cynolon Dactylon) Seed: Fresh, hulled, clean, new seed testing 98% for purity and 85% for germination. May 15 – September 15.
3. Winter Rye (Lolium multiflorum) Seed: 90% minimum purity and 85% germination. Seed ten (10) pounds per 1,000 sq. ft.

2.3 WATER

A. Water used in this work shall be suitable for irrigation and free from ingredients harmful to plant life. Furnish hose and other watering equipment required for the work.

2.4 HYDROMULCH

A. Wood cellulose fiber containing no germination inhibiting or growth inhibiting agents. Characteristics shall be as follows:
1. Percent moisture content: 9.0% (±3, 0%).
2. Percent organic mater: 99.2% (±0.8%).
3. Percent ash content: 0.8% (±0.2%).
4. pH: 4.8 (±0.5).
5. Water holding capacity: 150 grams water/100 grams fiber, minimum.

PART 3 – EXECUTION

3.1 PREPARATION

A. Before any seeding is attempted, the seed bed must be in a well pulverized, smooth, friable condition of uniformly fine texture.

3.2 FERTILIZER

A. Fertilizer shall be distributed uniformly at a rate of 800 pounds per acre, plus 1-ton agricultural lime per acre two (2) days prior to seeding, over the areas to be grassed, and shall be incorporated into the soil to a depth of at least 3 inches by discing or harrowing. The incorporation of fertilizer may be part of the tillage operation specified above. Undulations in the surface as a result of tillage or fertilizing shall be smoothed.

3.3 AMMONIUM NITRATE

A. Approximately 4 weeks after seeding and when grass coverage has been established, apply 3 pounds of ammonium nitrate per 1,000 square feet to all seeded areas and immediately water using a fine spray. At the end of the maintenance period and prior to final inspection, apply 10 pounds of specified fertilizer per 1,000 sq. ft. and water immediately.

3.4 SEED

A. Seed shall be Fescue or Bermuda. Method of seeding shall be hydroseeding or broadcast at the Contractor's option; however, the method selected shall be a part of his erosion control plan.

3.5 BROADCAST SEEDING

A. If conditions are such, by reason of drought, high winds, excessive moisture, or other factors, that satisfactory results are not likely to be obtained, the Contractor shall stop the work, and work shall be resumed only when conditions are favorable again or when approved alternate or corrective measures and procedures have been put into effect. If inspection during seeding operations or after there is a show of green indicates that strips have been left, or skipped, the Contractor shall sow additional seed on these areas.

B. Seeding shall be at the rate of 10 pounds per 1,000 sq. ft. for Fescue or 5 pounds per 1,000 sq. ft. for Bermuda.

C. Seed shall be broadcast either by hand or approved sowing equipment. The seed shall be uniformly distributed with the sower moving in one direction, and the remainder shall be sown with the sower moving at right angles to the first sowing. The seed shall be covered to an average depth of ¼ inch by means of a brush harrow, spike-tooth harrow, chain harrow, cultipacker, or another approved device.

3.6 HYDROSEEDING

A. Apply seed/fertilizer/hydromulch mixture in water slurry. Dispense using hydraulic mulching equipment in the following minimum quantities.
1. Fertilizer: 130 lbs./acre.
2. Fescue Seed: 300 lbs./acre/Bermuda seed 150 pound/acre.
3. Hydromulch: 1500 lbs./acre.

3.7 COMPACTION

A. Immediately after the seeding operations specified above have been completed, the entire area shall be compacted by means of a cultipacker, roller, or other approved equipment weighing 60 to 90 pounds per linear foot of roller. If the soil is of such type that a smooth or corrugated roller cannot be operated satisfactorily, a pneumatic roller shall have tires of sufficient size so that complete coverage of the soil surface is obtained. When a cultipacker or similar equipment is used, the final rolling shall be at right angles to the prevailing winds to prevent dust.

3.8 WATERING

A. Soak soil immediately after seeding to a minimum depth of 1" to 2", and to a minimum depth of 2" after sodding. Do not water to the point of creating wash out areas.

B. Keep all surfaces continuously moist thereafter until 30 calendar days after the lawn has been established. Use fine spray nozzles only.

3.9 CLEAN-UP

A. Remove from the site and dispose of all debris and foreign material. During the grassing operations, debris shall not be dumped on any part of the property or on any unauthorized area.

3.10 MAINTENANCE

A. The Contractor shall be responsible for establishment and proper care of the grassed areas during the period when the grass is becoming established and until final acceptance by the Owner.

B. Maintenance shall consist of watering, weeding, repair of any erosion and reseeding as necessary to establish a 100% uniform stand of grass, and shall continue until acceptance.

C. All seeded areas that do not show satisfactory growth within 18 days after seeding shall be re-seeded and re-fertilized as directed until a satisfactory lawn is established. Full coverage is required in 60 days.

D. All lawn areas shall be protected until acceptance. All eroded and damaged areas, regardless of cause, shall be immediately repaired and reseeded. Protect all lawn areas from pedestrian or vehicular traffic.

3.11 GUARANTEE AND ACCEPTANCE

A. Guarantee all lawns and grassing from the date of written acceptance for a period of not less than one year.

END OF SECTION 02930

SECTION 02933

TEMPORARY SEEDING

PART 1 – GENERAL

1.1 SCOPE

A. The work covered by this section consists of the establishment of a temporary vegetative cover on disturbed areas by seeding with appropriate rapidly growing grass seed. Temporary seeding shall be provided for all exposed soil surfaces that are not to be fine graded or landscaped within 30 days after fine grading.

1.2 PROJECT CONDITIONS

A. Protect all adjacent public and private property from siltation and other damage due to construction activities with silt dams or fences as indicated on the Drawings.

B. Temporary seeding shall be applied to any and all disturbed areas left idle for two weeks and shall be applied no later than the 15th calendar day from last land disturbance activity (i.e. clearing, grubbing, or grading).

1.3 QUALITY CRITERIA

A. Installation shall be in strict compliance with the rules and regulations of the local seed laws.

B. Installation shall comply with all applicable codes, rules, regulations and ordinances related to erosion control and temporary seeding.

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PART 2 – PRODUCTS

2.1 TEMPORARY SEED

A. Select temporary grass seed appropriate to the season and site conditions. Temporary grass shall be a quick growing species such as millet, rye grass, Italian rye grass or cereal grasses suitable to the area providing a temporary cover which will not later compete with grasses sown for permanent cover. Seed shall meet the requirements of the rules and regulations of the Georgia Seed Law.

