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VOLUME 1 OF 1

TECHNICAL SPECIFICATIONS

S P E C

FOR

MURPHEY CANDLER PARK HORSESHOE

PROJECT MANUAL:

CITY OF BROOKHAVEN, GEORGIA

PROJECT #15092.00 D
BID #22-104

PREPARED BY:

CPL Inc.
Land Planning · Landscape Architecture
3011 Sutton Gate Dr. Suite 130
Suwanee, Georgia 30024
678 318-1241

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BID FORM

MURPHEY CANDLER PARK – HORSESHOE

BROOKHAVEN, GEORGIA

1. Bid as Advertised: Yes _____
   No _____

2. Bid Expires:_____Month_____Day_____Year
   (Minimum of 90 days)

3. Bid Received From: (Company) _____

   (Address) _____

   (Phone) _____

   (Contact) _____

Project Number: 15092.00 D

Bid Number: **ITB No. 22-104**

I. INTRODUCTION:
The City of Brookhaven is in the process of accepting bids from qualified Contractors for the specified improvements in Ashford Park and providing a Splash Pad per the Scope of Work.

II. INSTRUCTIONS:
Failure to adhere to the instructions below and elsewhere in the Invitation To Bid may result in the bid being deemed non-responsive.

A. Bidder shall not attach information in lieu of completion of the forms provided below and any specifically requested attachments. All information requested by the Client must be provided.

B. Bidder's qualifications and ability to complete this project will be determined based upon the information presented. All questions must be answered in full.

Bidder acknowledges receipt of the following addenda:

Addendum No._____Dated _____

Addendum No._____Dated _____

Addendum No._____Dated _____

BASE BID LUMP SUM WITH UNIT PRICES

Base Bid, Single-Prime (All Trades) Contract: The undersigned Bidder, having carefully examined the Procurement and Contracting Requirements, Conditions of the Contract, Drawings, Specifications, and all subsequent Addenda, as prepared by Clark, Patterson, Lee and their consultants, having visited the site, and being familiar with all conditions and requirements of the Work, hereby agrees to furnish all material, labor, equipment services, and all calculated allowances below, necessary to complete the construction of the above-named project, according to the requirements of the Procurement and Contracting Documents, for the stipulated **Lump Sum** of:

_____

Dollars

($_____)

(Total transferred from the Construction Items Bid Schedule

BID GUARANTEE

The undersigned Bidder agrees to execute a contract for this Work in the above amount and to furnish surety as specified within 10 ten days after a written Notice of Award, if offered within 60 sixty days after receipt of bids, and on failure to do so agrees to forfeit to Owner the Bid Bond, as liquidated damages for such failure, in the following amount constituting five percent (5%) of the Base Bid amount above:

_____ Dollars ($_____)

SUBCONTRACTORS AND SUPPLIERS

The Bidder shall execute subcontracts for the portions of the Work as indicated on the attached List of Sub-contractors.

TIME OF COMPLETION

The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified in a written Notice to Proceed to be issued by Owner and shall fully complete the Work within 120 calendar days.

The City of Brookhaven will charge the Contractor Five Hundred Dollars and no cents ($500.00) per day for liquidated damages for every day beyond contracted time of completion that the Work is not complete.

Note: Completed Construction Items Bid Schedule must be completed in full and attached to this Bid Form or be declared non-Conforming:
See Instructions to Bidders ITB

Bidder further declares that the full name and resident address of Bidder's Principal is:

_____	_____
Authorized Representative *(Print or Type)*	Authorized Representative *(Signature)*

Signed, sealed, and dated this_____day_____, 2022

Notarized_____ (Seal)

My Commission Expires _____

Company Name and Address:

_____

_____

_____

Principal: _____

Title: _____

LIST OF SUBCONTRACTORS

I do_____,/do not_____, propose to subcontract some of the work on this project. I propose to Subcontract work to the following subcontractors:

NAME AND ADDRESS	TYPE OF WORK

COMPANY NAME_____

AUTHORIZED REPRESENTATIVE SIGNATURE_____

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.
e
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, 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 ensure 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 ensure 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 02112, page 2.

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

Contractor shall not interfere with reasonable use of the park and 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 contractors on the project site shall interfere with this work, the Landscape Architect shall declare the time and date when this project 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 without suffering a delay in the process.

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: **NOTE TO CONTRACTOR**
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

1.0 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. In 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.

2.0 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.

3.0 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 as; ***Murphey Candler Park-Horseshoe***
   a. Title of project and location; *Horseshoe, Murphey Candler Park*
   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 and supplier invoice.

A. Mobilization is identified as a separate line item so the contractor can bill ahead to secure operational capital to begin the project.

B. General Conditions and Overhead shall be shown as a separate line item at the bottom and not calculated into the unit items costs.

C. Additional Items: At the end of the Construction Items Bid Schedule the contractor may add additional line items that he feels were not listed or should be further broken down.

D. When 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 ***Horseshoe, Murphey Candler Park - City of Brookhaven –***

a. Project name and location – *Horseshoe, Murphey Candler Park*
b. Name of Consultant – *CPL Inc.*
c. Project number.
d. Contractor's name and address.
e. Date of submittal.

2. Arrange the Schedule of Payment items 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 the Application for Payment includes 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 change order work.

5. Maintain a chronological and on-going Ledger List of minor field 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. Quantity Allowance Payment Applications:
The contract includes certain allowance quantities for bid items that may need additional material quantities during the course of the project. The contractor is required to track these specific bid items during construction to verify when 100% of the bid quantities are exhausted. The documents are not limited to but may include Purchase Orders, delivery manifests, load tickets or any other document that confirms the use of the full 100%.

Once the bid quantity is exhausted, the contractor must request in writing access to use the allowance quantities. These quantities must also be documented as they are used. Pay Requests may only ask for the quantities used. Any remaining quantities are credited back to the Owner and the end of the project.

If the contractor exhausts the bid quantity and the allowance quantities, then he must prepare a Change Order Request to secure additional quantities.

N. Final Ledger: Contractor shall request payment for 100% of all construction items as shown on the Construction Schedule and Payment Request. Contractor must make a final tabulation of all Allowance Quantities and Change Orders as part of the final request. The final tabulation and 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. A Construction Change Directive contains a description of the change and designates the method 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. Coordinate with Municipal, agencies to close streets and control traffic.
8. Coordination between various sub-contractors.
9. Coordination between other on-site contractors.
10. Coordination with other contractors engaged by the Client or utility.
11. 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 permitting agencies to secure timely approvals of the work.
7. 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 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 the survey 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.

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.
2. Locate existing lateral sanitary sewer line as shown on the existing site survey.

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.

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. Road surfaces.

K. Subsurface Conditions: Contractor is responsible to correct all subsurface conditions necessary to ensure 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. Special sub-contractor pre-installation meetings
6. 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. Special Feature schedules
6. Weather conditions and schedule
7. 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. Shop drawings and submittals
j. Onsite inspections and adjustments
k. 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.
7. Record Drawings: Contractor shall maintain a current and complete set of all Contract Documents on-site at all times.
8. Review 'Requests for Information' and resolve.
9. Review 'Change Orders' and resolve.
10. Review pay requests and schedule of payments.
11. Resolve on-site issues and adjustments.
12. 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. Update with red lines to record changes as they occur. Said redlines must be issues in Meeting Minutes.

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

3. Shop drawings and approved site field changes

4. Documents and Samples of special product to the Site:

5. 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 01220

UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. See Construction Items Bid Schedule in the Instructions to Bidders in Division 1.

1.2 SUMMARY

A. This Section includes:

1. Unit price work as shown at the bottom of the Construction Items Bid Schedule.
2. List of unit prices required.
3. Procedures for unit price work.

1.3 DEFINITIONS

A. Unit price is an amount proposed by bidders, stated on the Bid Form and Construction Items Bid Schedule, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 SUBMITTALS

A. Supporting Data: When applications for payment include unit price work submit substantiated measurement of quantity installed or executed.

1.5 PROCEDURES

A. Unit Prices include all costs necessary to satisfactorily complete the work identified, including materials, delivery, labor, and installation. Insurance, overhead, profit and other General Conditions are shown separately as a percentage added.

B. Measurement and Payment: Refer to the individual Specification Sections for work that requires establishment of a unit price. Methods of measurement and payment for unit price items are specified in this section.

C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and the right to have such work measured, at Contractor’s expense, by an independent surveyor acceptable to Owner.

D. List of Unit Prices: A list of unit prices is included on the Construction Items Bid

Schedule. Specification Sections and details are referenced on the bid schedule that identifies requirements for materials described under each unit price item.

E. Unit Price Quantities: In case of unit price quantity discrepancies between Bid Form, Construction Items Bid Form and this form, or any other section, the unit price quantities stated in this section shall prevail.

PART 2 – PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LIST OF UNIT PRICES

NOTE:
Excavation and Removal of Unsatisfactory soil

Removal of unsatisfactory soils encountered that require excavation as defined in the specifications shall be included in the Unit Price and quantity of the materials being used to replace the excavation.
Unit of Measurement: Cubic Yard.
Scope: Include the following in the materials unit price: Excavation to subgrade, hauling and disposal off site.
Overhead and profit as part of material costs.

A. **Unit Price:** Replace with satisfactory earth fill:

1. Description: Removal of unsatisfactory soils leaves an unexpected void to be filled. Fill the void with earth fill up to proposed subgrade.
2. Purpose: To adjust the contract sum when actual quantity is determined.
3. Unit of Measurement: Cubic Yard
4. Quantity to be included in Contract Sum: **100 CY Allowance:**
5. Include only the following in the unit price: Excavation of unsatisfactory materials, securing and bringing suitable earth fill material from off site to fill the void to the original level of the soils removed.
6. Overhead and Profit to show as a separate percentage.
7. Include all other costs in contract sum.
8. Method of Measurement: Measurement will be made as outlined in the specifications and verified by the owner.

B. **Unit Price: Replace with Graded Aggregate Base (GAB) or Surge Stone:**

1. Description: Removal of unsatisfactory soils leaves an unexpected void to be filled. Fill the void with GAB or #57 stone up to proposed subgrade.
2. Purpose: To adjust the contract sum when actual quantity is determined.
3. Unit of Measurement: Cubic Yard
4. Quantity to be included in Contract Sum: **100 CY Allowance:**
5. Include only the following in the unit price: Excavation of unsatisfactory materials, securing and bringing GAB or Surge stone from off site to fill the void to the original subgrade level of the soils removed.

6. Overhead and Profit to show as a separate percentage.
7. Include all other costs in contract sum.
8. Method of Measurement: Measurement will be made as outlined in the specifications and verified by the owner.

C. Unit Price: Silt Fence

1. Description: Construction of additional silt fence where needed in the field and not shown on the plans.
2. Purpose: To adjust the contract sum when actual quantity is determined in the field.
3. Unit of Measurement: Linear Foot
4. Allowance quantity to be included in Contract Sum: **200 LF**
5. Include only the following in the unit price: Material and construction of the silt fence per detail; maintenance, repair, replacement, and removal of silt fence.
6. Overhead and Profit are included as a separate percentage.
7. Include all other costs in contract sum.
8. Method of Measurement: Measurement will be made as outlined in the specifications and verified by the owner.

D. Unit Price: Silt Sock

1. Description: Construction of additional silt sock where needed in the field and not shown on the plans.
2. Purpose: To adjust the contract sum when actual quantity is determined in the field.
3. Unit of Measurement: Linear Foot
4. Allowance quantity to be included in Contract Sum: **200 LF**
5. Include only the following in the unit price: Material and construction of the silt sock per detail; maintenance, repair, replacement, and removal of silt sock.
6. Overhead and Profit are included as a separate percentage.
7. Include all other costs in contract sum.
8. Method of Measurement: Measurement will be made as outlined in the specifications and verified by the owner.

E. Unit Price: Full Depth Reclamation

1. Description: Construction of additional FDR where needed in the field and not shown on the plans.
2. Purpose: To adjust the contract sum when extra quantity is determined in the field.
3. Unit of Measurement: Square Yard
4. Allowance quantity to be included in Contract Sum: **200 SY**
5. Include only the following in the unit price: Material and construction per specifications, detail, repair, and replacement for FDR.
6. Overhead and Profit are included as a separate percentage.
7. Include all other costs in contract sum.
8. Method of Measurement: Measurement will be made as outlined in the specifications and verified by the owner.

F. Unit Price: Wood Retaining Wall

1. Description: Construction of wood retaining wall where needed in the field and not shown on the plans either temporary or permanently.
2. Purpose: To adjust the contract sum when actual quantity is determined in the field.
3. Unit of Measurement: Linear Foot of wall.

4. Allowance quantity to be included in Contract Sum: **100 LF**
5. Include only the following in the unit price: Material and construction of the wooden wall per detail where needed to minimize excavation.
6. Wood materials shall be 'Ground Contact" wood as stated in Section 06100.
7. Overhead and Profit are included as a separate percentage.
8. Include all other costs in contract sum.
9. Method of Measurement: Measurement will be made as outlined in the specifications, staked in the field, and verified by the owner.

G. Unit Price: Tree Pruning Allowance.

1. Description: Tree care and pruning of site trees damaged during construction that need prescriptive treatment to recover from construction damage.
2. Collaboration and directives from the City of Brookhaven Arborist.
3. Purpose: To establish a contract Allowance until actual quantities and treatments are determined in the field with the arborist.
4. Unit of Measurement: Prescriptive treatment as defined by the arborist.
5. Allowance quantity to be included as a Lump Sum of **$5000**
6. Included in the allowance: Materials and labor to execute the prescriptive treatments as defined by the arborist.
7. Overhead and Profit are included within the allowance.
8. Method of Measurement: Contractor shall keep a detailed running total of the tree care and pruning work done until the allowance is exhausted.
9.

END OF SECTION 01220

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 actions taken. Include the following information on the label for processing and 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.

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2. 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.
3. 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.
4. Water: Potable water approved by local health authorities.
5. 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 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. Section 02112 ‘ Tree Protection” See Tree Penalty Clause.

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. Pines and Oaks
2. Location on site plan. Along edge of Horseshoe Road
3. Reason for pruning. Preserve the life of the tree
4. Description of pruning to be performed. See Appendix *Brookhaven 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. Root Control Fabric: Typar bio barrier root control fabric. Typar geos@typar.com 1 800 541-5519

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

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

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

1. Tree Protection-Zone Fencing: Metal construction fencing conforming to the Brookhaven Tree Ordinance and the detail included on the plans. Fence can be reusable material.

a. Height: minimum 4 feet.
b. Color: natural metal.

