ATTACHMENT NUMBER 1 ITB #18-029

REMEDIATIONS AT MORGAN FALLS OVERLOOK PARK

PROJECT MANUAL

September 8, 2017

PREPARED FOR:
Sandy Springs
Recreation and Parks Department

SANDY SPRINGS
GEORGIA

7840 Roswell Road
Sandy Springs, Georgia 30350

PREPARED BY:

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Part 1 General

1.01 Scope of Work

A. The Project overall involves minor site work for the construction of landscape retaining walls, pressure grouting of undermined stairs, a new sidewalk segment, minor drainage pipe installation, coordination of a dock expansion and associated landscaping.

The Base Bid includes all work shown in the contract documents.

1. Project Location: 200 Morgan Falls Road, Sandy Springs, Georgia 30350.

2. Owner: Sandy Springs, Georgia

B. Contract Documents – Remediations at Morgan Falls Overlook Park, September 2017, prepared for City of Sandy Springs by Foresite Group Inc.

The Work consists of:

1. Erosion Control

2. Demolition

3. Grading and Drainage

4. Pressure Grouting

5. Dock Installation Coordination. Dock addition to be purchased by City and installed by vendor in coordination with selected Contractor.

6. Landscaping

C. The Work shall be constructed under a single prime Contract.

D. Cooperate with separate contractors so that work under those contracts may be carried out smoothly, without interfering with or delaying work under this Contract.

E. Use of the Site: Do not disturb portions of the site beyond the areas indicated. Contractor shall not work on the site after 9:00 p.m. or before 6:00 a.m. without written consent from the Owner.

SPECIAL PROVISIONS

In the event, there are any discrepancies between the following provisions and other provisions in these documents, the following provisions shall prevail.

1. All references to "Engineer", "Landscape Architect", "Architect", or "Owner" in General Conditions, drawings or in specifications are deemed to mean the Project Manager and/or "Owner's Representative", as designated by the City.

2. PERMIT FEES

   All permitting fees required by Sandy Springs Department of Planning and Development have been paid by the City. Contractor is required to obtain all permits necessary for all temporary work, office trailers, and retaining walls at his own expense.

3. CONTRACT DRAWINGS

   Contractor will receive PDF's of plans and specs. It is the Contractor's responsibility to pay for and have printed from the pdf's hardcopies of plans and specs for the Contractor's use.

4. EROSION, SEDIMENTATION AND POLLUTION CONTROL MAINTENANCE

   No payment will be made for any portion of the project for which temporary erosion, sedimentation and pollution controls are not properly maintained. Any fines or delays for non-compliance of erosion control measures levied by any agency will be the responsibility of the Contractor.

5. WEATHER DAYS

   The following bad weather calendar days shall be anticipated and included in the contractual time period given for project completion. The Contractor's request for additional time due to weather shall only be granted for days beyond those listed below - considering the full term of the contract. The burden of proof and documentation for such request for additional time shall rest solely upon the Contractor.

January	10 days	July	4 days
February	10 days	August	2 days
March	7 days	September	2 days
April	6 days	October	3 days
May	4 days	November	5 days
June	3 days	December	9 days

6. LANGUAGE

   There shall be at least one person in a position of responsibility representing the Contractor, on site at all times, who is capable of translating from English to the language used by the workforce.

7. GENERAL CONTRACTOR LICENSE

All Bidders must be licensed by the state of Georgia to be a General Contractor.

8. CONTRACTOR EXPERIENCE

Bidder should have completed construction of a minimum of three (3) projects of similar size and scope within the past five (5) years and submit reference contacts on the enclosed form. The Contractor will identify on the Reference Form, by name, the Superintendent for each project. The Superintendent assigned to this project should have directed at least one of the three references.

9. LIST OF SUBCONTRACTORS

Contractor should submit a full List of Subcontractors with the Bid. Any changes during construction must be approved, in advance, by the City.