2.2 LIME

A. Provide agricultural grade ground or pulverized limestone. Lime shall contain not less than 85% carbonates with 50% passing a 100-mesh sieve. Lime shall have tested values of 90% minimum germination and 1% maximum weed content.

2.3 FERTILIZER

A. Provide standard commercial grade fertilizer, either 4-12-12, 6-12-12 or 5-10-15 as required for conditions.

PART 3 – EXECUTION

3.1 SEED-BED PREPARATION

A. Where soils are known to be highly acid (pH 5.5 and lower), apply lime at the rate of two tons per acre (1 #/10 s.f.).

B. Apply fertilizer at a rate of 450 lbs./acre (10 #/1,000 s.f.). Lime and fertilizer shall be incorporated into the top 2 to 4 inches of the soil by tilling.

C. Loosen ground surface by discing, raking or harrowing. If the area has been recently loosened or disturbed, no further roughening shall be required. Remove all large clods, boulders and debris which will interfere with the work. Remove all stones 2" and larger in any given dimension.

3.2 SEEDING

A. Apply seed evenly with a cyclone seeder, drill, cultipacker seeder or hydroseeder. Small grains shall be planted no more than one inch deep. Grasses and legumes shall be planted no more than ¼ inch deep. Distribution by hand shall not be permitted.

3.3 ROLLING

A. Roll all seeded areas before applying mulch. On steep slopes cover seeds by dragging spiked chains or similar methods.

3.4 MULCHING

A. All seeding in fall for winter cover shall be mulched. Seedings on slopes 4:1 or greater, on adverse soil conditions and in excessively hot or dry weather shall also be mulched.

B. Mulch shall be straw, or hay spread at the rate of approximately two tons/acre, wood cellulose fiber applied at the rate of approximately 1500 lbs./acre. Bituminous treated mulch shall be used on all slopes steeper than 2:1.

C. Seedings made during optimum spring and summer seeding dates, with favorable soil and site conditions shall not require mulch if written permission is received by the Engineer.

3.5 WATERING

A. Provide watering as required to establish and maintain healthy vegetative cover.

3.6 RESEEDING

A. Reseed and provide straw cover for bare areas 1 s.f. and larger to establish and maintain vegetative cover and to prevent sheet and rill erosion. Repair erosion damage as required and reseed.

END OF SECTION 02933

SECTION 02934

SODDING

PART 1 GENERAL

1.01 SCOPE

Sodding shall consist of establishing certain critical areas with sod as designated on the Drawings.

PART 2 PRODUCTS

2.01 SOD

A. Sod shall consist of a live, dense, well-rooted growth of turf grass species as noted on the Drawings. The sod shall be free from Johnson grass, nut grass and other obnoxious grasses and shall be of suitable character for the purpose intended and for the soil in which it is to be planted. It shall be un-injured at the time of planting.

B. Sod shall be uniform in thickness, having not over 2-inches or less than 1-inch of soil.

C. Sod strips shall have a consistent width of 12 or 18-inches.

2.02 FERTILIZER

A. Fertilizer (10-10-10) used in connection with sodding, shall contain 10 percent nitrogen, 10 percent phosphoric acid and 10 percent potash. The fertilizer shall be furnished in standard containers with the name, weight and guaranteed analysis of the contents clearly marked. The containers shall ensure proper protection in handling and transporting the fertilizer. All commercial fertilizer shall comply with local, state and federal fertilizer laws.

B. Ammonium nitrate shall be a standard commercial product, shall conform to the requirements for other commercial fertilizers as specified above, and shall have a minimum of 32-1/2 percent nitrogen.

2.03 LIME

Agricultural limestone shall be dolomitic and contain not less than 85 percent of calcium carbonate and magnesium carbonate combined, and shall be crushed so that at least 85 percent will pass the No. 10 mesh sieve and 50 percent will pass a No. 40 mesh screen.

2.04 WEATHER LIMITATIONS

Sod shall be planted only when the soil is moist and favorable to growth. No planting shall be done between October 1 and April 1 unless weather and soil conditions are considered favorable and permission is granted by the Engineer.

PART 3 EXECUTION

3.01 SODDING

A. The area to be sodded shall be constructed to the lines and grades indicated on the Drawings or as directed by the Engineer, and the surface loosened to a depth of not less than 3-inches with a rake or other device. If necessary, it shall be sprinkled until saturated at least 1-inch in depth and kept moist until the sod is place thereon. Immediately before placing the sod, the fertilizer shall be uniformly applied at the rate of 12 pounds of Grade 10-10-10, or equivalent, per 1,000 square feet. Agricultural limestone shall be applied at the rate of 50 pounds per 1,000 square feet.

B. The entire area shall be thoroughly covered with sod. The sod shall be placed on the prepared surface with the edges in close contact and, as far as possible, with staggered joints.

C. The sod shall be maintained moist from time of removal until reset but shall be placed as soon as practicable after removal from place where growing. Immediately after placing it shall be rolled with a light- weight roller or hand tamped to the satisfaction of the Engineer.

D. Sod on slopes steeper than 3 to 1 shall be held in place by wooden pins about 1-inch square and 6-inches long, driven through the sod into the soil until they are flush with the top of the sod.

3.02 WATERING AND MAINTENANCE

A. The sod shall be watered as directed by the Engineer for a period of two weeks after which ammonium nitrate shall be applied at the rate of three pounds per 1,000 square feet and the sod given a final watering.

B. The Contractor shall not allow any equipment or material to be placed on any planted area and shall erect suitable barricades and guards to prevent Contractor's equipment, labor or the public from traveling on or over any area planted with sod.

C. It shall be the obligation of the Contractor to secure a satisfactory growth of grass before final acceptance of the Project.

END OF SECTION 02934

SECTION 02975

CLEANUP AND FINISH

PART 1 - GENERAL

1.01 DESCRIPTION

A. Furnish labor, materials, and equipment required to complete cleanup of all paving, building, grounds, and all other areas outlined on the drawing.

B. Chemicals, paints, cleaning products, concrete or other waste materials shall not be discarded in the planting beds. If such materials are discharged in the plant beds, the contractor shall remove the contaminated soils and replace with viable topsoil.