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.

F. 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 completed, and equipment has been removed from 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 stockpile 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.

B. Biocarrier Fabric: Install root control fabric in accordance with manufactures specifications and the project details

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 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 from the surface of the ground
2. Lay Typar root barrier over the roots to cover all disturbed areas over existing roots.
3. Cover the area with washed #57 stone up to within 3 inches of finish grade or up to the bottom of proposed paving section.
4. Lay structural filter fabric over top of the #57 Stone to prevent siltation.
5. Lay 3 inches of Topsoil over the filter cloth up to finished grade.
6. Cover the topsoil with 3 inches of pine straw or aged hardwood mulch

3.10 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

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. Splash pad operation and maintenance training by the Splash Pad equipment provider.
9. Complete final cleanup requirements, including touchup painting.
10. 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 products 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 General Conditions for terms of Contractor's period to correct the Work.
2. Refer to Section 02900 for plant material warranties.
3. All conditions of this Section shall also apply to warranties 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 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 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: Owner reserves the right to reject warranties and to limit selection of 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, , Lighting, Electrical and any other products under warranty.

B. Schedule: Provide warranties on products and installations as specified in the included Sections: Division 2, thru Division 16.

END OF SECTION 01740

CONTRACTOR WARRANTY FORM

PROJECT: CITY OF BROOKHAVEN – MURPHEY CANDLER PARK HORSESHOE.

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

SUB-CONTRACTOR WARRANTY FORM

PROJECT: CITY OF BROOKHAVEN – MURPHEY CANDLER PARK IMPROVEMENTS

LOCATION: BROOKHAVEN, GEORGIA

OWNER: CITY OF BROOKHAVEN

SUB-CONTRACTOR:

We_____, sub-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 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 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 proximity of utilities on the roadside, some of the demolition should be performed by small lightweight equipment.

Contractor shall secure permission of City of Brookhaven before working in the ROW of Candler Lake East NE or crossing the right-of-way.

Demolition items shall consist of the removal of curb, asphalt, 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.

Asphalt outside the FDR area shall be demolished, and residue asphalt deposited within the FDR area to be ground into the Full Depth Reclamation process.

Granite curb shall be carefully removed and salvaged for reuse where possible. Unused granite curbs shall be given to the owner for salvage.

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 Candler Lake East NE.

Contractor make close off the Horseshoe for the duration of the project. But shall not interfere with the publics reasonable access to Murphey Candler Park facilities.

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 Redding Road.

1.04 DEFINITIONS

Limits of Disturbance: (LOD) The boundary within which all construction, materials storage, grading, landscaping and related activities shall occur.

Limits of Work: (LOW) The boundary within only maintenance type of work can occur, no new construction shall occur within the LOW.

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 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 Candler Lake East NE ROW lines must be performed carefully and meticulously. Contractor shall protect the existing service utilities from damage.

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 not identified as salvage 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 city 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 Candler Lake East NE shall be carefully coordinated to avoid danger for vehicles on the street.

B. Traffic Control and Safety: Contractor shall work with City of Brookhaven and local Police officials to prepare a traffic control and safety plan and process for the execution of work along Candler Lake East NE. 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 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 by 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:

A. Within the limits schematically identified on the Drawings, the site will be cleared 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 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
..

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.

6.

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 reveal 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.

1.5 DEFINITIONS

Limits of Disturbance: (LOD) The boundary within which all construction, materials storage, grading, landscaping and related activities shall occur.

Limits of Work: (LOW) The boundary within only maintenance type of work can occur, no new construction shall occur within the LOW.

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 or shoved onto abutting private properties.

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 active park 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 Horseshoe Loop area of the Park. These sites must be pre-approved by the Owner prior to utilization.

Other contractors working within the Horseshoe Road area may be staging and storing materials in the area. Contractor is responsible for coordinating with other contractors to identify and utilize space for staging and storage.

END OF SECTION 02100

SECTION 02112

TREE PROTECTION AND CLEANUP

PART 1 GENERAL

1.01 SCOPE

A. Tree Protection, selective tree removal, 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.

I. Tree Penalty:
The intent of this clause is to emphasize the importance of all trees to be saved on the site. All trees identified to be saved shall be maintained in an undamaged condition. Damage shall be defined as the act of scarring, nailing, cutting, breaking limbs, etc., of any tree or its root system in such a manner as may cause the tree to be permanently lost. Accidental damage due to dead trees falling, equipment breakdown or any act on the part of the operator, which appears to the Landscape Architect as unavoidable, would not warrant a penalty. However, the Contractor will be liable for consistently damaging trees by accidental damage. Damage due to improper location of utility trenches or ditches without prior field adjustment will not be considered accidental. The Contractor will be responsible for damage on the part of the operator or operators, whether by method of excavation, use of improper equipment, incompetency of the operator, or failure to properly inform the operator as determined by the Landscape Architect.

1. All trees on the site shall be saved except those marked specifically to be removed on

the drawings and those marked specifically on the site by the Landscape Architect to be removed. No other tree may be removed from the site prior to the Landscape Architect's inspection.

2. Penalties for damage to or removal of any healthy tree not specifically approved for removal on the site will be as follows:

TREE PENALTY TABLE

Large Trees			**Small Flowering Evergreen Trees & Shrubs**	
Caliper	Height	Penalty	Height	Penalty
1½"- 2"	14'	235.00	6 - 8'	130.00
2"– 2½"	16'	250.00	8 - 10'	150.00
3½"- 3"	16'	280.00	10 - 12'	200.00
3½"- 4"	16'	300.00	12 - 14'	250.00
4½"- 6"	20'	400.00	16 - 18'	375.00
5"-7½"	22'	450.00	18 - Up	500.00
6"-8"	26'	550.00	Follow large tree schedule using caliper of trunk	
8"-11"		1200.00		
11" - 20"		1500.00		
>12"		2000.00		

3. Trees will be graded by the Landscape Architect as to species, condition and site importance with the above figures acting as maximum penalties with the lowest assessment amounting to no less than one-half of the above penalty figures.
4. Disposal: All materials removed by the clearing operation shall be disposed of off-site. No burning of trees, stumps or other matter shall be conducted on the site, unless permission is obtained from the Owner.

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.

2.03 Root Control Fabric: Typar bio barrier root control fabric.
Typar geos@typar.com 1 800 541-5519

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.

C. Vegetative waste can be shredded and mixed with nitrogen to form a natural mulch. Natural mulch can be spread in the natural areas.

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.

D. 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 from the surface of the ground.
2. Lay Typar root barrier over the roots to cover all disturbed areas over existing roots.
3. Cover the area with washed #57 stone up to within 3 inches of finish grade or up to the bottom of proposed paving section.
4. Lay structural filter fabric over top of the #57 Stone to prevent siltation.
5. Lay 3 inches of Topsoil over the filter cloth up to finished grade.
6. Cover the topsoil with 3 inches 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.

B. Biocarrier Fabric: Install root control fabric in accordance with manufactures specifications and the project details.

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 02125 B

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) COMPLIANCE

PART 1 - GENERAL

1.01 SCOPE

A. The work specified in this Section consists of the following under the requirements for Authorization to Discharge under the National Pollutant Discharge Elimination System (NPDES), Storm Water Discharges Associated with Construction Activities, under the State of Georgia, Department of Natural Resources, Environmental Protection Division (EPD).

- Notice of Intent (N.O.I.) – Electronic submittal to EPD by Owner
- Updates to the Erosion, Sedimentation, and Pollution Control (ES&PC) Plan – By Landscape Architect
- Comprehensive Monitoring Plan (CMP) – By Landscape Architect
- Compliance Inspections and Monitoring – By Contractor
- Notice of Termination (N.O.T.) – By Owner after appraisal of site by Landscape Architect.

1.03 QUALITY ASSURANCE

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

B. Provide all materials and promptly take all actions necessary to monitor, document and achieve effective erosion and sedimentation control in accordance with the National Pollutant Discharge Elimination System (NPDES), Storm Water Discharges Associated with Construction Activities, under the State of Georgia, Department of Natural Resources, Environmental Protection Division (EPD) and these Specifications.

C. The temporary and permanent erosion and sedimentation control measures shown on the Erosion, Sedimentation, and Pollution Control (ES&PC) Plan are minimum requirements. Any additional erosion and sedimentation control measures required by the Contractor's means, methods, techniques and sequence of operation shall be updated on the ES&PC Plan and submitted to the Designer for approval by the Contractor at no additional cost to the Owner.

PART 2 - EXECUTION

2.01 NOTICE OF INTENT

A. The contractor shall obtain coverage as a Secondary Permittee under the General Permit GAR1000003– Common Development for the Murphey Candler Park projects. Contractor shall coordinate with the City of Brookhaven Public Works Director to be added as a Plan Preparer in the GEOS system to complete this paperwork.

2.02 EROSION, SEDIMENTATION, AND POLLUTION CONTROL PLAN UPDATES

A. Project Civil Engineer has prepared the ES&PC Plan for the Murphey Candler Park Improvements in accordance with Georgia's NPDES Permit for Storm Water Discharges Associated with Construction Activities. To meet the requirements of the permit, the Project Civil Engineer that prepared the ES&PC Plan has provided the required Engineer's certification on the plans.

B. Upon direction from the Owner's Representative, the Project Civil Engineer will conduct the initial inspection of the Best Management Practices (BMPs) for the construction site. The permit requires that the Engineer certifying the ES&PC Plan must also perform the initial BMP inspection.

C. Per the NPDES regulations, the ES&PC Plan is a dynamic document. The project Civil Engineer is responsible for updating the ES&PC Plan if needed. Major changes and amendments to the ES&PC Plan must be certified by a licensed professional engineer, including changes in design, construction, operation, or maintenance which has a significant effect on the potential for the discharge of pollutants to waters of the state. Appropriate Certification of the ES&PC Plan site change updates shall be the responsibility of the General Contractor and the project Civil Engineer.

2.03 COMPREHENSIVE MONITORING PLAN

A. The Contractor shall prepare the Comprehensive Monitoring Plan (CMP), as required under the NPDES permit. The purpose of the CMP is to define the methods used to monitor performance of on-site BMPs and storm water runoff. The plan shall include sampling strategies and monitoring locations for the site, along with details of the record keeping and reporting requirements applicable to the site. The plan shall also include example record keeping and reporting forms to assist with the documentation necessary to maintain compliance under the permit. The CMP shall be provided in an oversized 3-ring binder, and all records and inspection logs kept in a central on-site location.

B. Per the NPDES regulations, the CMP is a dynamic document and major changes and amendments to the Plan, such as changing sampling locations, must be certified by a licensed professional. The Contractor who prepared the CMP will be responsible for updating and certifying the CMP.

2.04 ON-SITE COMPLIANCE INSPECTIONS AND MONITORING

A. The Contractor shall provide daily, weekly, monthly, and rainfall dependent BMP inspections and associated storm water monitoring, as required under the permit. According to the permit, inspections and monitoring shall be conducted by "Qualified Personnel" under the supervision of the Primary Permittee. For this project, the Contractor is the Operator and shall perform all daily inspections and BMP maintenance. A summary of inspections required under the permit, are as follows.

B. Daily - Daily inspections must be conducted of petroleum storage usage and handling areas and construction entrances/exits by "Qualified Personnel". In addition, daily rainfall data must be recorded.

C. Weekly - Qualified personnel shall inspect site BMPs at least once every 7 calendar days and within 24 hours of the end of a storm that is 0.5 inches or greater.

D. Monthly - Inspections are required monthly until a N.O.T. is submitted for areas that have undergone final stabilization.

E. Qualifying Rainfall Event - Sampling after each qualifying rainfall event is required until the N.O.T. is submitted with the final sampling data. Qualifying sampling events as measured by the on-site rain gauges provided by the Contractor and monitored by the Owner, are defined under Section 6, subsection d.3. of the General NPDES Permit No. GAR100003, effective August 1, 2018.

F. All monitoring results will be recorded onto appropriate forms and provided in the CMP binder, so all records and inspection logs can be kept in a central on-site location. All monitoring results shall also be submitted monthly to Georgia Environmental Protection Division (EPD) as required under the permit.

2.05 NOTICE OF TERMINATION

A. At completion of construction, the Contractor is responsible for preparing and submitting the N.O.T. form. The N.O.T must be approved by the Designer/Landscape Architect before submittal. Final acceptance of this project by the City of Brookhaven will not be issued until the N.O.T. requirements have been satisfied.

END OF SECTION 02125 B

SECTION 02125

EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.01 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. This Section also specifies removal of temporary erosion and sedimentation controls.

C. Temporary and permanent erosion and sedimentation controls include grassing and mulching of disturbed areas and structural barriers at those locations, which will ensure that erosion during construction will be maintained within acceptable limits. Acceptable limits are as established by the Georgia Erosion and Sedimentation Control Act of 1975, as amended, Section 402 of the Federal Clean Water Act, and applicable codes, ordinances, rules, regulations and laws of local, state, and municipal authorities having jurisdiction. All fines imposed for improper erosion and sedimentation control shall be paid by the Contractor.

D. Land disturbance activity shall not commence until a Land Disturbance Permit has been issued by governing authority and Contractor has obtained NOI coverage as a Secondary Permittee under the General Permit GAR100003 – Common Development for the Murphey Candler Park Projects.

E. All control measures shown on the Drawings are to be considered the minimum required; additional measures may be required. Provide same as required.

F. 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.

G. Contractor shall stake the location of the erosion control fences prior to construction and approved by the Landscape Architect prior to construction.

1.02 SUBMITTALS:

A. Four complete copies of engineering data, including shop drawings, for all products shall be submitted to the Landscape Architect and Engineer for approval.

B. 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.

1.03 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 of 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.

1.04 QUALITY ASSURANCE:

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

C. 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.

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

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

C. Provide all materials and promptly take all actions necessary to achieve effective erosion and sedimentation control in accordance with the Georgia Erosion and Sedimentation Control Act of 1975 as amended (OCGA §12-7-1, et. seq.), local ordinances, other permits, local enforcing agency guidelines and these Specifications.

D. Basic Principles:
1. Coordinate the land disturbance activities to fit the topography, soil types and conditions.
2. Minimize the disturbed area and the duration of exposure to erosive elements.
3. Provide temporary or permanent stabilization to disturbed areas immediately after rough grading is complete.
4. Safely convey run-off from the site to a stable outlet to prevent flooding and damage to downstream facilities resulting from increased runoff from the site.
5. Retain sediment on-site that was generated on-site.
6. Minimize encroachment upon watercourses.