In accordance with General Condition 67, Contractor shall not award more than seventy-five percent of the work to subcontractors. Contractor shall perform, with his/her own organization, work amounting to not less than twenty five percent (25%) of the total Contract cost, including materials, equipment and labor. Purchase of materials by the Prime Contractor for use by a Subcontractor will not be allowed when computing the 75% limitation.

FAILURE TO RETURN THIS PAGE AS PART OF YOUR BID DOCUMENT MAY RESULT IN REJECTION OF BID.

BID SCHEDULE

The Bidder has carefully examined and fully understands the Contract, Plans and Specifications and other Documents hereto attached, and has made a personal examination of the Site of the proposed Work, and has satisfied himself as to the actual conditions and requirements of the Work, and hereby proposes and agrees that if his bid is accepted, he will contract with City of Sandy Springs according to the bidding Documents entitled **Remediations at Morgan Falls Overlook Park** and Addenda, as well as the existing conditions of the project, and conditions affecting the Work, the undersigned proposes to furnish all services, labor and materials required by them in accord with said documents, personal observations of the site conditions, including the total sums for Unit Price Items 1 and 2 below, for the sum as follows:

_____Dollars

($_____), which sum is hereinafter called “Base Bid”.

The undersigned agrees to commence work within 10 days of the date of Notice to Proceed issued by City of Sandy Springs Purchasing Office and to commit adequate forces on-site to substantially complete all Work, including punch list items and clean-up, as determined by the City within **60 calendar days**. City of Sandy Springs will charge the Contractor Five Hundred Dollars and no cents ($500.00), per day for liquidated damages for every day beyond 60 calendar days that the Work is not complete.

UNIT PRICE SCHEDULE

For the indicated construction item, the Base Bid shall include performing the work below. The stated unit prices include only those items listed in Section 01 2200, Unit Prices.

The total cost amounts for the estimated quantities of Unit Price items are included in the Base Bid. Bid Unit Price will prevail if calculation is in error. Payment for Unit price items will be for actual in-place quantities installed.

No.	Item	Unit	Est. Qty.	Unit Price	Total
1.	Pressure Grout	CF	35	_____	_____

The undersigned represents that the unit prices listed above are complete as specified in Section 01 2200, Unit Prices, acknowledges that the quantities are not guaranteed, and agrees that payment will be for the actual in-place quantities installed per the plans or as directed by the City. Prices must be entered, for all the blanks in the schedule. If there is an error in the calculation for the total amount entered, the bid unit price multiplied by the Estimated Quantity will be the bid amount that is considered included in the Base Bid.

Removal of rock or providing unit items in excess of the estimated amount will be paid at the unit price, upon verification by the City’s geotechnical firm and/or site representative.

The quantity of rock and/or unsatisfactory materials will be verified by the City’s representative or geotechnical firm. Should the amount included in the Base Bid or accepted deduct alternates for any of these items not be encountered, a change order will be initiated to refund to the County the difference at the bid unit price.

Section 01 2200
Unit Prices

Part 1 General

1.01 Scope

A. Section Includes:

1. Unit price work.

2. List of unit prices required.

3. Procedures for unit price work.

B. Related Sections

1. Applications for payment: As outlined in General Conditions and Bid Schedule

2. Procedures for modifications to the Contract: As outlined in General Conditions.

3. Procedures for utilization of testing and inspection: As outlined in Specifications.

4. Contract closeout procedures: As outlined in Closeout Submittals.

1.02 Unit Price List

A. Unit Price No. 1: Pressure Grout

1. Install pressure grout beneath settling slabs on grade to raise existing concrete top elevation to original design elevation. Pressure grout shall be installed as described and shown in the construction documents and specification section 03 6200, as directed by the owner representative.

2. Purpose: To adjust the Contract sum when actual quantity is determined.

3. Quantity to be included in Contract sum: 35 CY

4. Unit of measurement: Cubic Yard

5. Include only the following in the unit price:

   a. Material and installation of pressure grout

   b. Overhead and profit.