C. Debris shall not be dumped on any part of the property or any unauthorized place. All debris, construction material, Contractor's buildings or equipment, stumps, roots, boulders or any other extraneous material deposited during construction shall be removed from the site.

END OF SECTION 02975

SECTION 03200

CONCRETE REINFORCEMENT

0BPART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. Work covered by this Section includes the furnishing and installation of concrete and masonry reinforcement as specified in the Contract Documents.

1.2 RELATED WORK SPECIFIED ELSEWHERE

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

B. Cast-in-Place Concrete 03300

1.3 SUBMITTALS

A. Submit under provisions of Division One.

B. Manufacturer's certification that reinforcement meets Specification requirements, and/or certified mill test reports

C. Shop Drawings shall show dimensions, spacing, bar and mesh schedule, bending details, stirrup and support details, and other pertinent data and in accordance with ACI 315.

D. Submit manufacturer's printed product data, clearly marked, indicating proposed fibrous concrete reinforcement materials. Submit manufacturer's printed batching and mixing instructions.

1.4 QUALITY ASSURANCE

A. Provide at least one person who will be present during execution of this portion of the work and who shall be thoroughly familiar with the type of materials being installed, the referenced standards and the requirements of this work, and who shall direct all work performed under this section.

B. Work shall comply with requirements and recommendations of the following:
1. American Concrete Institute, ACI 315, "Manual of Standard Practice for Detailing Reinforced Concrete Structures."
2. American Concrete Institute, ACI 318, "Building Code Requirements for Reinforced Concrete Structures."
3. American Concrete Institute, ACI-ASCE 530 and 530.1, "Building Code Requirements for Masonry Structures."

4. American Welding Society, AWS D1.4, "Structural Welding Code for Reinforcing Steel".
5. American Welding Society AWS D12.1. "Recommended Practices for Welding Reinforcing Steel, Metal Inserts, and Connection in Reinforced Concrete Construction."
6. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice."
7. American Concrete Institute, ACI SP-66 "Detailing Manual."
8. American Concrete Institute, ACI 544, "Report on Fiber Reinforced Concrete."

1.5 DELIVERY, STORAGE, AND HANDLING

A. All deliveries shall be accompanied by detailed bills of material which shall include information pertaining to bar size, bar mark, length of bends, total length of bar, weight of individual sets of bars and total weight delivered for each structure. Bundles shall be color coded.

B. Store reinforcement off the ground, under suitable cover or in a suitable enclosure. Maintain easy access for inspection and identification of materials.

C. Maintain reinforcement free from dirt, grease, scale, loose rust, oil, paint, other foreign matter, and all deleterious materials. Clean all reinforcement as required to meet these conditions, and maintain such clean condition until such time as concrete is placed.

1.6 JOB CONDITIONS

A. All reinforcing steel within the limits of a day's pour shall be in place and firmly wired prior to commencement of concrete placing operations.

B. Installation or wiring of steel less than six hours before commencing placement of concrete shall not be permitted, except by special written authorization of the Architect/Engineer. At least six hours of review time for each pour location shall be provided to the Architect/Engineer by the Contractor after the last reinforcement is placed and prior to placement of concrete.

C. The reinforcing steel, in place, shall be subject to review and approval by the Architect/Engineer prior to placing of any concrete.

D. The Contractor shall notify the Architect/Engineer a minimum of at least 24 hours prior to readiness for each reinforcing review.

PART 2 - PRODUCTS AND MATERIALS

2.1 MATERIALS

A. Reinforcing Bars: Deformed bars conforming to ASTM A615, Grade 60, including

Supplementary Requirement S1.

B. Wire Fabric Plain Type: ASTM A185. Flat sheets only.

C. Wire Fabric Deformed Type: ASTM A497.

D. Tie Wire: 16-gauge annealed type.

E. Supporting Devices: Size and shape appropriate to conditions. Where concrete is exposed to view, chairs shall have plastic coated feet.

F. Supporting devices for slabs on grade shall have sand plates.

G. Dowels: plain round bars conforming to ASTM A675 Grade 80.

H. Fiber Reinforcing (Alternate temperature reinforcing for slabs on grade)
1. Fibermesh 300 (or engineer approved equal) 100 percent virgin polypropylene, fibrillated fibers containing no reprocessed olefin materials and specifically manufactured to an optimum gradation for use as concrete secondary reinforcement. Volume per cubic yard shall equal a minimum of 0.1% (1.5 pounds).
2. Fibrous concrete reinforcement shall be as manufactured by Fibermesh Company, 4019 Industry Drive, Chattanooga, TN 37416, or an engineer approved equal.
3. Physical Characteristics:
   a. Specific gravity: 0.91.
   b. Tensile strength: 50 to 110 ksi.
   c. Fiber length: graded per manufacturer.

I. Adhesive and grouted anchors shall be KELIBOND and KELIGROUT as manufactured by KELKEN GOLD of South Plainfield, New Jersey (201-753-0088), or an approved equal.

J. Mechanical Rebar Splices: CADWELD T Series and B Series as manufactured by Erico Products, Inc., or an approved equal.

K. Pipe Sleeves: Standard weight pipe conforming to ASTM A120.

2.2 FABRICATION

A. Fabricate reinforcement in accordance with CRSI Manual of Standard Practice, ACI SP-66 and ACI 318.

B. Accurately fabricate to the details and dimensions shown on the Drawings.

C. All bars shall be bent cold and shall not be bent or straightened in a manner that will injure the material (i.e. torched).

D. Bend all reinforcement in accordance with ACI 318.

E. No bars that are partially embedded in concrete shall be field bent except as shown on the Drawings or as permitted by Architect/Engineer.

1BPART 3 - EXECUTION

3.1 INSTALLATION

A. Accurately position reinforcement and firmly support in place. The system of holding reinforcement in place shall insure that steel will not be able to move during concrete placement. If necessary, top reinforcing shall be adequately held in position to support the weight of the workmen without displacement. All reinforcement shall be rigidly wired in place with adequate spacers and tie chairs. Bar supports shall be 3'-0" on center maximum, and in accordance with ACI 315.

B. For concrete slabs on ground or fill, support reinforcement on approved chairs. "Hooking-up" or "Walking-in" of any reinforcement including mesh, will not be permitted.

C. Protective concrete cover shown on the Contract Documents, or required by ACI Code, shall be rigidly adhered to. Coordinate conduit and insert placement so as to avoid decreasing or increasing protective cover on reinforcement.