E. Implementation:
1. The Contractor is solely responsible for the control of erosion within the Project site and prevention of sedimentation from leaving the Project site or entering waterways.
2. The Contractor shall install temporary and permanent erosion and sedimentation controls, which will ensure that runoff from the disturbed area of the Project site shall pass through a filter system before exiting the Project site.
3. The Contractor shall provide temporary and permanent erosion and sedimentation control measures to prevent silt and sediment from entering any waterways and any designated wetland areas.
4. The Contractor shall limit land disturbance activity to those areas shown on Drawings.
5. The Contractor shall maintain erosion and sedimentation control measures within disturbed areas on the entire site at no additional cost to the Owner until the final acceptance of the Project. Maintenance shall include mulching, re-seeding, clean out of sediment barriers and sediment/detention ponds, replacement of washed-out or undermined rip rap and erosion control materials, to the satisfaction of the Owner and Landscape Architect.
6. Trenching; Contractor shall not trench in areas the include root zones of trees to be saved. Trench lines can be adjusted in collaboration with the Landscape Architect.
7. Contractor may go outside the construction limits to establish erosion control methods that may be more practical than the ones shown on the drawings. Contractor shall get permission from the Owner and Landscape Architect before implementing such plans.
8. Existing dry swales and storm drainage structures may offer more effective opportunities to control silt runoff and erosion. Contractor is free to explore

alternative options on site for erosion control if the plans are approved by the Landscape Architect and Owner

PART 2 - PRODUCTS

2.01 SEDIMENT BARRIER:

A. Silt Fence:
1. Type A (NS - Non-Sensitive) silt fence shall meet the requirements of Section 171 of the Georgia Department of Transportation Standard Specifications, latest edition.
2. Type C (S - Sensitive) Silt Fence is a combination of Type A silt Fence with woven wire reinforcement. Type C Silt Fence reinforcement shall meet the requirements of Section 171 of Georgia D.O.T. Specifications. Netting shall be ½ - inch, galvanized steel, chicken wire mesh.
3. Silt fence fabric shall be an approved product on the Georgia DOT Qualified Product List No. 36, latest edition.

B. Hay Bales: Hay bales shall be clean, seed-free cereal hay, rectangular in shape and contain five cubic feet or more of material.

C. Concrete Blocks: Concrete blocks shall be hollow, non-load-bearing type.

D. Plywood shall be 3/4-inch thick exterior type to lay over roots for access.

E. Filter stone shall be crushed stone conforming to Georgia Dept. of Transportation Table 800.0IH, Size Number 3. Filter stone may be used to build check dams.

F. Compost Filter socks to be used where tree roots should not be cut by silt fence trencher as shown on the construction documents.

G. Surge stone may be used to create check dams where necessary to impede silt flow.

2.02 CONSTRUCTION EXIT STONE:

A. Use sound, tough, durable stone resistant to the action of air and water. Slabby or shaley pieces will not be acceptable, aggregate size shall be in accordance with the National Stone. Association Size R-2 (1.5 to 3.5-inch stone) or Type 3 riprap stone conforming to Section 805.01 of the Georgia Department of Transportation Standard Specifications.

2.03 CONCRETE:

A. Concrete shall have a compressive strength of not less than 3,000 psi, with not less than 5.5 bags of cement per cubic yard and a slump between 3 and 5-inches. Ready-mixed concrete shall be mixed and transported in accordance with ASTM C94.

2.04 RIP RAP:

A. Stone Rip Rap: Use sound, tough, durable stones resistant to the action of air and unless noted otherwise, stone riprap shall be per size indicated on the Plans and individually sized for each outfall.

1. Type 1 Rip Rap: Size and gradation shall conform to Section 805.01 of the Georgia DOT Standard Specification for Type 1 Stone Dumped Rip Rap.
2. Type 3 Rip Rap: size and gradation shall conform to Section 805.01 of the Georgia DOT Standard Specifications for Type 3 Stone Dumped Rip Rap.
3. River Stone: Where designated Contractor shall use river stone comparable to Type l.
4. Rip Rap may be used to erect Check Dams on dry swales or existing storm structures.

2.05 PLASTIC FILTER FABRIC:

A. All plastic filter fabric shall conform to the Georgia Department of Transportation Standard Specifications, Section 881.06 for non-woven filter fabrics on most applications for this project, except for underneath riprap areas or stone construction entrances.

B. A plastic filter fabric shall be an approved product on the Georgia Department of Transportation Qualified Product List No. 28, latest edition.

C. 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. Listed on Georgia DOT QPL-36.

D. 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.

E. 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).

F. Contractor shall furnish and install as necessary a minimum 200 lbs. of erosion control polymer for incidental "touch-up" or "point source erosion areas".

G. Furnish two forms of synthetic polymer:
    1. Emulsion polymer for hydro seeder application with 30% active strength.
    2. Powder polymer for hand spreading with an active strength of 95%.

2.06 GRASSING:

A. Grassing materials shall meet the requirements of the following sections of the Georgia Department of Transportation Standard Specifications, latest edition:

Material	Section
Topsoil	893.01
Seed and Sod	890
Fertilizer	891.01
Agricultural Lime	882.02
Mulch	893.02
Inoculants	893.04

B. Seed species shall be provided as shown on the Drawings.

C. Mulch: Seeding (temporary and permanent) on all disturbed areas shall be held in place by the use of a mulch binder, as approved by the Project Landscape Architect. The mulch binder shall be non-toxic to plant and animal life and shall be approved by the Project Landscape Architect.

D. Rolled Erosion Control Products (RECP): On all slopes exceeding 3 (horizontal) to 1 (vertical) shall be held in place by the use of a RECP blankets/matting, as approved by the Project Landscape Architect.

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

PART 3 - EXECUTION

3.01 GENERAL:

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

B. All erosion and sedimentation control devices and structures shall be inspected by the Contractor at least once a week and immediately after to each rainfall occurrence. Any device or structure found to be damaged shall be repaired or replaced by the end of the day.

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

3.02 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

3.03 SEDIMENT CONTROL:

A. Construction Exit:
1. Construction exit(s) shall be placed as shown on the Drawings and as directed by the Project Landscape Architect. A construction exit shall be located at any point traffic will be leaving a disturbed area to a public right-of-way, street, alley, sidewalk, or parking area.
2. Placement of Construction Exit Material: The ground surface upon which the construction exit material is to be placed shall be prepared to a smooth condition free from obstructions, depressions or debris. The plastic filter fabric shall be placed to provide a minimum number of overlaps and a minimum width of one foot of overlap at each joint. The stone shall be placed with its top elevation conforming to the surrounding roadway elevations. The stone shall be dropped no more than three feet during construction.
3. Construction Exit Maintenance: The Contractor shall regularly maintain the exit with the top dressing of stone to prevent tracking or flow of soil onto public rights-of-way and paved surfaces as directed by the Project Landscape Architect.
4. Construction Exit Removal: Construction exit(s) shall be removed and properly disposed of when the disturbed area has been properly stabilized, the tracking or flow of soil onto public rights-of-way or paved surfaces has ceased and as directed by the Project Landscape Architect.

B. Sediment Barriers:
1. Sediment barriers shall include, but are not necessarily limited to, silt fences, hay bales, and any device, which prevents sediment from exiting the disturbed area.
2. Silt fences and hay bales shall not be used in any flowing stream, creek or river.
3. Sediment barriers shall be installed as shown on the Drawings and as directed by the Owner or Project Landscape Architect.
5. Sediment barriers shall be maintained to ensure the depth of impounded sediment is no more than one-half of the original height of the barrier or as directed by the Project Landscape Architect. Torn, damaged, destroyed or washed-out barriers shall be repaired, reinforced or replaced with new material and installed as shown on the Drawings and as directed by the Owner or Project Landscape Architect.
5. Sediment Barrier Removal:
a. Sediment barrier shall be removed once the disturbed area has been stabilized with a permanent vegetative cover and the sediment barrier is no longer required as directed by the Project Landscape Architect.
b. Accumulated sediment shall be removed from the barrier and replaced and stabilized on site as directed by the Owner or Project Landscape Architect.
c. All non-biodegradable parts of the barrier shall be disposed of properly.
d. The disturbed area created by barrier removal shall be permanently stabilized.

F. Inlet Protection: All storm inlets shall be covered with sediment boxes during grading operations and shall remain so covered until all open areas are permanently stabilized against erosion.

3.4 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.

3.5 MAINTENANCE

A. Inspect all control elements after each rainfall event and a minimum of every two (2) 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. Contractor is expected to maintain the erosion control compliance in accordance with NPDES Standards. See Section 02125B of this Project Manual.

B. Maintain all erosion, sedimentation, pollution control measures until the site has reached complete stabilization as described in Part VI.A. Termination of Coverage in the General NPDES Permit.

3.6 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.

3.07 CLEAN-UP:

A. Dispose of all excess erosion and sedimentation control materials in a manner satisfactory to the Owner and Landscape Architect.

B. Final clean up shall be performed in accordance with the requirements of these Specifications and to the satisfaction of the Owner and Landscape Architect.

END OF SECTION 02125

SECTION 031320

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.

B. See Section 31320 Full Depth Pavement Reclamation.

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 sidewalks, curbs and pavement.
2. Preparation of granular base for pavement on parking spaces.
3. Excavation and backfilling for utility systems.
4. Work for the Full Depth Reclamation asphalt repair
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.

1.06 DEFINITIONS

Limits of Disturbance: (LOD) The boundary within which all construction, materials storage, grading, landscaping and related activities shall occur.

Limits of Work: (LOW) The boundary within only maintenance type of work can occur, no new construction shall occur within the LOW.

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.

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 Landscape 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 rainwater 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 soil 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 horizontals 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.

D. 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 02200

SECTION 02511

ASPHALT PAVING

PART 1 - GENERAL

1.01 WORK INCLUDED

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

B. Roadways 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.
B. Contractor to submit example of granite curb to match existing granite curb for approval prior to ordering the material.

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

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. Full Depth Reclamation: See section 31320 for pavement design.

C. 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 GRANITE CURB

A. Granite curb exists on the site. New curb may be needed in some locations. New curb shall match the existing granite curb in all areas were new or replacement curb is needed.

2.06 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 02512

FULL DEPTH RECLAMATION

PART 1 – GENERAL

1.01 SUMMARY

A. Full-depth reclamation (FDR) with cement shall consist of pulverizing and mixing to a specified depth existing asphalt pavement and underlying materials with Portland cement and water to produce a dense, hard, cement-treated base. It shall be proportioned, mixed, placed, compacted, and cured in accordance with these specifications, and shall conform to the lines, grades, thicknesses, and typical cross sections shown in the plans. This process will be referred to as Full Depth Reclamation (FDR) for this project.

B. Section Includes: Treatment of base for in place full depth pavement recycling with cement or fly ash.

C. Site Visit: Contractor is required to visit the site to understand the limitations and conditions of the area to be converted to FDR.

D. Contractor is responsible for taking measurements and bidding sufficient quantities of materials to complete the project at the grades identified on the grading plan.

E. Contractor is responsible to take sufficient care to protect the adjacent vegetation, structures, utilities and any other site object or feature designated to remain.

1.02 QUALIFICATIONS

A. Contractor shall have a minimum of three (3) years' experience in FDR installation and shall have an experienced FDR superintendent on site during the FDR work.

B. Contractor or subcontractor shall have a minimum of at least one FDR project completed as part of his portfolio of projects.

C. Bidder shall submit at least one reference for a FDR project that has been completed by the contractor or subcontractor for the project.

D. Owner reserves the right to meet with the FDR contractor or subcontractor to discuss his qualifications and experience prior to awarding the contract.

1.03 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.

B. The Georgia Department of Transportation Standard Specifications, Construction of Roads and Bridges – Latest Edition.

C. ASTM International (ASTM):

1. ASTM C150 – Portland Cement.
2. ASTM C618 – Fly Ash and Raw or Calcined Natural Pozzolan for use as a Mineral Admixture in Portland Cement Concrete.
3. ASTM C309 -Specification for Liquid Membrane-Forming Compounds for Curing Concrete (AASHTO M 148)
4. ASTM C595 -Specification for Blended Hydraulic Cements (AASHTO M 240)
5. ASTM C618 -Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete (AASHTO M 295)
6. ASTM C989 -Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars (AASHTO M 302)
7. ASTM C1157 -Performance Specification for Hydraulic Cement (AASHTO M 240)
8. ASTM C1240 -Specification for Silica Fume Used in Cementitious Mixtures (AASHTO M 307)
9. ASTM C977 – Quicklime and Hydrated Lime for Soil Stabilization.
10. ASTM D558 -Moisture-Density (Unit Weight) Relations of Soil-Cement Mixtures (AASHTO T 134)
11. ASTM D977 -Specification for Emulsified Asphalt (AASHTO M 140)
12. ASTM D1556 -Density and Unit Weight of Soil in Place by the Sand-Cone Method (AASHTO T 191)
13. ASTM D1633 – Compressive Strength of Molded Soil-Cement Cylinders.
14. ASTM D2167 -Density and Unit Weight of Soil in Place by the Rubber Balloon Method
15. ASTM D2922 -Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth) (AASHTO T 310)
16. ASTM D4609 – Evaluating Chemicals for Soil Stabilization

D. American Association of State Highway and Transportation Officials (AASHTO):
1. AASHTO M216 – Lime for Soil Stabilization.
2. AASHTO T89/T90 – Atterberg Limits
3. AASHTO T 99 – Compaction Effort, Method C
4. AASHTO T 22 – Compressive Strength, 7-day, psi
5. AASHTO T 11/T27/T28 – Grain Size Analysis
6. AASHTO T 168 – Sampling procedures
7. AASHTO T 180 – Moisture Density Relationship

E. National Lime Association (NLA):
1. NLA Bulletin 326 – Lime Stabilization Construction Manual.

F. Georgia Department of Transportation (GDOT):
1. Standard Specifications for Construction and Materials.

G. Portland Cement Association:
1. IS008-Soil Cement Base Reference Specification

1.04 ENVIRONMENTAL REQUIREMENTS

A. Contractor shall not install mixed materials in sustained wind in excess of 10 mph or when temperature is below 40 degrees Fahrenheit. Soil-cement shall not be mixed or placed when the soil aggregate or subgrade is frozen, or when the air temperature is below 40°F (4°C). Moisture in the soil at the time of cement application shall not exceed the quantity that will

permit a uniform and intimate mixture of the soil and cement during mixing operations and shall be within 2% of the optimum moisture content for the soil-cement mixture at start of compaction. Additional dry soil can be added to wet materials to bring moisture content into an acceptable range for chemical processing.