6. Include all other costs, including mobilization, in the contract base bid.

7. Method of measurement: Actual quantity constructed.

1.03 Submittals

Supporting Data: With applications for payment covering unit price work submit substantiated measurement of quantity installed or executed.

A. Unit Prices

1. Indicate unit price for each item on bid form.

2. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

3. Quantities:

a. Include in the contract base bid an amount equal to the unit price times the estimated quantities.

b. Actual quantities will be determined by measurement, and the contract sum will be adjusted accordingly.

4. Accepted unit prices will be included in the agreement.

B. Procedures for Modifications to the Contract: Procedures for submitting and handling modifications due to changes are specified elsewhere.

END OF SECTION

Section 01 2500
Substitution Procedures

Part 1 General

1.01 Material

A. Use materials and equipment that are new and of quality suited to use intended, suitable for function intended, and plainly labeled and delivered to Project site in original unopened containers when nature of materials is suitable for containers.

B. The Engineer has endeavored to specify materials, products and assemblies which are totally free of asbestos, polychlorinated biphenyl (PCB) or other similar materials believed to endanger the health and safety of construction workers and future building occupants. However, manufacturers' information and other data normally furnished to the Engineer by producers of building material products and systems do not always contain accurate, complete or appropriate information for the Engineer to properly evaluate each product.

C. It shall therefore be a requirement of these Contract Documents that neither the Contractor, nor his material suppliers, nor his Subcontractors install or otherwise incorporate any materials containing asbestos, PCB or other hazardous materials within the boundaries of the Project. No soil found on site, or transported to the site from remote locations, which is contaminated with material containing asbestos, PCB, Radon, gasoline, fuel oil, diesel fuel or other similar fossil fuels shall be used for fill, backfill or landscape topsoil.

D. The Contractor shall require that each of his Subcontractors and material suppliers warrants to Owner and Engineer, that all materials, products and assemblies incorporated, or submitted for incorporation into this Project, are totally free of asbestos, PCB, or other such hazardous materials. This warranty shall include all materials, products and assemblies specified and otherwise required in the Contract Documents. This warranty shall also include all materials, components and accessories not specifically enumerated or detailed in these Contract Documents but which are required by performance specifications or recommended by manufacturers for complete installation of materials, products and assemblies. If the Contractor or his Subcontractors or material suppliers have knowledge that, or believe that an item, component, material or accessory within a product or assembly may contain asbestos, PCB or other such hazardous material, it is the Contractor's sole responsibility to secure a written certification from the manufacturer of any suspected material stating this material is totally free of asbestos, PCB or other hazardous materials. A copy of the written certification shall be submitted to the Owner and Engineer.

E. Products that are specified by reference standards or in descriptive manner without a manufacturer's name, model number or trade name, shall be selected by the Contractor, shall comply with all specified requirements, and shall not contain asbestos, PCB or other hazardous materials in any form. The Contractor shall be responsible for determining that materials requested for substitution are totally free of asbestos, PCB or other similar materials known to endanger the health and safety of construction workers and future building occupants.

1.02 Workmanship

A. Follow manufacturer's instructions. When instructions are in conflict with

Contract Documents, make request for clarification before proceeding. Maintain copy of manufacturer's instructions at Project site.

B. Comply with industry standards except when specified tolerances indicate more rigid standards or more precise workmanship. Perform work by persons qualified to produce workmanship of specified quality.

C. Join materials to uniform, accurate fit to meet with straight lines free of smears and overlaps. Install exposed materials appropriately level, plumb, and at accurate right angles or flush with adjoining materials. Attach materials with sufficient strength, number, and spacing of attachments that will not fail until materials joined are broken or permanently deformed.

1.03 Contractor's Options

A. For products specified only by reference standard or description, provide any product meeting specifications.

B. For products specified by naming one or more products or manufacturers, request for substitution for any product not named is required.

C. For products specified by naming one or more products or manufacturers with no substitutions permitted, provide one of named products.