D. In the event conduits, piping, inserts, sleeves, or any other items interfere with the placing of reinforcement, as indicated on the Contract Documents, consult Architect/Engineer for required changes.

E. Protect installed reinforcing from damage and displacement before, during, and after placement of concrete. Exposed reinforcing intended for bonding with future extensions shall be protected from corrosion.

F. At the time concrete is placed, all reinforcement shall be free from dirt, mud, ice, rust, scale, loose mill scale, oil, paint, and other coatings which may destroy or reduce bond between steel and concrete.

G. The Contractor shall repair or replace damaged, distorted or displaced reinforcement.

H. Fiber Reinforcing
   1. Add fibrous concrete reinforcement to concrete materials at the time concrete is batched in amounts in accordance with approved submittals for each type of concrete required.
   2. Mix concrete in strict accordance with fiber reinforcement manufacturer's instructions and recommendations for uniform and complete distribution.
   3. Manufacturer shall provide a qualified technical representative to instruct the

concrete supplier in proper batching and mixing of materials to be provided.

3.2 SPLICES IN REINFORCEMENT

A. Lap splices (wired together) and embedment lengths shall conform to:
Concrete - ACI 318 - Chapter 12
Masonry - ACI 530 - Chapter 8

B. No splices of reinforcement shall be made except as shown on the plans or as specified/authorized by the Architect/Engineer.

C. Mechanical splices shall be installed in strict accordance with manufacturer's instructions.

D. Welding of reinforcing is not permitted unless specified or authorized by the Architect/Engineer.

END OF SECTION 03200

SECTION 03300

CAST IN PLACE CONCRETE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provision of Contract, including General and supplementary conditions and Division 1 Specification Sections, apply to this section.

1.02 SUMMARY OF WORK

A. This section specifies cast-in-place concrete, mix design, placement procedures and curing procedures.

B. Related Sections The following Sections contain requirements that relate to this Section:

1. Division 3: Section "Concrete Formwork".

2. Division 3: Section "Steel Reinforcement for Concrete"

3. Division 3: Section "Brushed Concrete Finish”

1.03 SUBMITTALS

A. Mix Designs: Submit to Engineer for each type of concrete used on project, in advance of proposed use. Verify the design mix in accordance with Method 1 or Method 2 of ACI 301, Section 3.8, as follows:

1. Method 1 : Submit samples of materials to be used and proposed mix design
to testing Agency for verification as outlined in Method 1.

2. Method 2: Submit to Engineer, with copy to Testing Agency, necessary data to verify mix in accordance with ACI 301, Section 3.8.2.2.

B. Pre-qualify ready-mixed concrete suppliers according to the requirements of ASTM
Specification C94, entitled "Ready-Mixed Concrete". Mi and transport concrete as required by ASTM C94, Paragraphs 15.1 and 15.2.

C. Product Data for proprietary materials and items, including mixtures, patching compounds, waterstops, joint systems, curing compounds, dry shake finish

materials, and others as requested by Engineer.

D. Samples of materials as requested by Engineer, including names, sources, and descriptions, as follows:

1. Design Test

1.03 JOB CONDITIONS

A. Weather

1. Precaution shall be taken to prevent high temperatures in fresh concrete during hot weather, in accordance with ACI 305. Water reducing set retarding admixtures shall be used in such quantities as recommended by concrete supplier to assure that concrete remains workable and lift lines will not be visible.

2. Cold weather placement shall be in accordance with ACI 306.

1.05 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of following codes, specification and standards, except where more stringent requirements are shown or specified.

1. American Concrete Institute (ACT) Standards:

a. ACI 3 01, "Specification for Structural Concrete for Buildings".

b. ACI 3 18, "Building Code Requirements for Reinforced Concrete".

2. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice".

3. American Society for Testing and Materials (ASTM) "Specification for Ready-Mixed concrete" ASTM C94.

B. Allowable Tolerances in finished, exposed work.

1. Maximum + 3/16" in length of 20'-9" maximum, + 318" in length of 40'-0" or more.

2. In cross sectional dimension +3/16".

3. In surface plane, plumb and level + 118" in 10'-0" in any direction when measured with a 10'0" straight edge.

4. Tolerances shall conform to ACI 301.

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

A. Portland Cement: Meeting ASTM C150, Type I of 111, natural color, domestic Manufacture. Only one brand of cement shall be used.

B. Normal Weight Aggregate: Fine and coarse aggregate meeting ASTM C33 from a single source for exposed concrete.

C. Air-Entraining Admixture: Meeting ASTM C260. Add to produce air entrainment in accordance with ACI 3 18.

D. Water-Reducing Admixture: Meeting ASTM C494, Type A only.

E. Water-Reducing Retarding and Accelerating Admixtures: Meeting ASTM C494, Type D and E. Add as required for weather conditions encountered.

F. Water shall be clean, potable and free of deleterious amounts of acid.

G. Expansion Joints Filler Strips: Non-extruding, pre-molded asphaltic fiber board, of thickness shown on drawings.

H. Calcium chloride or mixtures containing calcium chloride or fly ash shall not be used in concrete without Engineer's approval.

2.02 RELATED MATERIALS

A. Waterstops: Water stops for below grade shall be polyvinyl chloride plastic compound, ribbed, with center bulb designed to resist 125 head feet of water.

B. Embedded items such as sleeves, straps, washers, angles and plates, shall be of structural steel conforming to ASTM A36. Anchor bolts shall conform to ASTM A36 and shall be the regular hexagon type. All embedded items shall be hot-dipped
galvanized in accordance with ASTMIA123.

2.03 CURING AND SEALING COMPOUND

A. The compound shall be a clear styrene acrylate liquid type complying with ASTM C309, Type I, Class A.
   1. Curing and sealing compounds must not change the color of the concrete (i.e. yellowing) and breakdown in a two to four week period.

2.04 CONCRETE TYPES

A. Class of Concrete : Class A - 3000 psi normal weight.

B. Concrete Mixtures: The concrete shall be positioned by the water-cement ration method. The proportioning shall be based on the requirements of a plastic and workable mix within the slump range (ASTMC-145) and strengths required. The following class of concrete is required:

Class: A
Minimum Compressive Strength @ 28 Days: 3000 psi
Maximum Slump: 3-4 inches
Water Cement ratio: .46 maximum

C. All concrete exposed to freezing and thawing shall be air-entrained at manufacturer's prescribed rate to result in concrete with a total air content of 4.5% to 6.0%.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine surfaces designated to receive work described in this section for conditions adversely affecting the finished work. Repair or replace surfaces not meeting tolerances or quality requirements imposed within specifications governing substrate construction prior to initiating this work.