B. Contractor shall not allow the material to be blown or washed into any nearby water bodies, streams, creeks, lakes or wetlands.

C. The operation of cement application, mixing, spreading, compacting and finishing shall be continuous and completed within 4 hours from the start of mixing. Any soil-cement mixture that has not been compacted and finished shall not be left undisturbed for longer than 30 minutes.

1.05 SUBMITTALS

A. Sequencing Plan: Contractor shall submit a sequencing plan that outlines the timing and process of doing the entire paved area while allowing local citizens access to use the park.

B. Traffic Control Plan: Contractor shall submit a traffic control and safety plan within the park to avoid endangering local citizens who will be using portions of the park while under construction.

C. Contractor shall submit a Quality Control Plan for Full Depth Reclamation to Engineer and Owner to review. This will include a description of all equipment that is to be used for the Full Depth Reclamation process. Engineer will not approve plan but will acknowledge to Contractor if the Engineer considers the plan to be complete.

D. Submit 30-pound sample of each material to be used at the site in airtight containers to the materials testing company.

E. Submit name of each materials supplier and specific type and source of each material to be used. Obtain approval of Owner prior to any change in sources.

F. Manufacturers' data and specifications for equipment including capacities to be used in mixing and compacting the FDR.

G. Certifications for Portland cement and supplementary cementitious materials as required by the owner's project engineer.

1.06 QUALITY ASSURANCE

A. Perform work in accordance with all state and local standards in conjunction with requirements specified herein, and contractors Quality Control Plan.

B. All testing of soil-cement or its individual components, unless otherwise provided specifically in the contract documents, shall be in accordance with the latest applicable ASTM, or AASHTO specifications.

C. Contractor performing the work shall be pre-qualified by the Engineer on behalf of the Client and shall have and demonstrate a history of successful FDR projects with at least three (3) years' experience in Full Depth Pavement Rehabilitation/Recycling using pulverization and cement fly ash additives.

D. Contractor shall collaborate with the owner's geotechnical consultant assigned to the project to assure that the requirements of the work is achieved.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Soil Treatment Materials:
1 Portland Cement: ASTM C150, Type I.
2 Fly Ash: ASTM C618.
3 Other products: Contractor may submit alternate materials that he feels will produce the same or better product than the materials specified.

B. Recycled Asphalt Pavement, Base, and Subgrade Material:
Shall consist of the existing asphalt pavement, existing base course material, and/or subgrade material. The base course and subgrade material shall not contain roots, topsoil, or any material deleterious to its reaction with cement. The particle distribution of the processed material shall be such that 100% passes a 3-inch (75 mm) sieve, at least 95% passes a 2-inch (50 mm) sieve, and at least 55% passes a No. 4 (4.75 mm) sieve.

In the case where fill material has to be placed in advance to raise and area to proposed grades, the material shall conform to products that can be included into the FDR process.

C. Water:
Shall be free from substances deleterious to the hardening of the cement-treatedmaterial.

D. Pozzolans:
If used, pozzolans including fly ash, slag, and silica fume shall comply with the appropriate specifications (ASTM C618, AASHTO M 295 for fly ash; ASTM C989, AASHTO M 302 for slag; and ASTM C1240, AASHTO M 307 for silica fume).

E. Curing Compounds:
Curing compounds shall comply with the latest specifications for emulsified asphalt (ASTM D977, AASHTO M 140) or liquid membrane-forming concrete (ASTM C309, AASHTO M 148).

F. Coarse Aggregate:
Conforming to the requirements of Section 800 of The Georgia Department of Transportation Standard Specifications, Construction of Roads and Bridges – Latest Edition.

G. Fine Aggregate:
Conforming to the requirements of Section 801 of The Georgia Department of Transportation Standard Specifications, Construction of Roads and Bridges – Latest Edition.

H. Graded Aggregate:
Conforming to the requirements of Section 815 of The Georgia Department of Transportation Standard Specifications, Construction of Roads and Bridges – Latest Edition.

I. Subsoil: Existing to be reused.

2.02 EQUIPMENT

Minimum equipment for Full Depth Reclamation is as follows:

A. Self-Propelled Reclaimer shall be capable of fully integrating additive and water and mix with the material for a fully homogeneous material.
1. Minimum horsepower: 500 hp
2. Minimum depth: 12 inch per pass
3. Full length spray bar for consistent water spray
4. Positive displacement pump interlocked with the machine such that amount of water spray is automatically adjusted.
5. Individual water valves for each sprayer such that specific valves can be shut off.

B. Motor grader: Motor grader shall have a cross slope indicator and be capable of spreading, pre-shaping, aerating, and final shaping of material.

C. Vibratory padfoot roller:
1. Dimensions: 84-inch-wide drum
2. Minimum Weight: 10 ton
3. Blade for back-dragging.
4. 25-ton min pneumatic roller can be substituted for padfoot roller.

D. Double drum vibratory steel roller with 10-ton minimum weight and water spray system.

E. Water truck capable of supplemental watering base and controlling dust with a controlled spray.

F. Mechanical cement or fly ash spreader that is capable of an adjustable rate of flow as well as even and uniform distribution of cement at the required rate in one pass. Pneumatic distribution of cement is prohibited.

G. No track type machinery may traverse any of the areas where trees are designated to be protected.

2.03 ACCESSORIES

A. Curing Seal:

a. Asphalt Emulsion Primer

b. Conforming to the requirements of Section 832 of The Georgia Department of Transportation Standard Specifications, Construction of Roads and Bridges – Latest Edition.

PART 3 – EXECUTION

3.01 PREPARATION

A. Contractor shall stake the horizontal and vertical alignments of the finished surface and arrange a walkthrough approval with the Owner's Representative prior to starting and FDR work.

B. Obtain approved mix design from the Geotechnical Engineer before proceeding with placement.

C. Contractor shall locate horizontal and vertical locations of all existing utilities in area of work prior to any pulverization. Utilities that cause vertical depth conflicts shall be lowered to the greater of three feet below finished grade or one foot below lowest point of pulverization at contractor's expense.

D. Contractor shall perform all utility work in area of FDR prior to performing any chemical processing.

E. Any manholes, valve covers, or other buried structures shall be protected from damage prior to processing.

F. Start stabilization only when weather and soil conditions are favorable for successful application of proposed material.

G. The area to receive FDR must be modified prior to the addition of cement or other chemical additives. Finished grade (to include asphalt pavement section of 3-1/2") shall be flush with the existing gutter; therefore, an equivalent amount of material to account for the pavement section (3-1/2") must be removed from the milled section.

H. The subgrade shall be firm and able to support, without yielding or subsequent settlement, the construction equipment and the compaction of the FDR material. Soft or yielding subgrade shall be corrected and made stable before construction proceeds.

I. Isolate and prepare only areas that can be completed within the working day.

3.02 EQUIPMENT

A. Perform operations using suitable, well maintained equipment capable of operations as stated above.

3.03 INITIAL PULVERIZATION AND MIXING

B. The surface of the pavement prior to mixing shall be at an elevation so that when mixed with cement and water and re-compacted to the required density, the final elevation will be as shown in the plans or as directed by the engineer. The material in place and surface conditions shall be approved by the engineer before the next phase of construction is begun.

C. The minimum depth of pulverization and reclamation will be 10 inches and is based on the pavement depths established in the coring report for the various roads. Said report is in an appendix to this project manual.

D. Before cement is applied, initial pulverization or scarification may be required to the full depth of mixing. Scarification or pre-pulverization is a requirement for the following conditions:

E. When the processed material is more than 3% above or below optimum moisture content. Whenthe material is below optimum moisture content, water shall be added. The pre-pulverized material shall be sealed and properly drained at the end of the day or if rain is expected.

F. For slurry application of cement, initial pulverization shall be performed to provide a method to uniformly distribute the slurry over the processed material without excessive runoff or ponding.

G. The final mixture (bituminous surface, granular base, and subgrade soil) shall be pulverized such that 95% passes the 2-in. (50 mm) sieve and at least 55% passes the No. 4 (4.75 mm) sieve. No more than 50% of the final mixed material shall be made of the existing bituminous material unless approved by the engineer and included in a mixture design.

H. FDR processing shall not commence when the soil/aggregate or subgrade is frozen, or when the air temperature is below 40°F (4°C).

1. The moisture content shall be maintained within 2% of theoretical optimum water content by weight.

2. Additional material may be added to the top or from the subgrade to improve the mixture gradation, as long as this material was included in the mixture design.

3. The Materials Testing Company shall check the gradation at least once each day reclamationactivities occur, or once every 1000 SY. whichever is greater.

4. Contractor has option of "pre-pulverizing" material prior to final pulverization and mixing if needed to ensure proper gradation.

3.04 SPREADING OF CHEMICAL STABILIZER

A. Cement or Fly Ash Stabilized Base: Spread cement in amount and rate indicated in the mix design provided by the Geotechnical Engineer. Application rate shall not vary by more than 5% by weight from the approved mix design.

B. Dust Control: Cement or Fly Ash dust shall be controlled by the Contractor so that dust is kept within the confines of the working area limits. Application of cement by motor grader will not be acceptable.

C. Time: Application of cement or Fly Ash shall be limited to a working area such that all operations including compaction, finishing, and curing can be continuous and completed in daylight hours, and within three (3) hours of the application of the chemical stabilizer.

Only the equipment used for spreading and mixing is allowed to pass over the spread cement or fly ash before it is mixed into the existing material. Cement or fly ash that has been displaced shall be replaced prior to mixing being started.

3.05 MIXING WATER WITH CEMENT OR FLY ASH AND PULVERIZED MATERIALS

A. Water shall be mixed into the mixture of cement or fly ash and pulverized materials. The addition of water and the mixing of it into the material shall be completed in one continuous pass.

B. The mixture of water, cement or fly ash, and pulverized materials shall be within the tolerance limits of

the theoretical optimum moisture content and shall be suitable for immediate compaction without further mixing or grading. Moisture content shall be checked by a microwave oven in accordance with ASTM D 4643 or equivalent methods such as nuclear gauge, direct heating or infrared. If the average moisture content is not within 2% percent of the mix design recommendation, then the moisture content shall be adjusted by moisture addition with a water truck or by aeration to reduce the moisture content.

C. Gages shall be provided to allow for the continuous monitoring of the amount of water that is applied.

D. Mixing process shall be performed in a series of parallel lanes of convenient length and width. After a straight continuous section is completed the contractor shall operate parallel to the previous work area and adjust the mixing to maintain a homogeneous mixture between the adjacent work areas.

E. If placed cement or fly ash gets too wet from over spray, rain, or other means, and cannot be corrected. Entire affected area shall be re constructed with a modified mix, submitted and approved by CEC, based on current condition of the material.

3.06 COMPACTION AND FINISHING

A. The processed material shall be uniformly compacted to a minimum of 98% of maximum dry density based on a moving average of five consecutive tests with no individual test below 96%. Field density of compacted FDR material can be determined by the 1) nuclear method in the direct transmission mode (ASTM D2922, AASHTO T310); 2) sand cone method (ASTM D1556, AASHTO T191); or 3) rubber balloon method (ASTM D2167). Optimum moisture and maximum dry density shall be determined prior to start of construction and also in the field prior to and during construction by a moisture-density test (ASTM D558 or AASHTO T134).

B. At the start of compaction, the moisture content shall be within 2% of the specified optimum moisture. No section shall be left undisturbed for longer than 30 minutes during compaction operations. All compaction operations shall be completed within 2 hours from the start of mixing.

C. After the mixture has been compacted, the surface shall be shaped to the required slope and grades +/- 0.5% tolerance. Final surface (Asphalt) slopes and elevations must meet tolerance requirements for final surface listed in specifications. Additional corrective measures may be needed to meet these additional requirements (i.e. additional asphalt, wedging/asphalt leveling, or milling of reclaimed base). During the shaping, light scarifying may be necessary to prevent the formation of compaction planes. Broom dragging or clipping of the surface may be required as a part of the process of shaping the surface during compaction. The surface material shall be maintained at the specified moisture content during finishing operations.

D. At the end of each day where chemical processing has occurred, contractor shall cut a straight, clean, vertical face for the full depth and along the full-length perimeter of material processed and remove excess. When working adjacent to areas that have cured or partially cured, contractor shall pay particular attention to compacting area adjacent to cold joint that was cut on previous surface.

E. All compaction and finishing operations shall be completed with 4 hours of initial start of mixing.

3.07 CURING

A. Completed portions of FDR base can be opened immediately to low-speed local traffic and to

construction equipment provided the curing material or moist curing operations are not impaired, and provided the FDR base is sufficiently stable to withstand marring or permanent deformation. The section can be opened up to all traffic after the FDR base has received a curing compound or subsequent surface and is sufficiently stable to withstand marring or permanent deformation. If continuous moist curing is employed in lieu of a curing compound or subsequent surfacing within 7 days, the FDR base can be opened to all traffic after the 7-day moist curing period, provided the FDR base has hardened sufficiently to prevent marring or permanent deformation.

B. Contractor shall keep finished area wet at optimum moisture for full curing time (7 days) or place curing seal over area within 24 hrs. of completion. If traffic is allowed on surface with curing seal, spread area with sand to keep seal from coming off and damaging stabilized base and wait for curing seal to harden sufficiently to keep from being damaged.

C. If curing compound is placed construction traffic can resume after 72 hrs. Areas should be paved as soon as practical after 72 hr. curing period.

3.08 SURFACING

A. Subsequent pavement layers (asphalt concrete, bituminous surface treatment, or Portland cement concrete) can be placed any time after finishing, as long as the FDR base is sufficiently stable to support the required construction equipment without marring or permanent distortion of the surface.

3.09 MAINTENANCE

A. The contractor shall maintain the FDR base in good condition until all work is completed and accepted. Such maintenance shall be done by the contractor at his own expense. Maintenance shall include immediate repairs of any defects that may occur. If it is necessary to replace any processed material, the replacement shall be for the full depth, with vertical cuts, using either fresh cement-treated material or concrete. No skin patches will be permitted.

3.10 FIELD QUALITY CONTROL

A. Responsibilities: Unless otherwise specified, the quality control tests and inspections specified below will be conducted by the Owner's Materials Testing Company at no cost to the Contractor. The Contractor shall perform additional testing or inspection as considered necessary by the Contractor for assurance of quality control.