D. Where particular items of methods, materials, systems, and equipment are specified as products of certain named manufacturers, products of those named manufacturers, or approved equivalents, are acceptable. Certain specified construction and equipment details may not be regularly included as part of the named manufacturer's standard catalog equipment, but shall be provided by the manufacturer as required for the proper functioning of the equipment. The Contractor shall assume full responsibility to assure that the manufacturer provides materials and equipment conforming to indicated and specified requirements. Reasonable minor variations in equipment due to manufacturing methods are expected and will be acceptable; however, indicated and specified performance and material requirements are minimum. The Engineer reserves the right to determine equality of equipment that deviates from any of the indicated and specified requirements.

E. Naming any manufacturer does not imply approval of that manufacturer's nonconforming products.

F. The Contractor shall include in the Work; the materials, products and equipment named in the Contract Documents by trade name, proprietary name or manufacturer's catalog numbers, including any specified modifications thereto unless proposed substitutions are approved in writing by the Architect.

1.04 Substitutions

A. Engineer will consider formal requests from Contractor and Vendor for product substitutions.

1. Contractor shall submit written request using the Section 01 2500.01 Substitution Form to Engineer for review and consideration of proposed substitution.

2. Each proposed substitution shall require Engineer's written approval prior to inclusion in Work.

3. Any request not using a complete Substitution Form will not be considered.

B. Submit separate request for each substitution in compliance with Section 01 2500. Support each request with:

1. Complete data substantiating compliance of proposed substitution with requirements of Contract Documents.

2. Product identification including manufacturer's name and address.

3. Manufacturer's product data including product description, reference standards, and performance and test data.

4. Samples as applicable.

5. Name and address of similar projects on which product has been installed and date of each installation.

6. Itemized comparison of proposed substitution with product specified. List significant variations including costs.

7. Data relating to changes in construction schedule.

8. List of changes required in other Work or products.

9. Designation of required license fees or royalties.

10. Designation of availability of maintenance service and source of replacement materials.

C. Substitutions will not be considered for acceptance when they are indicated or implied on Shop Drawings or Product Data Submittals without formal request from Contractor or when acceptance will require substantial revision of Contract Documents.

D. When a request for substitution is denied, General Contractor shall provide specified products.

E. Substitute products shall not be installed without Engineer's written acceptance or prior approval.

F. Where the shop drawings, product data and/or samples as submitted by Contractor indicate a departure from the Contract which Engineer deems to be a minor adjustment in the interest of Owner, not involving a change in the Contract Price or Contract Time, Engineer will approve the data/drawing, but the approval will contain, in substance, the following notation:

"The modification shown on the attached data/drawings is approved in the interest of Owner to effect an improvement for the Project and is accepted with the understanding that it does not involve any change in the Contract Price or Contract Time; that it is subject generally to all Contract stipulations and covenants; and that it is without prejudice to any and all rights of Owner under the Contract and Bond or Bonds."

G. Approval by Engineer of shop drawings, product data and/or samples will be general and shall not relieve Contractor from the responsibility of adherence to the Contract, nor shall it relieve him of the responsibility for any error which may exist or result.

1.05 Contractor's Representative

A. In making formal request for substitution, Contractor/Subcontractor represents:

1. He has investigated proposed product and has determined it is equal to or superior to specified product.

2. He will provide same warranties and bonds for substitution as for specified product.

3. He certifies cost data presented is complete and includes all related costs under this Contract but excludes any Engineer's redesign costs, and waives all claims for additional costs related to substitution which subsequently becomes apparent. Any redesign costs from use of substitution are the responsibility of the contractor.

4. He will coordinate installation of accepted substitute, making such changes as may be required for Work to be complete in all respects.

5. He waives claims for additional costs caused by substitution which may subsequently become apparent or unforeseen at the time of approval.