3.02 MIXING AND BATCHING

A. Method of Mixing: Mix concrete in accordance with ASTM C94, except where more stringent requirements are specified.

1. All trucks used for truck mixing shall be equipped with accurate water measuring devices and revolution counters.

B. Batching Hot and cold weather batching shall comply with ACU306 and ACI305 and conform to the following:

1. Cold weather batching when the temperature is below 40 degrees or likely to fall below 40 degrees in the 24 hour period before placing, adequate equipment shall be provided for heating the concrete materials. When placed in forms, the concrete shall have a temperature between 55 degrees F.

and 90 degrees F. Only specified non-chloride acceleration shall be used.

2. Hot weather batching During hot weather the temperature of the concrete shall be less than 100 degrees F.

3.03 DISCHARGE CONCRETE

A. Discharge of concrete shall be completed within 1- ½ hrs.

B. Adding water to restore slump loss during excessive mixing or due to too long an elapsed time since initial mixing (1- ½ hrs.) will not be permitted.

3.04 PLACING

A. Before placing concrete, preliminary work such as forms and reinforcing steel sleeves and embedded items shall be checked carefully, inspected and approved.

B. Concrete shall be handled from mixer to place of final deposit as rapidly as practical by methods which shall prevent separation or loss of ingredients. Concrete shall be
distributed by means equal to a steep-sided bottom drop concrete bucket and shall not be allowed a free fall of over four feet, except as specifically allowed for caissons. Bucket shall have a capacity of not less than ½ cubic yard. Transporting and handling equipment shall be cleaned at frequent intends and flushed thoroughly with water before and after each day's m. Water shall not be discharged into concrete forms.

C. No concrete shall be placed in forms after initial set has taken. Re-tempering of concrete which has partially set is prohibited. Place concrete in the forms within 1- ½ hours after initial batching. No placing will be permitted when the sun, temperature, wind or limiting of facilities prevent proper finishing and curing.

D. Deposit concrete as near final position as possible to avoid re-handling. Place in uniform, horizontal layers 18 to 24 inches in depth; care being taken to avoid vertical joints or inclined planes. Piling up of concrete in forms in such a manner as to permit escape of mortar, or flow of the concrete itself, will not be permitted. Deposit concrete continuously and as rapidly as practical until entire unit of pour is completed, with thorough consolidation by vibrating to insure a dense, homogeneous mass without voids or pockets.

E. Transport and place pumped concrete in accordance with 11 ACI requirements. Make provisions in formwork design and construction to handle effects of pump hammer.
Employ aggregates of controlled water contents for pumped concrete. Equipment used to transport concrete shall be compatible with concrete reinforcing and desired finishes.

3.05 CONSOLIDATION

A. Use mechanical vibrating equipment for concrete consolidation. Use equipment and procedures for consolidation of concrete in accordance with ACI 309.

B. Do not use vibrators to transport concrete inside forms. Insert and withdraw

vibrators vertically at uniformly spaced locations. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer.

3.06 COLD WEATHER PLACING

A. Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

B. When air temperature has fallen to or is expected to fall below 40 degrees, uniform heat water and aggregates before mixing to obtain a concrete mixture temperature of no less than 55 degrees and not more than 90 degrees at placement.

3.07 HOT WEATHER PLACING

A. When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.

B. Cool ingredients before mixing to maintain concrete temperature at tune of placement below 90 degrees; mixing water may be chilled.

C. Use water reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, when acceptable to Landscape Architect.

3.08 CONCRETE CURING AND PROTECTION

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with a.11 evaporation-control material. Apply in accordance with manufacturer's instructions after screening and bull floating, but before trowling.

1. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting keep continuously moist for not less than 7 days.

B. Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing and by combinations thereof as herein specified.

1. Provide moisture curing by keeping concrete surfaces continuously wet by covering with water of continuous water-fog spray.

2. Provide moisture-cover curing as follows Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable

width with sides and ends lapped at least 3 inches and sealed by waterproof tape.

3. Provide curing and sealing compound to exposed exterior slabs, walks, and curbs as follows Apply specified curing and sealing compound to concrete surfaces as soon as final finishing operations are complete. Apply uniformly in continuous operation in accordance with manufacturer's direction.

C. Curing Formed Surfaces: Cure formed concrete surfaces, including walls, by moist curing with forms in place for the full 7 day curing period. If forms are removed, continue curing by methods specified above, as applicable.

D. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, walks and curbs by application of appropriate curing method.

E. Protection: During curing period, the concrete shall be protected from damaging mechanical disturbances and excessive vibration. All finished surfaces shall be protected from damage by construction equipment, materials or methods, and by rain or running water.

3.09 CONCRETE FINISHES

A. Scratch Finish: Apply scratch finish to sub slab surfaces to receive mortar setting beds for brick pavers, tile and dimensional stone pavement. After placing slab, slope surface to drains as required, roughen surface with stiff brushes, brooms, or rakes.

B. Float Finish: Apply float finish to slab surfaces to receive trowel finish and other finishes specified in Division 3 "Brushed Concrete Finish".

1. After screening, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades, when surface water has disappeared. Consolidate surface by hand floating. Check and level surface plane and slope surface to drains as required. Immediately after leveling, refloat surfaces to a uniform, smooth, granular texture.

C. Trowel Finish: Apply trowel finish to concrete surfaces to be exposed to view as required on the drawings.

1. After floating, consolidate concrete surface by hand-troweling operation, free of trowel marks, uniform in texture and appearance.

3.10 CONCRETE SURFACE REPAIRS

A. Patching Defective Areas: Repair and patch defective areas with cement mortar

immediately after removal of forms, when acceptable to Engineer.

1. Cut out honeycombs, rock pockets, voids over ¼ inch in any dimension, and holes left by the rods and bolts, down to solid concrete but in no case to a depth of less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water and brush out the area to be patched with specified bonding agent. Place patching mortar before bonding compound has dried.

2. Patching mortar for exposed-to-view surfaces shall, when dry, match color surrounding. Compact mortar in place and strike off slightly higher than surrounding surface. Finish patch after shrinkage in such a manner as to match the adjoining surfaces.