B. Unconfined compressive strength: Under no circumstances shall the processed material's 7-day unconfined compressive strength be less than 300 psi.

C. Field Density: Field in-place density shall be determined by the Geotechnical Engineer as specified in the Mix Design.

D. If tests indicate work does not meet specified requirements, contractor is responsible for full correction of the area. Corrected areas shall be retested by the Owners Material Testing Company. Allowable remedies are as follows:

1. Unconfined compressive strength is too low:
   Prepare a remediation mix design and re-process area per specifications for new FDR.

2. Unconfined compressive strength is too high:
   a. Prepare a remediation mix design that includes extending the pulverization depth beyond the existing stabilized section (to include additional subgrade material) and/or addition of select material and re-process area per specifications for new FDR.
   b. Remove entire section that has excessive strength and any additional subgrade material required and replace with soil cement or full depth concrete. If concrete is used, base shall be prepared per GDOT specifications prior to placing asphalt surface on top.

3. Thickness of Reconstructed Base: The thickness shall be measured at a minimum every 100 LF of linear construction during compaction and re-shaping such that additional area can be modified by adding additional cement or material prior to compaction and re-shaping.

4. Repairs and replacement of stabilized areas that do not meet the specification requirements will be done at the contractor's sole expense.

3.11 MEASUREMENT AND PAYMENT

A. This work will be measured:

1. For the purposes of bidding the contractor shall assume a concrete amount of 54 lbs./S.Y. per 12" of FDR depth.
2. FDR is estimated at 3,214 S.Y. to be paid Lump Sum and adjusted based upon the actual amount of cement specified by the mix design.
3. Such payment shall constitute full reimbursement for all work necessary to complete the FDR base course, including watering, curing, inspection and testing assistance, and all other incidental operations.

END OF SECTION

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.

.

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, readymixed, complying with FS TT-P-1952, Type II, with drying time of less than 45 minutes.

.

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. Form, size, and shape of replacement curbs shall match the existing curbs to which the new curb will be attached.

C. 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.

D. 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:

A. Granite Curbs are also specified for the parking on Candler Lake East NE, to butt into the concrete curbs. Granite curbs shall match existing granite curbs on Candler Lake East NE.

B. 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 02521

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.

B. Construction consists of repair and replacement of existing storm pipes and structures.

1.2 SUMMARY

A. This Section includes storm drainage components on the site.

B. Related Sections include the following:
Section 02200 Earthwork
Section 02700 Grouting of Storm Sewer
Section 02723 Inlets
Section 03300 Cast-in-Place Concrete

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.

1.5 SUBMITTALS

A. Product Data: For the following:

1. Polymer-concrete, channel drainage systems.
3. Backwater valves, cleanouts, and drains.
4. Plastic dry wells.
5. 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.

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: 2 percent through manhole.

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.

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, silt tight, 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:

1. NPS 4 and NPS 6: High Density Polyethylene pipe and fittings, connecting bands, and banded joints..
2. NPS 8 to NPS 15: High Density Polyethylene pipe and fittings, connecting bands, and banded joints.
3. NPS 18 to NPS 36: High Density Polyethylene 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 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 chemical 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 technician's 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 pipeline 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 affect 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 within 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 Client.

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.

e.

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. Minimum compressive strength of the concrete for all sections shall be 4,000 psi.
4. Maximum allowable absorption of the concrete shall not exceed eight percent of the dry weight.
5. 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 re-tempered 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 02723

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, culti-packer seeder or hydro-seeder. 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 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 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 WORK OF THIS SECTION

A. Formwork for cast-in-place concrete.

B. Cast-in-place concrete, including concrete for the following, and other items as indicated on the Drawings.
1. Concrete curbs, sidewalks.
2. Grout for reinforced masonry.

C. Concrete curing and finishing.

D. Control joints, expansion, and contraction joints.

1.2 NOT USED

1.3 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. Concrete Reinforcement 03200

1.4 SUBMITTALS

A. Submit under provisions of Division One.

B. Submit manufacturer's catalog cuts, technical data, and recommendations on quantities, installation, and application for the following:
1. Formwork accessories.
2. Concrete admixtures.
3. Waterstops.
4. Grout and patching materials.
5. Bonding agents.
6. Anchor bolts and inserts.
7. Joint fillers.
8. Vapor barrier.
9. Curing and sealing compounds

C. Submit proposed mix designs and test data. Identify for each mix submitted the method by which proportions have been selected.
1. For mix designs based on field experience, include individual strength test results, standard deviation, and required average compressive strength f(cr) calculations.
2. For mix designs based on trial mixtures, include trial mix proportions, test results, and graphical analysis and show required average compressive strength f(cr).

3. Indicate quantity of each ingredient per cubic yard of concrete.
4. Indicate type and quantity of admixtures proposed or required.
5. Submit current test reports for aggregates showing compliance with specified quality and gradation.

D. Submit affidavits from an independent testing agency certifying that materials furnished under this section conform to Specifications.

E. Provide documentation from manufacturers assuring compatibility of admixtures with other ingredients. Provide documentation from manufacturers assuring compatibility of all surface applied products.

F. Submit concrete placement schedule prior to start of any concrete placement operations. Include location of all joints indicated on drawings, plus anticipated construction joints.

G. Submit copies of delivery tickets complying with ASTM C 94 for each load of concrete delivered to site. Include on the tickets the additional information specified in the ASTM document.

H. Submit description of planned protective measures for cold weather or hot weather concreting.

1.5 QUALITY ASSURANCE

A. The American Concrete Institute (ACI), ACI 318 "Building Code Requirements for Reinforced Concrete" and ACI 301 "Specifications for Structural Concrete for Buildings" shall be part of these Specifications as though written and attached hereto.

B. Work shall comply with recommendations and requirements of the following, except as specifically superseded by these Specifications:
1. ACI 211 "Selecting Proportions for Concrete";
2. ACI 226 "Silica Fume in Concrete";
3. ACI 308 "Curing Concrete;
4. ACI 304 "Measuring, Mixing, Transporting and Placing Concrete";
5. ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures";
6. ACI 302 "Floor and Slab Construction";
7. ACI 305 "Hot Weather Concreting;
8. ACI 306 "Cold Weather Concreting";
9. ACI 347 "Formwork for Concrete"; and
10. ACI 330

C. Provide at least one person who shall be present during the execution of this portion of the Work and who shall be thoroughly trained and experienced in placing the types of concrete specified and who shall direct work performed under this Section.

D. Concrete Quality Control
1. Procure concrete from a single Architect/Engineer-approved source. Source shall be a central commercial batching plant conforming to "Concrete Plant Standards" of the Concrete Manufacturer's Association automatic proportioning type.
2. Conform to ASTM C94, paragraphs 1 through 15 and paragraph 18.
3. Obtain materials of each type from same source for the entire project.
4. The Contractor shall engage testing agency to conduct tests and perform other services specified for quality control during construction.

E. Project Conditions
1. Notify Architect/Engineer at least 48 hours in advance of intent to place concrete.
2. Do not place concrete when the ambient temperature is below 40^0F nor when the concrete temperature or ambient temperature exceeds 85^0F. The Architect/Engineer may approve the placement of concrete under the above conditions, provided the recommendations of ACI 305 or ACI 306 are strictly adhered to.
3. Do not place concrete when environmental conditions may adversely affect the placing, finishing, or curing of concrete, or its strength.

F. The Contractor is responsible for correction of concrete work which does not conform to the specified requirements, including strength, tolerances, and finishes. The Contractor shall correct deficient concrete as directed by the Architect/Engineer.

PART 2 - PRODUCTS AND MATERIALS

2.1 FORMWORK

A. Form Materials:
1. Concrete not exposed to view: Any standard form materials that shall produce structurally sound concrete.
2. Exposed finish concrete: Materials selected to offer optimum smooth, stain-free final appearance and minimum number of joints. Material shall resist hydrostatic head without bowing or deflection.
3. Plywood: PS-1, B-B high density concrete form overlay, Class I.

B. Formwork Accessories:
1. Form coating: Form release agent that will not adversely affect concrete surfaces or prevent subsequent application of concrete coatings.
2. Form ties: Commercially manufactured types; cone snap-ties, taper removable bolt, or other type which will leave no metal closer than 1-1/2 inches from surface of concrete when forms are removed, leaving not more than a one-inch diameter hole in concrete surface.

2.2 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type II for normal weight concrete; Type II for lightweight concrete. Use only one brand of cement for each structure.

B. Fly Ash: ASTM C618, Type F, Tables 1, 2, 3, and 4.

C. Microsilica (silica fume): "Force 10,000" as manufactured by W.R. Grace & Company.

D. Water: Fresh, clean, and potable.

E. Aggregates:
1. Normal weight concrete: ASTM C 33.
2. Light weight concrete: ASTM C330, expanded shale.
3. Aggregate for normal weight concrete for interior slabs on grade shall conform to Georgia State DOT specification 603-0202 for Crushed Gravel.
4. Fine aggregate: percentage passing No. 200 sieve shall be less than 2%.

5. Coarse aggregate: Percentage passing No. 200 sieve shall be less than 0.7%.
   a. Nominal size 1": ASTM Size No. 57
   b. Nominal size 3/4": ASTM Size No. 67
   c. Nominal size 1/2": ASTM Size No. 7
6. Aggregates shall have been tested within the past six months from the date of the contract for the following:
   a. Gradation: ASTM C136
   b. Material finer than 200 sieve: ASTM C117
   c. Organic impurities: ASTM C40
   d. Soundness: ASTM C88
   e. Clay lumps: ASTM C142
   f. Light weight constituents: ASTM C123
   g. Abrasive of coarse materials: ASTM C131
   h. Soft particles: ASTM C235
   i. Resistance to freeze-thaw: ASTM C66, ASTM C682.

F. Admixtures
1. Admixtures that produce more than 0.1 percent of soluble chloride ions by weight of cement are prohibited.
2. Admixtures shall be certified by their manufacturer for compatibility with other mix components.

G. Air-Entraining Admixture: ASTM C 260. The following products or approved equivalents will be among those considered acceptable:
1. "Air Mix"; The Euclid Chemical Company.
2. "Micro-Air"; Master Builders, Inc.
3. "Daravair"; W. R. Grace & Co.

H. Water-Reducing Admixture: ASTM C 494, Type A. The following products or approved equivalents will be among those considered acceptable:
1. WRDA with HYCOL; W.R. Grace & Co.

I. High-Range Water-Reducing Admixture (Superplasticizer): ASTM C 494, Type F or G. The following products or approved equivalents will be among those considered acceptable:
1. "WRDA 19"; W.R. Grace & Co.
2. "Daracem-100"; W. R. Grace & Co.

2.3 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. Nonshrink Grout: CRD-C 621, Grade B.
1. Provide nonmetallic type only.
2. The following products or approved equivalents will be among those considered acceptable:
   a. "Masterflow 713 or 928"; Master Builders, Inc.
   b. "Euco N-S Grout"; The Euclid Chemical Company.
   c. "Axpandcrete"; Anti-Hydro Waterproofing Co.
   d. "Embeco 636"; Master Builders for equipment bases.

B. Burlap: AASHTO M 182, Class 2 jute or kenaf cloth.

C. Moisture-Retaining Cover: ASTM C 171, and as follows:
1. Fiber-reinforced waterproof paper.
2. Polyethylene film.
3. White burlap-polyethylene sheeting.

D. Bonding Systems: ASTM C881; Type, grade, and class as required for project conditions. The following products or approved equivalents will be among those considered acceptable:
1. "Concresive LPL", Master Builders, Inc.
2. "Sikadur 32 Hi-Mod", Sika Corporation.
3. "Euco #452 Epoxy System"; Euclid Chemical Company.

E. Adhesive anchor system:
1. Reinforcing bars:
a. "HIT C-100 System", HILTI.
b. "Keligrout"; KELKEN GOLD, INC., Princeton, NJ (phone 800-342-5154)
2. Anchor bolts:
a. "HVA System", HILTI.
b. "Kelibond Anchors", KELKEN GOLD, INC., Princeton, NY (phone 800-342-5154)

F. Expansion Joint Filler for pavements and sidewalks: Nonextruding bituminous type conforming to ASTM D1751.

G. Isolation joint filler for slabs on grade: Preformed cork, 1/2" thick, conforming to ASTM D1752, Type II.

H. Preformed Control Joint: "Screed Cap" for joints to receive sealant; "Zip Cap-Control Joint" for sawcut type joints; as manufactured by Greenstreak, Inc.

I. Waterstop: Polyvinyl chloride (PVC), ribbed type with center bulb. Size appropriate to application. Supply prefabricated corner shapes.

J. Waterstop: Bentonite type, "Volclay Waterstop-Rx", as manufactured by American Colloid Company.

K. Vapor Barrier: Polyethylene sheets 10 mils thick. Top with 2-inch clean sand fill.

L. Vapor Barrier: Moistop as manufactured by Fortifiber Corporation.

M. Dovetail Anchor Slot: Galvanized steel, 22 gauge, felt filled.

N. Wedge anchors: Hohman & Barnard, size as noted on Drawings.

2.4 SURFACE APPLIED CURING AND SEALING COMPOUNDS

A. Products of the following manufacturers, provided they comply with requirements of the contract documents, will be among those considered acceptable:
1. Master Builders, Inc.
2. Anti Hydro Company, Inc.
3. The Euclid Chemical Company.
4. W. R. Meadows, Inc.

5. Sonneborn Building Products Division/ChemRex, Inc.
6. L & M Construction Chemicals, Inc.

B. Curing and Sealing Compounds: For interior or exterior applications.
1. Products shall comply with ASTM C 309, Type 1, clear styrene acrylate type, 30% minimum solids content.
2. Maximum allowable moisture loss of 0.3 grams per square centimeter.
3. Do not apply to surfaces scheduled to receive other finishes, coatings or coverings unless specifically approved by the Architect/Engineer.
4. "SuperRez-Seal"; The Euclid Chemical Company or approved equivalent.

C. Sealing and Hardening Compounds: Generally, for use at exterior slabs and walks subject to deicing products.
1. Concrete shall receive initial water cure as described elsewhere in this section.
2. Product shall be siloxane based, 20% minimum solids content.
3. "Euco-Guard 200"; The Euclid Chemical Company or approved equivalent.

D. Chemical Hardening Compounds: For interior applications where a denser and more durable surface is required.
1. Concrete shall receive initial water cure as described elsewhere in this section.
2. Product shall be magnesium siliocofluoride that reacts chemically with the free lime and calcium salts in the hardened concrete.