1.06 Engineer's Duties

A. Review Contractor's requests for substitutions with reasonable promptness.

B. Notify Contractor, in writing, of decision for acceptance or rejection of requests for substitution.

Part 2 Products (Not Used)

Part 3 Execution (Not Used)

END OF SECTION

Section 01 2500.01
Request for Substitution

TO: Foresite Group, Inc.
3740 Davinci Court, Suite 100
Peachtree Corners, GA 30092

FROM: _____
name of company

_____
street address

_____
city and state

_____
phone number and name of person to contact

PROJECT:

1. Specification Section and Paragraph Numbers of product specified

2. Proposed Substitution

   a. Name and Model No.
   b. Manufacturer: _____
      Name
      _____
      Address
      _____
      Phone

   c. Description

   _____

   _____

   _____

   d. Attach applicable performance and test data
   e. Numbers of applicable reference standards
   f. Attach a color chart, if applicable.
   g. Attach installation instructions.

3. Manufacturer's Reputation: Attach the following:

   a. Evidence of reputation for prompt delivery.
   b. Evidence of reputation for efficiency in servicing products.

4. Comparison: Attach an itemized comparison of the proposed substitution with product specified, including all reference standards related to the product.

5. Previous Installation: Provide the following information on similar projects on which proposed substitution was used, list projects in both the locale of the project and the Atlanta metro area:

	Name and address of project	Date of Installation	Name, address, and phone number of Architect
a.	_____	_____	_____
			_____
			_____
b.	_____	_____	_____
			_____
			_____
c.	_____	_____	_____
			_____
			_____
d.	_____	_____	_____
			_____
			_____

6. Changes in Work: Attach data relating to changes required in other work to permit use of proposed substitution and changes required in the construction schedule.

7. In making request for substitution, petitioner represents that he has examined the Drawings and, and has determined that, to the best of his knowledge, the proposed substitution is appropriate for the use intended in the Drawings and Specifications.

_____

Signature of Petitioner/Bidder/Date

END OF SECTION

Section 01 2973
Schedule of Values

Part 1 General

1.01 Scope

A. The work under this Section includes preparation and submittal of a schedule of values.

1.02 General

A. Timing of Submittal: Submit to the Engineer, 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 Engineer's approval of the Contractor's 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 Engineer, shall be used only as a basis of the Contractor's Application for Payment.

1.03 Form and Content of Schedule of Values

A. Form and Identification

1. Type schedule on 8-1/2 x 11-inch white paper.

2. Contractor's standard forms and automated printout may be used.

3. Identify schedule with:

a. Title of Project and location

b. Engineer

c. Name and address of Contractor

d. Contract designation

e. 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 structure, then by CSI Format, for ease of field verification of quantities completed in each structure.

C. Format

1. Follow the Table of Contents of the Contract Documents as the format for listing the component items.

2. Identify each item with the number and title of the respective major Section of the Specifications.

D. For each major line item list sub-values of major products or operations under the item.

E. For the Various Portions of the Work:

1. Each item shall include a directly proportional amount of the Contractor's overhead and profit.

F. The sum of all values listed in the schedule shall equal the Bid Total.

Part 2 Products (Not Used)

Part 3 Execution (Not Used)

END OF SECTION

Section 01 3119
Project Meetings

Part 1 General

1.01 Scope

A. Work under this Section includes all scheduling and administering of pre-construction and progress meetings as herein specified and necessary for the proper and complete performance of this work.