END OF SECTION 03300

Tree Conservation Plan

Recommendation For:

Blackburn Park Parking Lot Improvements

City of Brookhaven
2019

OCTOBER 3

Prepared by: CPL
Authored by: Joseph Powell
ISA Certified Arborist SO-7488A

ARCHITECTURE
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CONTENTS

Tree Conservation Plan Recommendation

INTRODUCTION

It is imperative for all construction lead hands to thoroughly read and understand this report. Tree preservation specifications should be followed and adhere to during the entire construction process.

This report is in regards to the proposed construction at 3493 Ashford Dunwoody Road and must accompany the following additional documents:

1. Sheets D1, TPR1 and LS3 from the City of Brookhaven Blackburn Park Parking Lot Improvements constructions documents.

It is important to have healthy, vigorous trees growing during this construction project. Proper watering is essential to the tree's survival. Trees indicated in the additional documents above shall be well watered during the week leading up to the project start and continuing through the construction process until completion. Reducing plant stress will lessen the chance of decline. Mulching the critical root zone will help insulate soils from compaction, reduce soil water loss and reduce stress in the canopy. The sooner care begins the better the chance the tree will survive with few problems.
Trees are a capital asset on the property and protecting this investment by proper management is critical. Large mature trees provide many life sustaining benefits, which humans need for survival and quality of life. Preservation is just as important as planting.

ASSIGNMENT

CPL was to prepare a preconstruction Tree Conservation Plan and Prescription Recommendation for work associated with the construction at Black Burn Park 3493 Ashford Dunwoody Road. Trees #1, #2, #3, #4 and Tree Groups 'A' and 'B' were assessed for the potential impacts that would be caused by construction.

LIMITATION OF THE ASSIGNMENT

It must be understood that CPL is the assessor of the trees in regards to tree conservation practices as it relates to the most current tree protection standards. The client should secure a project Arborist to perform the recommendations provided within this report or secure a project Arborist to provide and preform his or her own recommendations. The client and the Construction Supervisors should incorporate the information outlined within this report into their construction methodology to complete their project in a reasonable manner.

The project scope and details for tree preservation shall be discussed at the pre-construction meeting. All proposed construction methods are limited to what was provided in the plans and in discussions

with the Cities Program Manager. Estimates, measurements and comments regarding tree preservation were based on the proposed construction plans.

OBSERVATIONS

Information was collected on April 10, 2019 by Joseph Powell, ISA Certified Arborist.
There were 4 individual trees and two tree groups assessed.
Tree Protection Fencing is recommended for all trees along the driveway.
No species at risk or endangered species were encountered.

DISCUSSION

The following sections discuss specific areas regarding the preservation of trees during construction. Tree preservation is a pro-active measure that starts at the planning stage. Understanding the importance of tree roots in overall tree health and survivability is of the highest importance in implementing effective tree preservation measures**.**

1. **Root Pruning Protocol-** The roots provide nutrients and water to the leaves and branches while supporting the tree in wind storms and preventing failure. Trees are remarkable, in that the upper canopy can be completely green and full while the majority of the roots below have been removed; leaving the tree highly prone to failure and imminent death within a few years. Once a tree is injured, that injury is never "healed" but instead the tree allocates a great deal of energy to try and repair itself, often times at the expense of its vitality and sometimes leading it into a mortality spiral that may not be noticed until years later.

   Root pruning is a practice to minimize injuries to trees. Roots in comparison to upper canopy limbs store a great deal of energy and reserves for trees to survive and must be removed with the utmost care and consideration. Similar to pruning the upper canopy of the tree, roots are best removed (if needed) via target pruning practices and not by being torn off. Roots must be assessed by a qualified and experienced arborist and then pruned properly with a sharp tool.

   Root pruning is not a common skill set and should be performed by a qualified arborist familiar with root excavation and root pruning. Tree's roots are underground and are otherwise not detectible without physical exploration – i.e., using a Supersonic Air Tool (SSAT) such as an AirSpade® or Daylighting vehicle (Hydro-Vac). Root pruning trenches must be at least the depth of the deepest root (usually 12-24 inches) and about 6 inches wide. Roots are assessed by the arborist with regard to the effects construction may have on the tree, and then either pruned with a sharp tool, possibly recommended for removal, or a design change may be needed on-site to accommodate. **The use of a rotary saw is not acceptable to prune the roots of trees.**

Root Pruning within the Structural Root Plate(SRP) of any tree requires root exploration via Supersonic Air Tool or Daylighting Vehicle to first remove the soil and expose the roots. For all excavating within the SRP being conducted on site, a Hydrovac at low pressures (<500 psi) shall be used. A Certified Arborist(CA) shall be required onsite during the initial excavation to make appropriate recommendations to the contractor for suitable tree preservation as required. When trees are damaged or injured significantly, the CA must notify the project arborist immediately to report the circumstances.

Roots less than 3/4 inch in diameter can be pruned using a sharpened tool such as hand pruners or a sharpened spade under the supervision of the Certified Arborist. Roots 3/4 – 3 inches in diameter can be pruned by the Certified Arborist using a sharp tool, such as a handsaw, hand pruner or loppers and under the supervision of the Construction Inspector and/or the advisement of the Project Arborist. All roots over 3 inches in diameter must be assessed by the Project Arborist prior to pruning unless the arborist on-site can confidently assess the effect of the removal of the root as not detrimental to the tree. This must be documented by the Certified Arborist and reported to the project arborist immediately.

Root Pruning within the Critical Root Zone(CRZ) and outside of the SRP, typically requires the use of a sharpened garden spade, cutting a line to a depth of about 12 inches by the on-site Certified Arborist and the advisement of the project arborist if needed. However, the same pruning protocol for the size of roots encountered (in the SRP) applies to the roots found within this area. The trenches (when using SSAT) are typically backfilled with the same excavated soil or new topsoil or compost and Tree Protection Fencing should be installed along this trench to protect the remaining roots.

2. **Critical Root Zones (CRZ) -** This is the area to be protected and is defined by the diameter of the tree and by the arborist and will change from tree to tree due to structural boundaries. Where some fill or excavate must be temporarily located near a CRZ, a plywood barrier must be used to ensure no material enters the CRZ. Rigid fencing is needed when construction machines are very close (within 3-6 feet) of the trunk to prevent accidental bumps from machines. These seemingly harmless bumps stay with the tree forever and can cause significant chronic stress to the tree.