E. Concrete Curing Compounds: Generally, for interior curing applications.
1. Product shall comply with ASTM C309, Type 1, Class B, wax free, resin based.
2. Maximum allowable moisture loss of 0.3 grams per square centimeter.
3. "KUREZ", The Euclid Chemical Company or approved equivalent. Do not apply to surfaces scheduled to receive other finishes, coatings, or coverings unless specifically approved by the Architect/Engineer.
4. For surfaces that are scheduled to receive other finishes, coatings, or coverings, use dissipating resin-type compound, "KUREZ-DR", The Euclid Chemical Company or approved equivalent.

F. Evaporation retarder: "Confilm"; Master Builders Company.

2.5 CONCRETE MIX DESIGN

A. Do not begin concrete operations until proposed mixes have been reviewed and approved by the Architect/Engineer.

B. Comply with recommendations of ACI 211.1 for normal weight concrete.

C. For each type and strength of concrete, establish the required average strength f(cr) of the design mix on the basis of either field experience or trial mixtures as specified in ACI 301, and proportion mixes accordingly. If trial mixtures method is used, employ an independent testing agency acceptable to the Architect/Engineer for preparing and reporting proposed mix designs.

D. Admixtures:
1. Air-entraining admixture: Add at rate to achieve specified air content.
2. High-range water-reducing admixture (superplasticizer): Add as required for placement and workability.

3. Do not use admixtures not specified or approved.

E. Design mixes to meet or exceed each requirement specified. Where more than one criterion is specified, the most stringent shall apply. For example, a minimum cement content or maximum water-cement ratio might result in strengths greater than the minimum specified; likewise, a greater cement content or lower water-cement ratio may be required in order to achieve the required strength.

F. Normal Weight Concrete - Type A
1. Minimum compressive strength f'c: 3,000 psi @ 28 days.
2. Maximum water-cement ratio by weight: 0.50.
3. Minimum cement content: 475 lbs. per cubic yard.
4. Coarse aggregate size: 1".
5. Maximum slump: 3-1/2 inches $\pm$ 1 inch.
6. Air Content: 4-6%.
7. Schedule: Foundation work.

G. Normal Weight Concrete - Type B
1. Minimum compressive strength f'c: 4,000 psi @ 28 days.
2. Maximum water-cements ratio by weight: 0.45.
3. Minimum cement content: 540 lbs. per cubic yard.
4. Coarse aggregate size: 3/4"-1".
5. Maximum slump: 3-1/2 inches $\pm$ 1 inch.
6. Schedule: interior slabs on grade.

H. Normal Weight Concrete - Type C
1. Minimum compressive strength f'c: 4,000 psi @ 28 days.
2. Maximum water-cement ratio by weight: 0.45.
3. Minimum cement content: 590 lbs. per cubic yard.
4. Coarse aggregate size: 1/2".
5. Maximum slump: 3-1/2 inches $\pm$ 1 inch.
6. Air Content: 4-6%.
7. Schedule: exterior sidewalks or paving, structural piers & walls

I. Light Weight Concrete - Type D
1. Minimum compressive strength f'c: 4,000 psi @ 28 days.
2. Minimum cement content: 660 lbs. per cubic yard.
3. Coarse aggregate size: 3/4".
4. Maximum slump: 2-1/2 inches $\pm$ 1 inch.
5. Air Content: 4-8%.
6. Schedule: Supported floors on composite steel deck.

J. Light Weight Insulating Concrete - Type-E
1. Comply with requirements for U.L. Design number P907.
2. Six c.f. Perlite aggregate per bag of Portland cement.
3. One- and one-half pint 12.5 % solution neutralized vinsol resin, air-entrainment agent.
4. Average dry density: 27 pcf.
5. Minimum compressive strength: 150 psi.
6. Schedule: Fire rated roof assembly.

K. Provided that no additional expense to owner is involved, contractor may submit for

Architect's/Engineer's approval requests for adjustment to approved concrete mixes when circumstances such as changed project conditions, weather, or unfavorable test results occur. Include laboratory test data substantiating specified properties with mix adjustment requests.

2.6 CONTROL OF MIX IN THE FIELD

A. A tolerance of up to 1 inch above specified slump will be permitted for 1 batch in 5 consecutive batches tested. Concrete of lower slump than that specified may be used, provided proper placing and consolidation is obtained.

B. If slump upon arrival at the site is lower than 1 inch below the value specified, one addition of water in accordance with ASTM C 94 will be permitted to bring slump within tolerance, provided that:
   1. A positive means is available to measure the amount of water added at the site.
   2. The specified (or approved) maximum water-cementitious ratio is not exceeded.
   3. Not more than 45 minutes have elapsed since batching.

C. Total Air Content: A tolerance of plus or minus 1-1/2 percent of that specified will be allowed for field measurements.

D. Do not use batches that exceed tolerances.

2.7 CONCRETE MIXING

A. Mix concrete materials in transit mixers, complying with requirements of ASTM C94, paragraphs 1 to 15 and 18 only.

B. Elapsed time between initial contact of the cement with water and the completed discharge of the batch at the project site shall not exceed 90 minutes or 300 revolutions of the drum, whichever comes first. These limits shall be reduced at the direction of the Architect/Engineer.

C. Concrete batch plant shall conform to requirements of the "Concrete Plant Standards" of the "Concrete Manufacturer's Association".

PART 3 – EXECUTION

3.1 HOT AND COLD WEATHER CONCRETING

A. Do not proceed with work of this section for hot or cold weather placement without approval of the Architect/Engineer.

B. Comply with recommendations of ACI 306 when air temperatures are expected to drop below 40 degrees F either during concrete placement operations or before concrete has cured.
   1. Do not use frozen or ice-laden materials.
   2. Do not place concrete on frozen substrates.
   3. Do not add salt, calcium chloride, anti-freeze compounds.

C. Comply with recommendations of ACI 305 when ambient temperature before, during, or after concrete placement is expected to exceed 85 degrees F.
   1. Do not use retarding admixtures.
   2. Make special provisions for curing and finishing.

3.2 CONCRETE FORM PREPARATION

A. Comply with requirements of ACI 301 and ACI 347 for formwork, and as herein specified. The contractor is responsible for design, engineering, and construction of formwork, and for its timely removal.

B. Earth forms are not permitted.

C. Design and fabricate forms for easy removal, without impact, shock, or damage to concrete surfaces or other portions of the work.

D. Design to support all applied loads until concrete is adequately cured, within allowable tolerances and deflection limits.

E. Construct and brace formwork to accurately achieve end results required by contract documents, with all elements properly located and free of distortion. Provide for necessary openings, inserts, anchorages, and other features shown or otherwise required.
   1. Minimize form joints and make watertight to prevent leakage of concrete.
   2. Provide chamfered edges and corners at exposed locations, unless specifically indicated otherwise on the drawings.
   3. Provide openings to accommodate work of other trades, sized and located accurately. Securely support items built into forms; provide additional bracing at openings and discontinuities in formwork.
   4. Provide temporary openings for cleaning and inspection in most inconspicuous locations at base of forms, closed with tight-fitting panels designed to minimize appearance of joints in finished concrete work.
   5. Build into concrete work all required ties, anchors, anchor bolts, sleeves, and other inserts. Accurately set items, by using templates, in their final position at the time concrete is placed.

F. Comply with minimum tolerances established in ACI 117, unless more stringent requirements are indicated on the drawings.

G. Provide either form materials with factory applied non-absorptive liner or field applied form coating. If field applied coating is employed, thoroughly clean and recondition formwork and reapply coating before each use. Rust on form surfaces is unacceptable.

3.3 JOINT CONSTRUCTION

A. Construction Joints: Locate and install construction joints as indicated on Drawings. If construction joints are not indicated, or if contractor opts to add additional joints, locate in manner which will least impair strength and stability of the structure.
   1. Contractor shall submit location diagrams to Architect/Engineer for approval if locations are not shown on the Contract Documents.
   2. Provide keyways not less than 1-1/2 inches deep.
   3. Continue reinforcement across and perpendicular to construction joints, unless details specifically indicate otherwise.
   4. Provide adequate shear reinforcement as shown on the Drawings or as directed by the Architect/Engineer.
   5. Where a joint is to be made, the surface of the concrete shall be thoroughly cleaned. Joints shall be wetted and slushed with a coat of neat cement grout immediately before placement

of new concrete. The grout shall be a neat cement and sand grout (1:3 mix) placed to a 1/2" minimum thickness. An approved bonding compound may be used in lieu of the cement grout with approval of the Architect/Engineer.

6. Provide waterstops as indicated, and on all construction joints below grade adjacent to usable spaces. Install to form continuous, water-tight dam, with field joints fabricated in strict accordance with manufacturer's instructions.

B. Movement Joints: Construct isolation joints in slabs poured on grade at points of contact with vertical components, such as foundation walls and column pedestals.

1. Install joint filler to full concrete depth. Recess top edge of filler 1/8 inch where joints are unsealed.
2. Slabs on grade shall be tied to foundation walls with #3 reinforcing bars at 4’-0" unless specifically shown otherwise on the drawings.
3. Smooth dowels, greased or treated one end to prevent bond shall be installed at columns and as shown on the Drawings. Refer to "Installing Dowels", this section.

C. Expansion Joints: Construct expansion joints where indicated. Install expansion joint filler to full depth of concrete. Recess edge of filler to depth indicated to receive joint sealant (and backer rod where necessary) specified in Division 7.

D. Control Joints - Slabs on grade: Spacing of joints in slabs shall not exceed three times the thickness of the slab on center in feet nor 15 feet. Joints shall typically isolate columns and shall run between columns.

1. If locations of joints are not specifically shown on the Drawings, the Contractor shall submit location diagram to the Architect/Engineer for approval.
2. Form control joints by means of saw cuts one-fourth the depth of the slab (1-1/4" minimum), performed as soon as possible after slab finishing without possibility of dislodging aggregate.
3. Form control joints with preformed plastic accessories as directed by manufacturers.

E. Control Joints - Walls: Construct control joints in walls within 5'-0" of corners/intersections and then at 25'-0" on center.

1. Contractor shall submit location diagram to Architect/Engineer for approval if locations are not shown on the Drawings.
2. Construct weakened plane vertical control joints as shown on the drawings. Provide adequate shear reinforcement as directed by the Architect/Engineer.
3. Joints above grade shall be constructed to provide for the installation of water tight joint and sealant. Joints shall be filled with appropriate backer rod and sealant.
4. Provide waterstops where indicated on the Drawings and on all joints below grade adjacent to usable spaces. Install to form continuous watertight dam, with field joints fabricated in strict accordance with manufacturer's instructions.

3.4 INSTALLATION OF SMOOTH DOWELS

A. Install dowels as noted on the Drawings.

B. One end of dowel on one side of joint shall be non-bonded, allowed to slip.

C. Methods:

1. Coat the non-bonded end with grease and wrap snugly with polyethylene tape. Work shall be neat and snug without excess material.

2. Use pre-molded dowel caps over non-bonded end.

3.5 INSTALLATION OF BUILT-IN ITEMS

A. Set anchorage devices and other items required for other work connected to or supported by cast-in-place concrete, using templates, setting drawings, and instructions from suppliers of items to be embedded.

B. Set edge forms and intermediate screeds as necessary to achieve final elevations indicated for finished slab surfaces.

C. Set anchor bolts furnished under Division 5, using templates and in coordination with steel shop drawings.

D. Comply with requirements of Paragraph 6.3 of ACI 318.

3.6 CONCRETE PLACEMENT

A. Provide materials necessary to ensure adequate protection of concrete during inclement weather before beginning installation of concrete.

B. Before beginning concrete placement, inspect formwork, reinforcing steel, and items to be embedded, verifying that all such work has been completed.

C. Moisten wood forms immediately before placing concrete in locations where form coatings are not used.

D. Provide runways for wheeled equipment to convey concrete. Do not support runways on reinforcing or wheel equipment directly over reinforcing.

E. Schedule continuous placement of concrete to prevent the formation of cold joints.

F. Provide construction joints if concrete for a particular element or component cannot be placed in a continuous operation.

G. Deposit concrete as close as possible to its final location, to avoid segregation.

H. Limit horizontal layers to depths which can be properly consolidated, but in no event greater than 24 inches.

I. Consolidate concrete by means of mechanical vibrators, inserted vertically in freshly placed concrete in a systematic pattern at close intervals. Penetrate previously placed concrete to ensure that separate concrete layers are knitted together.

J. Vibrate concrete sufficiently to achieve consistent consolidation without segregation of coarse aggregates.

K. Do not use vibrators to move concrete laterally.

L. Strike off and level concrete slab surfaces, using highway straight edges, darbies, or bull floats before bleed water can collect on surface. Do not work concrete further until finishing operations

are commenced.

3.7 FINISHING FORMED SURFACES

A. Repair surface defects, including tie holes, immediately after removing formwork.

B. Remove honeycombed areas and other defective concrete down to sound concrete, cutting perpendicular to surface or slightly undercutting. Dampen patch location and area immediately surrounding it prior to applying bonding compound or patching mortar.

C. Before bonding compound has dried, apply patching mixture matching original concrete in materials and mix except for omission of coarse aggregate, and using a blend of white and normal Portland cement as necessary to achieve color match. Consolidate thoroughly and strike off slightly higher than surrounding surface.

D. Unexposed Form Finish: Repair tie holes and patch defective areas. Rub down or chip off fins or other raised areas exceeding 1/4-inch height.

E. Exposed Form Finish:
1. Repair and patch defective areas with fins or other projection completely removed and smoothed.
2. Smooth Rubbed Finish: Apply to surfaces indicated no later than 24 hours after form removal. Wet concrete surfaces to be finished and rubbed with Carborundum brick or other abrasive until uniform color and texture are achieved. Do not apply separate grout mixture.

3.8 FINISHING SLABS

A. Finishing Operations
1. Do not directly apply water to slab surface or dust with cement.
2. Screeding: Strikeoff to required grade and within surface tolerances indicated. Verify conformance to surface tolerances. Correct deficiencies while concrete is still plastic.
3. Bull Floating: Immediately following screeding, bull float or darby before bleed water appears to eliminate ridges, fill in voids, and embed coarse aggregate. Recheck and correct surface tolerances.
4. Do not perform subsequent finishing until excess moisture or bleed water has disappeared and concrete will support either foot pressure with less than ¼ inch indentation or weight of power floats without damaging flatness.
5. Final floating: Float to embed coarse aggregate, to eliminate ridges, to compact concrete, to consolidate mortar at surface, and to achieve uniform, sandy texture. Recheck and correct surface tolerances.
6. Troweling: Trowel immediately following final floating. Apply first troweling with power trowel except in confined areas and apply subsequent trowelings with hand trowels. Wait between troweling to allow concrete to harden. Do not over trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over it. Consolidate concrete surface by final troweling operation. Completed surface shall be free of trowel marks, uniform in texture and appearance, and within surface tolerance specified.
7. Grind smooth surface defects which would telegraph through final floor covering system.