3. **Structural Root Plate (SRP) -** Work within the SRP of any tree would be considered serious root injury and would leave the tree with a high potential of structural failure or serious decline. The trees SRP shall be Field Marked for exact locations. No excavation shall occur in the SRP. It is better to add some fill than to excavate roots. Fill can be modified (such as using High Performance Base (HPB)) to allow gas exchange and water permeability, while the tree adapts to the change slowly over time.

4. **Tree Protection Fencing (TPF) -** TPF is used on construction sites to ensure that damage to the tree and its root zone is prevented. This distance is typically located by the CRZ. However, this distance is not achievable due to infrastructure being too close. Conversely, the protection fence distance sometimes must accommodate a larger CRZ due to a limited root growing area/volume (this area is typically defined by the project arborist.) TPF locations shall be field marked by the project arborist, and installation will be completed by the contractor. The TPF must be anchored to the ground and must be installed to the lines defined by the project arborist. Problems will arise for tree preservation efforts when anyone removes the TPF, even temporarily. It takes one instance of soil compaction from a heavy machine for roots to suffer from air and water deprivation and for the tree to become stressed. It is imperative to install and maintain in good condition the TPF to prevent this from happening before and throughout the entire construction process.

5. **Tree Protection Signs** - Signage informs the public and reminds the contractors the significance of the Tree Protection Zones and the efforts put forward by the client in tree preservation. Place tree protection signs on the tree preservation fencing and in clear visibility. All signage should be in both English and Spanish. Place signs approximately every 20 feet on preservation fence.

6. **Site Access and Staging** - Construction access will be from the north and south entrances on Ashford Dunwoody Rd. All staging areas are understood to be outside of the CRZ. At no time are materials, vehicles, traffic or debris to be stacked, staged, or piled inside the TPF. Fuel Storage shall not be allowed on site. Petroleum-based products can contaminate the soil and are highly toxic to trees. Washing down concrete or cement handling equipment, in particular, should be prohibited on site. The ingredients in concrete products are high in PH, which is very caustic and can drastically alter the soil chemistry, damaging plants.

CONCLUSION

All trees are recommended to have Tree Preservation Fencing installed according to the specifications detailed in the construction documents. The trees will be the least impacted from construction if the TPF is installed prior to construction.

Manual work only and no machinery are recommended within the CRZ and SRP of Trees #1, #2, #3, #4 and Tree Groups ‘A’ and ‘B’. All work within the CRZ of aforementioned trees is recommended to be conducted under the supervision of an ISA Certified Arborist secured by the City of Brookhaven for this project and in accordance with ANSI Z60 standards.

Air excavation with root pruning is recommended for Tree Groups ‘A’ and ‘B’ and shall only be performed as needed and directed by an ISA Certified Arborist in order to install the new sidewalks. Excavated areas shall be backfilled with the same excavated soil.

If the preservation methods outlined in this report are adhered to, and the CRZ of the trees is respected where machines are not used and foot traffic is kept to a minimum, these trees will incur minimal root injuries and stress from the proposed construction. If there is any need to remove the TPF, approval from the project ISA Certified Arborist must be granted and other mitigation determined to minimize damage to the trees.

The following Tree Prescription is recommended to be administered to Trees #1, #2, #3, #4 and Tree Groups ‘A’ and ‘B’. The Prescription shall be performed by a ISA Certified Arborist secured by the City of Brookhaven for this project.

Tree Conservation Prescription Recommendation

Soil test - A soil test is needed to determine the PH and to be able to adjust as needed. Desirable range of 5.0 to 6.5 is preferred. Soil PH can be raised by incorporating ground agricultural limestone, or lower it by adding sulfur. Once a PH is determined, amendments can be added to adjust the soil PH.

PHC Tree Saver – All backfill shall be amended per soil test and mixed with PHC Tree Saver. This beneficial mycorrhizal fungi helps increase root colonization, absorption of water and minerals and mitigates adverse environmental stresses.

Pruning - Trees shall be pruned as needed for shape and form. All dead wood, cross branches and mistletoe shall be removed. The canopies shall not be pruned more than one third.

Nutra-Gel+Micros - This all-purpose fertilizer shall be spread across the critical root zones at a rate of 3lbs/1000 square feet, providing continuous fertilization for up to 6 months. Infiltrated in this gel are all the essential nutrients which are required by plants. This gel can hold up to 400 times its weight in water, which helps to keep moisture in the soil.

Mirimchi Green Pro Soil Enhancer - This organic compost shall be spread across the critical root zones at a rate of 3lbs per DBH above the root zone. This is a professional blend of premium compost and USDA certified biobased premium Biochar. Biochar can increase soil fertility of acidic soils (low pH soils), increase agricultural productivity, and provide protection against some foliar and soil-borne diseases.