B. Finishes: Coordinate appearance and texture of required final finishes with the Architect/Engineer before application

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1. Broomed Float Finish: After floating and when water sheen has practically disappeared, apply uniform transverse corrugations approximately 1/16-inch-deep, without tearing surface.
2. Trowel Finish: As specified above.

C. Slab Surface Tolerances:
1. Achieve flat, level planes except where grades are indicated. Slope uniformly to drains.
2. Floated finishes: Depressions between high spots shall not exceed 5/16 inch under a 10-foot straight edge.
3. Troweled finishes: Achieve level surface plane so that depressions between high spots shall not exceed 1/8 inch under a 10-foot straight edge.

D. Slab Finish Schedule: Apply finishes in the following typical locations and as otherwise shown on the drawings:
1. Broomed float finish:
   a. Sidewalks, exterior ramps and slabs.
2. Trowel finish:
   a. Exposed interior floors.

3.9 CONCRETE CURING AND PROTECTION

A. Prevent premature drying of freshly placed concrete and protect from excessively cold or hot temperatures until concrete has cured.

B. Provide curing of concrete by one of the methods listed and as appropriate to service conditions and type of applied finish in each case. Curing period shall be not less than 7 days for standard cements and mixes.

C. Cure formed concrete surfaces by moist curing with forms in place for full curing period or until forms are removed.
1. Keep wet wooden or metal forms exposed to heat of the sun.
2. If forms are removed prior to completion of curing process, continue curing by one of the applicable methods specified.

D. Water Cure: The surface of finished concrete shall be kept continuously wet for a minimum of seven days.
1. Concrete surfaces shall be kept continuously wet by sprinkling or fogging with water and by a covering material thoroughly saturated with water and kept wet by intermittent hosing. Concrete shall be protected against freezing during the curing.
2. Covering material shall be kept continuously moist so that a film of water remains on the concrete surface throughout the curing period. Alternate cycles of wetting and drying shall not be permitted during the curing period.
3. The use of a moisture retaining cover over burlap or a manufactured type of moisture retaining cover shall be permitted. Lap not less than 3 inches at edges and ends, and seal with waterproof tape or adhesive. Repair holes or tears during curing period with same tape or adhesive. Maintain covering in intimate contact with concrete surface. Secure to avoid displacement.
4. Do not use plastic sheeting directly on surfaces that will be exposed to view when in service.

C. Compound Cure: Curing compounds shall be applied immediately following last finishing operations.
   1. Apply curing compound at rate stated by manufacturer to conform with moisture-retention requirements specified, using second, immediate application at right angles to first. Reapply if damaged by rain.
   2. Apply additional coat near substantial completion to act as sealer.
   3. Use curing compounds only in locations permitted or required. Do not apply to surfaces to receive other finishes, coatings, or coverings.

D. Hardening Compound: Apply to concrete after initial water cure and seasoning of the concrete as recommended by manufacturer. Apply two or more applications as recommended by manufacturer to achieve maximum hardness.

E. Avoid rapid drying at end of curing period.

F. During and following curing period, protect concrete from temperature changes of adjacent air in excess of 5 degrees F per hour and 50 degrees F per 24 hours. Progressively adjust protective measures to provide uniform temperature changes over entire concrete surface.

3.11 JOINT FILLER

A. Concrete surfaces shall be fully cured (minimum 120 days).

B. Fill full depth of crack for proper load transfer.

C. Install in strict accordance with manufacturer's instructions.

3.12 REMOVAL OF FORMS AND SUPPORTS

A. Non-Load-Bearing Formwork: Provided that concrete has hardened sufficiently that it will not be damaged, forms not actually supporting weight of concrete or weight of soffit may be removed after concrete has cured at not less than 50 degrees F for 24 hours. Maintain curing and protection operations after form removal.

3.13 MISCELLANEOUS CONCRETE ITEMS

A. Fill in holes and openings left in concrete structures for passage of work by other trades after such work is in place. Place such fill-in concrete to blend with existing construction, using same mix and curing methods.

B. Provide machine and equipment bases and foundations, as indicated on drawings. Set anchor bolts at correct elevations, complying with diagrams or templates of equipment manufacturer.

C. Provide concrete grout for reinforced masonry where indicated on drawings and as scheduled.

3.14 CONCRETE REPAIRS

A. Patch tie holes, honeycomb, and other surface imperfections in accordance with ACI 301 and as directed by the Architect/Engineer.

B. Defective concrete is defined as concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

C. Repair or replacement of defective concrete or surface imperfections shall be as determined by the Architect/Engineer.

D. Do not patch, fill, touch-up, repair, or replace any concrete except upon specific approval of methods and materials by the Architect/Engineer for each individual area.

3.15 REMOVAL OF EXISTING CONCRETE

A. Saw cut surfaces or drill holes at regular intervals sufficient to establish a fracture plane for removal by power tools.

B. Salvage all existing reinforcing; do not cut away until specifically directed by the Architect/Engineer, or as shown on the Drawings.

C. New work bonded to existing work:
1. Clean and roughen existing surface by sandblasting, water-blasting, scabbler, or other approved method.
2. Embed dowels and reinforcing as detailed on the Drawings.
3. Coat surface with bonding agent applied in strict accordance with manufacturer's instructions.

D. Existing work cut away for new work.
1. Saw cutting and removal shall continue to within 1/4" of the finished surface. The final 1/4" removal shall be completed by grinding to the final surface.
2. Cut existing reinforcing bars 1/2" below the surface. Coat with anti-corrosion protective coating. Grout holes.
3. Provide bond breaker where new concrete work is adjacent to existing work but structurally separate.

3.16 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. Composite Sampling and Making and Curing of Specimens: ASTM C 172 and ASTM C 31.
1. Take samples at point of discharge.
2. For pumped concrete, perform sampling and testing at the frequencies specified herein at point of delivery to pump, and perform additional sampling and testing at the same frequency at discharge from line. Results obtained at discharge from line shall be used for acceptance of concrete.

B. Slump: ASTM C 143. One test per batch. Modify sampling to comply with ASTM C 94.

C. Air Content of Normal Weight Concrete: ASTM C 173 or ASTM C 231. One test per strength test performed on air-entrained concrete.

D. Concrete Temperature: One test per strength test.

E. Compressive Strength Tests: ASTM C 39.
1. Mold and cure one set of 4 standard cylinders for each compressive strength test required.

2. Obtain samples on a statistically sound, random basis, minimum frequency as follows:
   a. One set per 100 cubic yards or fraction thereof for each day's pour of each class.
   b. One set per 3500 square feet of slab or wall area or fraction thereof for each day's pour of each concrete class.
   c. When the above testing frequency would provide fewer than 5 strength tests for a given class of concrete during the project, conduct testing from not less than 5 randomly selected batches, or from each batch if fewer than 5.
3. Test Schedule:
   a. Test 1 specimen per set at 7 days for information unless an earlier age is required.
   b. Test two specimens per set for acceptance of strength potential; test at 28 days unless other age is specified. The test result shall be the average of the two specimens. If one specimen shows evidence of improper sampling, molding, or testing, the test result shall be the result of the remaining specimen.
   c. Retain one specimen from each set for later testing, if required.
4. Strength potential of as-delivered concrete will be considered acceptable if all of the following criteria are met:
   a. No individual test shall fall below specified compressive strength by > 500 psi.
   b. Not > 10 percent of individual tests fall below specified compressive strength f'(c).
   c. Average of any 3 consecutive strength test results equals or exceeds specified compressive strength f'(c).
5. Testing for evaluation of field curing:
   a. Frequency: One field set of specimens per strength acceptance test.
   b. Mold specimens from same sample used for strength acceptance tests. Field-cure, and test at same age as for strength acceptance tests.
   c. Evaluate construction and curing procedures and implement corrective action when strength results for field-cured specimens are less than 85 percent of test values for companion laboratory-cured specimens.

F. Test Results: Testing agency shall report test results in writing to Architect/Engineer and contractor within 24 hours of test.
1. Test reports shall contain the following data:
   a. Project name, number, and other identification.
   b. Name of concrete testing agency.
   c. Date and time of sampling.
   d. Concrete type and class.
   e. Location of concrete batch in the completed work.
   f. All information required by respective ASTM test methods.
2. Nondestructive testing devices such as impact hammer or sonoscope may be used at Architect's/Engineer's option for assistance in determining probable concrete strength at various locations or for selecting areas to be cored, but such tests shall not be the sole basis for acceptance or rejection.
3. The testing agency shall make additional tests of in-place concrete as directed by the Architect/Engineer when test results indicate that specified strength and other concrete characteristics have not been attained.
   a. Testing agency may conduct tests of cored cylinders complying with ASTM C 42, or tests as directed.
   b. Cost of additional testing shall be borne by the Contractor when unacceptable concrete has been verified.

END OF SECTION 03300

SECTION 03523

CONCRETE SIDEWALKS

PART 1 - GENERAL

1.01 SCOPE:

A. Concrete sidewalks shall be constructed of Portland cement concrete, at the locations and to the dimensions, lines, grades and cross section 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 sidewalks shall include all the necessary excavation, unless otherwise indicated, subgrade and subbase preparation, backfilling, final clearing up and completing all incidentals thereto, as indicated on the Drawings or as directed by the Project Landscape Architect.

C. All materials and methods of construction for concrete sidewalks and pavement shall conform to the requirements of the Georgia Department of Transportation Standard Specifications and ASTM C 94 "Standard Specification for Ready Mixed Concrete".

D. Gravel parking areas and driveways shall conform to aggregate base requirements outlined in this Section of the specifications.

E. Concrete sidewalk shall butt into the edge of the integral concrete curb with and expansion joint.

F. Concrete road apron shall conform to the Brookhaven City standard.

1.02 CONDITIONS

A. Weather Limitations:
   1. Do not conduct concrete paving operations when surface is saturated, or contains excess of moisture, which would prevent uniform distribution and required penetration.
   2. Construct concrete sidewalk sections only when atmospheric temperature in the shade is above 40 degrees F, when the underlying base is dry and when weather is not rainy.
   3. Place base course when air temperature is above 35 degrees F and rising. No base course shall be placed on a frozen, saturated, or otherwise unsuitable subgrade material.

B. Grade Control: Establish and maintain the required lines and grades for each course during construction operations.

1.03 INSPECTION AND TESTING:

A. Pavement and base testing will be performed by an independent testing laboratory paid by the Owner.

B. The testing agency shall test in-place courses for compliance with specified density, thickness and surface smoothness requirements.

C. Earthwork and compaction operations shall conform to the requirements of Section 02200 of these specifications.

D. Concrete Strength: One set of acceptance and field cylinders (a total of four) from the same batch of concrete will be made for each 50 cubic yards or fraction thereof, not less than once for each 5,000 square feet of pavement in each day's placing for each class and mix design.
   1. Each batch of concrete shall be tested for slump prior to placement. Slump shall be between 1/2 and 1 1/2 inches as determined by AASHTO Test Method T119.
   2. Acceptance cylinders are compression test cylinders molded in the field, stored and cured in the field for the first 24 hours after molding and thereafter in the laboratory of the testing agency until time of testing. Average breaking strength at 28 days of a set of two acceptance cylinders will comprise test.
   3. Field cylinders are compression test cylinders molded in the field, stored and cured on the work site in the same location and subject to the same exposure as job concrete of which it is a representative. Each set of two acceptance cylinders will have two matching field cylinders.
   4. One field cylinder will be broken at seven days and the remaining will be held in reserve.

E. Allowable Variation in Thickness:
   1. Aggregate Base Course: ±1/2-inch.
   2. Surface Course: ± 1/4-inch.

F. Surface Smoothness: Test finished surface of each course for smoothness using a 16-foot straightedge. Intervals of tests shall be as directed by the Landscape Architect. Surfaces will not be acceptable if exceeding the following:

   1. Base Course: 1/4-inch in 16 feet.
   2. Surface Course: 1/8-inch in 10 feet.

G. Contractor's Duties Relative to Testing:
   1. Notifying laboratory of conditions requiring testing.
   2. Coordinating with laboratory for field-testing.
   3. Paying costs for additional testing performed beyond the scope of that required and for retesting where initial tests reveal non-conformance with specified requirements.
   4. Paying the cost of overlays or pavement removal and replacement which does not comply with the specified testing limits.

H. Samples:
Contractor shall pour at least 3 samples of colored concrete complete with finish and an adjacent integral curb for approval prior to committing to the entire concrete pour.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Materials used in the construction of sidewalks, in addition to Section 03300 and other general requirements of these Specifications, shall conform, unless otherwise stipulated, to the following:
1. Portland cement shall conform to ASTM C 150, Type 1.
2. Graded aggregate base shall be uniform throughout and conform to requirements of Section 815.01 of the Georgia Department of Transportation Specifications.
3. Sand: Dune sand, bank-run sand and manufactured sand are not acceptable. Only builders' sand shall be used.
4. Fiber Reinforcement: Engineered polypropylene fibers designed for secondary reinforcement of concrete slabs.
5. Color: Schofield (Samples to be selected).
6. Premolded joint filler for expansion joints shall conform to the requirements of ASTM D 1751 or ASTM D 1752. The joint sealer for the joints in the concrete pavement shall meet the requirements of Federal Specification SS-S-164 and shall be hot poured type.
7. Concrete Color: Concrete shall include integrated colors in the concrete mix and shall be from same supplier and same batch mixture. Finished concrete shall have a light broom finish parallel to traffic flow on all sidewalk sections.
8. All concrete, except where shown or specified otherwise, shall have the following minimum compressive strengths at 28 days, and slump at time of placement:

Location	Strength	Maximum Aggregate Size	Slump
Footings, Bases	3500 psi	1-1/2"	1"
Walls	3500 psi	3/4"	1"
Pavement, Sidewalks	3500 psi	1-1/2"	1"

2.02 FORM MATERIAL:

A. Unless otherwise indicated, construct formwork for exposed concrete surfaces with plywood, metal, natal-farmed plywood faced or other acceptable panel-type materials to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to the joint system specified. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection.

B. Lumber used in construction of wood forms shall be free of bulge or warp, of uniform width, not less than 2-inches in thickness, except that 1-inch thickness may be used on curves, and shall be sound and free from loose knots. Stakes shall be not less than 2" x 4" lumber of sufficient length that, when driven, they will hold the forms rigidly in place.

C. Metal forms shall be of approved sections and shall have a flat surface on top. They shall present a smooth surface of the desired contour, sufficiently thick and braced to withstand the weight of the concrete without bulging or becoming displaced.

PART 3 - EXECUTION

3.01 LABOR:

A. For finishing, competent and skilled finishers shall be provided.

3.02 EQUIPMENT:

A. All equipment necessary and required for the construction of concrete sidewalks must be on the Project, proven to be in first class working condition and approved by the Owner, before construction will be permitted to begin.

B. A one bag mixer will be permitted when the total output of concrete, per 10-hour day, does not exceed 25 cubic yards.

C. Satisfactory floats, edgers, spades and tamps shall be furnished. Tamps of not over 8-inch diameter and weighing not less than 25 pounds shall be provided for tamping subgrade. A 10-foot longitudinal float of the inverted T-type with plough handles attached for manipulation, and a rigid float not less than 18-inches longer than the width of the walk being constructed, shall be provided**.**

3.03 REMOVAL OF STRUCTURES AND OBSTRUCTIONS:

A. Unless otherwise indicated or stipulated, the removal of structures, obstructions, etc., will be performed in accordance with the requirements of Section 02060 of these Specifications.

3.04 EARTHWORK AND COMPACTION

A. Earthwork and compaction operations shall be performed in accordance with requirements of Section 02200 of these specifications.

3.05 SUBGRADE PREPARATION:

A. The subgrade for the sidewalk shall be formed by excavation to a depth equal to the thickness of the concrete plus the base course.

B. All subgrade shall be of such width as to permit the proper installation and bracing of the forms.

C. Yielding, or unsuitable material shall be removed and backfilled with satisfactory material in accordance with recommendations and approval of geo-technical consultant. Place 6-inches of graded aggregate base, as determined by the geotechnical sub-consultant, under concrete sidewalks as necessary for subgrade stabilization, compacted thoroughly and finished to a smooth, unyielding surface and proper line, grade and cross section of the proposed construction.

C. Additional stabilization of poor subgrade areas may be necessary to achieve compaction criteria for aggregate base. These additional subgrade stabilization measures shall be performed under the direct supervision of the geo-technical consultant. These measures may include, but are not limited to, placement of

geogrid reinforcement materials, aggregate bridge lifts, undercutting of unsuitable soils and soil cement admixtures.

3.06 FORMS:

A. All forms shall be set upon the prepared subgrade, true to lines and grade, and held rigidly in place so as not to be disturbed or displaced during the placing of the concrete. The top of the form shall be set to exact grade and the height shall be equal to not less than the thickness of the proposed concrete.

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

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

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

E. Immediately before placing the concrete, the forms shall be given a coat of light oil and where being removed and used again, the forms shall be thoroughly cleaned and oiled each time.

F. Forms shall be removed within 24 hours after placing concrete and no pressure shall be exerted upon the concrete in removing forms.

G. When the concrete sidewalk is to be joined to an existing sidewalk, the existing sidewalk, if not in proper condition for the junction, shall be cut to a neat line perpendicular to both the centerline and the surface, or as indicated by the Owner.

3.07 JOINTS:

A. Control joints shall be saw scores. No trowel joint shall be permitted or accepted.

B. Unless otherwise indicated on the Drawings or as directed by the Landscape Architect, premoulded expansion joint filler, 3/4-inch in thickness, shall be placed at the locations and in line with expansion joints in the adjoining pavement, gutter or curb. Transverse expansion joints for concrete sidewalks shall be 3/4-inch thick. When expansion joints are not required in the adjoining pavement or gutter, and not otherwise indicated on the Drawings, a 3/4-inch premoulded expansion joint filler shall be placed at intervals of not over 30 feet apart. All premoulded expansion joint filler must be cut to full width or length of the proposed construction and shall extend to within 1/2-inch of the top or finished surface. All longitudinal expansion joints shall be placed as indicated on the Drawings or as directed by the Project Landscape Architect.

C. All expansion joints shall be true, even and present a satisfactory appearance.

D. All expansion joint material protruding after the concrete has been finished shall be trimmed flush as directed by the Landscape Architect.

E. Construction Joints: Locate and install construction joints not shown on the Drawings, so as not to impair strength and appearance of the structure, as acceptable to the Landscape Architect. Review need for additional joints or scores with the Landscape Architect prior to construction.

F. Control Joints in Slabs-on-Ground: Construct control joints in slabs-on-ground to form panels of patterns as shown. Locate expansion type joint at spacing recommended by Portland Cement Association.

G. Control Joints in Sidewalks: Provide joints in pattern as indicated on the Drawings. Locate expansion type joints at spacing as indicated.

H. Saw joints shall be cut no sooner than 7 hours or less than 24 hours from initial pour.

3.08 MANUFACTURING AND PLACING CONCRETE**:**

A. Immediately before placing concrete, the depth of the proposed concrete shall be checked by means of a template cut true to the cross section of the proposed construction and any irregularities shall be corrected.

B. Immediately before placing concrete, all subgrade shall be thoroughly sprinkled or wetted.

C. Concrete shall not be placed upon a frozen subgrade or subbase.

D. Construction joints will be permitted only at grooves or at expansion joints, unless otherwise approved by the Owner.

E. The concrete shall be manufactured and placed in accordance with the requirements of Section 03300 of these Specifications.

F. The concrete shall be placed immediately after mixing; the edges, sides, etc. shall be thoroughly spaded and the surfaces tamped sufficiently to thoroughly compact the concrete and bring the mortar to the surface. The concrete shall be deposited and compacted in a single layer.

3.09 FINISHING:

A. The concrete shall be stuck-off with a transverse template resting upon the side forms and then shall be floated with a 10-foot longitudinal float working the float transversely across the concrete with a sawing motion, always maintaining it parallel to the edges of the sidewalk, or driveway, where practicable, and in such a manner that all surplus water, laitance and inert material shall be removed from the surface. This operation shall be continued until the surface of the concrete shows no variation from a 10-foot straightedge. If necessary, additional concrete shall be added to fill depressions, and the longitudinal float used again. The longitudinal float shall not be moved ahead more than one-half its length at any time.

B. When the surface of the concrete is free from water and just before the concrete obtains its initial set, it shall be gone over and finished with a wooden float so as to produce a sandy texture. The longitudinal surface variations shall be not more than 1/4-inch under a 12-foot straightedge, nor more than 1/8-inch on a five-foot transverse section. The surface of the concrete must be finished so as to drain completely at all times.

D. The edges of the sidewalks or driveways shall be carefully finished and rounded with an edging tool having a radius of 1/2-inch.

E. Finish: The finished surface of the concrete shall be a light broom finish perpendicular to the flow of traffic.

F. The edges of the concrete at contraction joints shall be rounded with an edging tool having a radius of 1/4-inch. The top and ends, where practicable, of expansion joint material shall be cleaned of all concrete and the expansion joint material shall be trimmed so as to be slightly below the surface of the concrete. All marks caused by edging shall be removed with a wetted brush or wooden float.

G. The surface of sidewalks shall be divided into blocks by use of a grooving tool. Grooves shall be placed so as to cause contraction joints to be placed at a groove line, where practical. The grooves shall be spaced equal to the sidewalk width, but not to exceed 10' spacing between joints. The grooves shall be cut to a depth of not less than 1-inch. The edges of the grooves shall be edged with an edging tool having a radius of 1/4-inch, and any marks caused by edging or otherwise shall be removed with a wetted brush or wooden float so as to give the surface an uniform texture and finish

3.10 PROTECTION AND CURING:

A. Immediately after finishing the concrete, it shall be covered and cured in accordance with the requirements of Section 03300 of these Specifications. Curing materials shall conform to the requirements of ASTM C 309 (liquid membrane compound) or ASTM C 171. If the temperature falls to below freezing, satisfactory heating devices shall be placed under suitable covers to keep the temperature around the concrete at above 45 degrees F.

B. Pedestrians will not be allowed upon concrete sidewalks until 12 hours after finishing concrete, and no vehicles or loads shall be permitted upon any sidewalk or driveway until the concrete has attained sufficient strength for such traffic.

C. The Contractor shall construct such barricades and protection devices as are necessary to keep pedestrians and traffic off the sidewalks.

H. If any sidewalk is damaged at any time previous to final acceptance of the project, it shall be repaired by removing all concrete within the limits of the grooves, and be replaced, at the Contractor's expense, with concrete of the type, kind and finish in the original construction.

3.11 BACKFILLING:

A. Immediately after the concrete has set sufficiently, the spaces along the sides or edges of the sidewalk shall be refilled with suitable material, this material shall be compacted in layers of not over 4-inches each, until firm and solid.

3.12 CLEANING:

A. All excess or unsuitable material shall be removed and disposed of in accordance with requirements of Section 02200 of these Specifications.

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 02523

SECTION 06100

ROUGH CARPENTRY

1.1 GENERAL

A. Submittals: Submit the following:
1. Contractor shall remove a treatment tag from each type of lumber delivered to the site and provide it to the Landscape Architect and Owner with a copy of the order manifest and delivery date. Include in daily reports and provide at regular on-site project meetings.
2. Contractor shall provide material certificates for dimension lumber specified to comply with minimum allowable unit stresses.
3. Wood treatment data, including chemical treatment manufacturer's instructions for handling, storing, installing, and finishing treated materials.
4. Research or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence code compliance of engineered wood products, foam-plastic sheathing, air-infiltration barriers, metal framing anchors, power-driven fasteners, and fire-retardant-treated wood.

1.2 PRODUCTS

A. Lumber, General: Comply with DOC PS 20 and with applicable grading rules of inspection agencies certified by the American Lumber Standards Committee's (ALSC) Board of Review. Provide dressed lumber, S4S, with each piece factory marked with grade stamp of inspection agency.

1. For exposed lumber, furnish pieces with grade stamps applied to ends or back of each piece, or omit grade stamps and provide grade-compliance certificates issued by inspection agency.
2. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.
3. Provide lumber with 15 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.
4. Wood piles shall be Marine Grade for constant contact with water.

B. B. Wood-Preservative-Treated Materials: Comply with applicable requirements of AWPA C2 (lumber). Mark each treated item with the Quality Mark Requirements of an inspection agency approved by ALSC's Board of Review.

All permeant wood products making contact with the ground or exposed to the natural elements above the ground shall be **GROUND CONTACT** treated wood. No exceptions shall be made. Every piece of lumber shall have a treatment tag attached to one end.

WARNING NOTE

NO ABOVE GROUND CONTACT LUMBER SHALL BE USED ON THIS PROJECT, ONLY GROUND CONTACT, BELOW GROUND CONTACT OR MARINE GRADE MATERIALS WILL BE ACCEPTED ON THIS PROJECT

1. Ground Contact Lumber: Pressure treat all above and ground contact items with waterborne preservatives to a minimum retention of 0.40 lb/cu. ft. or approved equal. After treatment, kiln-dry lumber and to a maximum moisture content of 19 and 15 percent, respectively. (*Equal to or better than LP-22 treatment*)
2. Water Contact: Lumber, piles or posts in constant contact with fresh or salt water shall be **Marine Grade** treatment.
3. Complete fabrication of treated items before treatment, where possible. If cut after treatment, apply field treatment complying with AWPA M4 to cut surfaces.
4. Exterior Type: Use for exterior locations and where indicated.
5. Inspect each piece of treated lumber after delivery and discard damaged, defective or untagged pieces.

C. Dimension Lumber: Provide dimension lumber of grades indicated according to the ALSC National Grading Rule (NGR) provisions of the inspection agency indicated.

1. Non-Load-Bearing Interior Partitions: Provide Standard, Stud, or No. 3 grade and any of the following species:
    a. Species: Mixed southern pine; SPIB.

2. Framing Other than Non-Load-Bearing Partitions: Provide Construction or No. 2 grade and any of the following species:
    a. Species: Southern pine; SPIB.

3. Exposed Framing: Provide material hand-selected from lumber of species and grade indicated below for uniformity of appearance and freedom from characteristics and would impair finish appearance.
    a. Species and Grade: Southern pine, Select Structural; SPIB.

E. Miscellaneous Lumber: Provide No. 3 or Standard grade lumber of any species for support or attachment of other construction, including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, and similar members.

F. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that evidence compliance with building code in effect for Project. Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

1. Laminated-Veneer Lumber: Lumber manufactured by laminating wood veneers in a continuous press using an exterior-type adhesive complying with ASTM D 2559 to produce members with grain of veneers parallel to their lengths and complying with the following requirements

a. Extreme Fiber Stress in Bending: 2500 psi (17 MPa) for 12-inch nominal- (286-mm actual-) depth members.
b. Modulus of Elasticity: 2,000,000 psi (13 800 MPa).

2. Parallel-Strand Lumber: Lumber manufactured by laying up wood strands using an exterior-type adhesive complying with ASTM D 2559, and cured under pressure to produce members with grain of strands parallel to their lengths and complying with the following requirements:

a. Extreme Fiber Stress in Bending: 2900 psi (20 MPa) for 12-inch nominal- (286-mm actual-) depth members.
b. Modulus of Elasticity: 2,000,000 psi (13 800 MPa).

3. Prefabricated Wood I-Joists: Units manufactured by bonding stress-graded lumber flanges to wood-based structural-use panel webs with exterior-type adhesives complying with ASTM D 2559, to produce I-shaped joists complying with the following requirements:
a. Structural Capacities: Establish and monitor structural capacities according to ASTM D 5055.

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P. Fasteners: Size and type indicated. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with a hot-dip zinc coating per ASTM A 153 or of Type 304 stainless steel.

1. Power-Driven Fasteners: CABO NER-272.
2. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.
3. All hardware shall be hot dipped galvanized.
4 All nails shall be hot dipped galvanized ring shank exterior deck nails
5. All face screws shall be hot dipped galvanized for exterior use.

G. Concrete footer: *'Sakcrete'* filled in hole with post.

1.3 EXECUTION

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.

B. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.

C. All face nails or screws shall be counter sunk.

END OF SECTION 06100

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
b. Concrete paving.
c. Concrete reinforcing steel.
d. Concrete masonry units.
e. Wood joists.

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 points 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 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