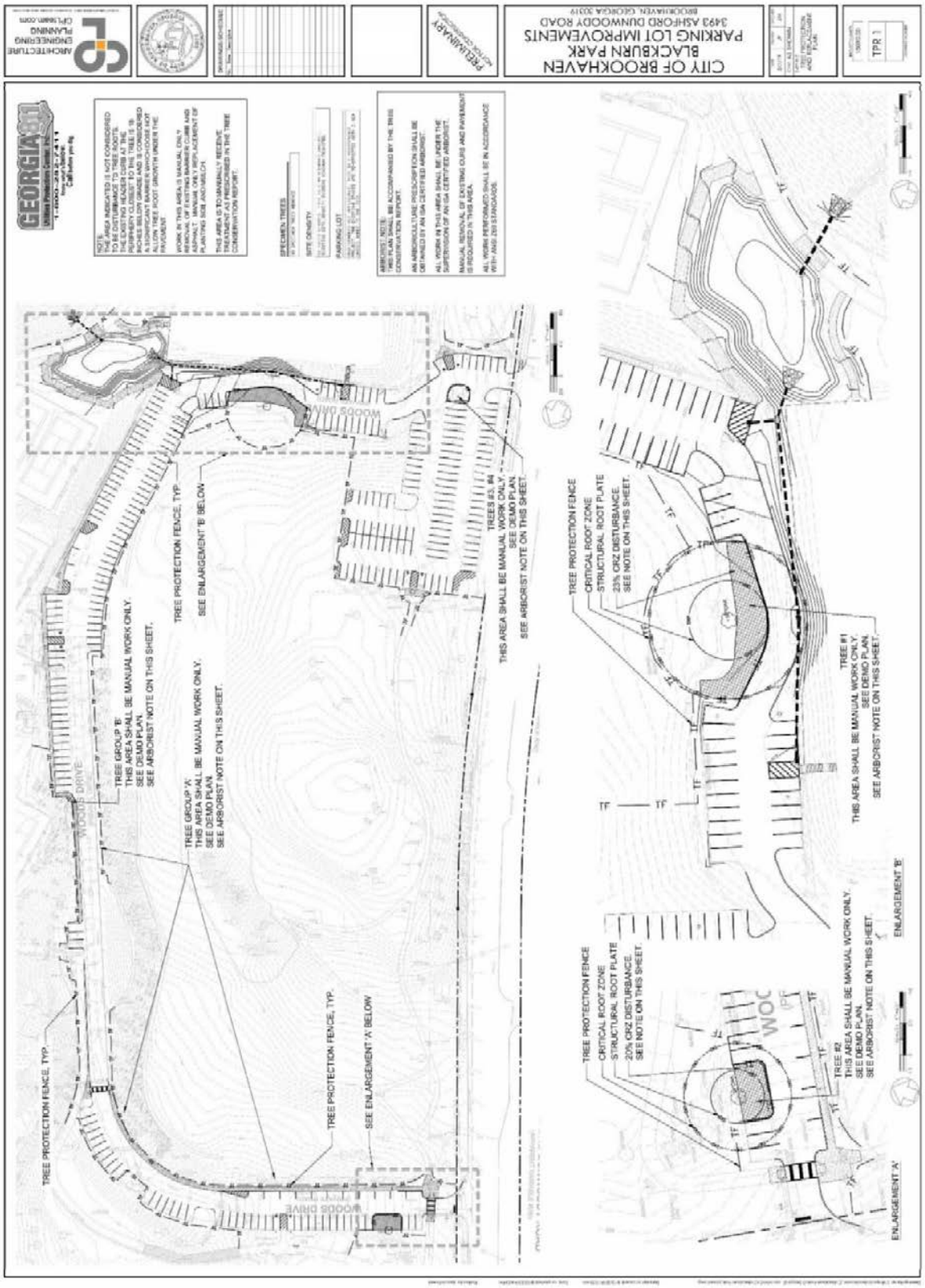
Irrigation - A temporary dripline system will be installed to provide, light, frequent watering to the critical root zones.

Mulching – Pine straw to be raked up and removed. A layer of aged hardwood mulch 6” thick to be installed over the entire critical root zones. Mulch shall be kept 6” away from the trunk of each tree to prevent insect and disease.

Monitoring - Tree preservation and contractor performance shall be reviewed in weekly site visits until construction substantial completion.

The Contractor shall be responsible for enforcement of this preservation policy as well as penalties and mitigation regarding breach of this preservation policy.

Appendix 1 – Tree Protection Plan (sample)



Appendix 2 – Photos

Tree #1 - Quercus nigra

Tree #2 – Quercus alba

Tree #3, #4 – Quercus

Tree Group ‘A’ – Predominantly Pinus palustris with a few Cercis canadensis

Tree Group ‘A’ (cont.) – Predominantly Pinus palustris

Tree Group 'A' (cont.) – Acer saccharum

Tree Group 'B – Predominantly Pinus palustris with a few Cercis canadensis

Tree Group ‘B’ (cont.) - Predominantly Pinus palustris with a few Cercis canadensis

Appendix 3 – Assumptions and Limiting Conditions

1. Any legal description provided to the consultant is assumed to be correct. Any titles and ownerships to any property are assumed to be good and marketable. No responsibility is assumed for matters legal in character. Any and all property is evaluated as though free and clear, under responsible ownership and competent management.
2. Care has been taken to obtain all information from reliable sources. All data has been verified insofar as possible; however, the consultant can neither guarantee nor be responsible for the accuracy of information provided by others.
3. The consultant shall not be required to give testimony or attend court by reason of this report unless subsequent contractual arrangements are made, including payment of an additional fee for such services as described in the fee schedule and contract of engagement.
4. Loss or alteration of any part of this report invalidates the entire report.
5. Possession of this report or a copy thereof does not imply right of publication or use for any purpose by any other than the person to whom it is addressed, without the prior expressed written or verbal consent of the consultant.
6. Neither all nor any part of the contents of this report, nor copy thereof, shall be conveyed by anyone, including the client, to the public through advertising, public relations, news, sales or other media, without the prior expressed written or verbal consent of the consultant particularly as to value conclusions, identity of the consultant, or any reference to any professional society or institute or to any initialed designation conferred upon the consultant as stated in his qualifications.
7. This report and values expressed herein represent the opinion of the consultant, and the consultant's fee is in no way contingent upon the reporting of a specified value, a stipulated result, the occurrence of a subsequent event, nor upon any finding to be reported.
8. Sketches, diagrams, graphs, and photographs in this report, being intended as visual aids, are not necessarily to scale and should not be construed as engineering or architectural reports or surveys.
9. Unless expressed otherwise: (1) information contained in this report covers only those items that were examined and reflects the condition of those items at the time of inspection; and (2) the inspection is limited to visual examination of accessible items without dissection, excavation, probing, or coring. There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the plant or property in question may not arise in the future.

Appendix 4 – Arborist Certification

I, Joseph Powell, certify that:

I have personally inspected the trees and the property referred to in this report and have stated my findings accurately. The extent of the evaluation is stated in the attached report and the Limits of the Assignment.

I have no current or prospective interest in the trees or the property that are the subject of this report and have no personal interest or bias with respect to the parties involved.

The analysis, opinions, and conclusions stated herein are my own and are based on current scientific procedures and facts.

My analysis, opinions, and conclusions were developed and this report has been prepared per commonly accepted arboricultural practices.

No one provided significant professional assistance to me, except as indicated within the report.

My compensation is not contingent upon the reporting of a predetermined conclusion that favors the cause of the client or any other party nor upon the results of the assessment, the attainment of stipulated results, or the occurrence of any subsequent events.

I further certify that I am a member in good standing of the International Society of Arboriculture. I have been involved in the field of Arboriculture sense March 2017.

Signed:

CPL

Joseph Powell, PLA
ISA Certified Arborist
SO-7488A

Appendix 5 – References

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