B. Scheduling and Administration by Engineer

1. Prepare agenda.

2. Make physical arrangements for the meetings.

3. Preside at meetings.

4. Record minutes and include significant proceedings and decisions.

5. Distribute copies of the minutes to participants.

1.02 Preconstruction Conference

A. The Engineer shall schedule the preconstruction conference prior to the issuance of the Notice to Proceed.

B. Representatives of the following parties are to be in attendance at the meeting:

1. Owner.

2. Engineer.

3. Architect

4. Contractor and superintendent.

5. Major subcontractors.

6. Representatives of governmental or regulatory agencies when appropriate.

C. The agenda for the preconstruction conference shall consist of the following as a minimum:

1. Distribute and discuss a list of major subcontractors and a tentative construction schedule.

2. Critical work sequencing.

3. Designation of responsible personnel and emergency telephone numbers.

4. Processing of field decisions and change orders.

5. Adequacy of distribution of Contract Documents.

6. Schedule and submittal of shop drawings, product data and samples.

7. Pay request format, submittal cutoff date, paydate and retainage.

8. Procedures for maintaining record documents.

9. Use of premises, including office, temporary facilities, storage areas and Owner's requirements.

10. Major equipment materials deliveries and priorities.

11. Safety and first aid procedures.

12. Security procedures.

13. Housekeeping procedures.

14. Work hours.

15. Utilities.

1.03 Project Coordination Meetings

A. Project Coordination Meetings may be requested at any time at the discretion of the Owner, Engineer or Contractor. The party requesting a meeting shall provide the other two parties with as much notice as possible, as well as a written agenda for such meeting.

1.04 Project Coordination Meetings

A. Schedule regular monthly meetings as directed by the Engineer.

B. Hold called meetings as the progress of the work dictates.

C. The meetings shall be held at the location indicated by the Engineer.

D. Representatives of the following parties are to be in attendance at the meetings:

1. Engineer.

2. Contractor and superintendent.

3. Major subcontractors as pertinent to the agenda.

4. Owner's representative as appropriate.

5. Representatives of governmental or other regulatory agencies as appropriate.

E. The minimum agenda for progress meetings shall consist of the following:

1. Review and approve minutes of previous meetings.

2. Review work progress since last meeting.

3. Note field observations, problems and decisions.

4. Identify problems which impede planned progress.

5. Review off-site fabrication problems.

6. Review Contractor's corrective measures and procedures to regain plan schedule.

7. Review Contractor's revision to the construction schedule as outlined in the Supplementary Conditions.

8. Review submittal schedule; expedite as required to maintain schedule.

9. Maintenance of quality and work standards.

10. Review changes proposed by Owner for their effect on the construction schedule and completion date.

11. Complete other current business.

Part 2 Products (Not Used)

Part 3 Execution (Not Used)

END OF SECTION

Section 01 3200
Construction Progress Documentation

Part 1 General

1.01 Scope

A. Progress documentation requirements include:

1. Contractor's construction schedule.

2. Progress reports.

3. Progress photographs.

4. Inclement weather delay requests.

1.02 Submittals

A. Contractor's construction schedule:

1. Submit within 10 days after Notice To Proceed.

2. Submit revised schedule with application for payment.

B. Progress reports: Submit with each application for payment.

C. Progress photographs: Submit with each application for payment and of finished work.

D. Minutes of Progress Meetings.

1.03 Form of Submittals

A. Schedules – General

1. Provide legend of symbols and abbreviations for each schedule.

2. Use the same terminology as that used in the Contract Documents.

3. Submit a minimum of three copies.

B. CPM Charts

1. CPM (Critical Path Method): A method of planning and scheduling a construction Project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of the Project.

C. Reports – General: Submit a minimum of three copies.

D. Photographs

1. In accordance with Section 01 3233 Construction Photographs.

1.04 Coordination

A. In preparing schedules, take into account the time allowed or required for the Owner's Representative's administrative procedures.

1.05 Progress Reports

A. Prepare a narrative report describing the general state of completion of the work and describing in detail the following:

1. Actual and anticipated delays, their impact on the schedule, and corrective actions taken or proposed.

2. Actual and potential problems.

3. Effect of delays, problems, and changes on the schedules of subcontractors.

4. Status of corrective work ordered by the Owner's Representative.

Part 2 Products (Not Used)

Part 3 Execution (Not Used)

END OF SECTION

Section 01 3216
Construction Schedules

Part 1 General

1.01 Scope

A. The work under this Section includes preparing, furnishing, distributing, and periodic updating of the construction schedules as specified herein.

B. The purpose of the schedule is to demonstrate that the Contractor can complete the overall Project within the Contract Time and meet all required interim milestones.

1.02 Quality Assurance

A. Primavera Project Planner (P3) by Primavera Systems, Inc., Primavera Sure Trac 2.0, or similar CPM software, shall be used to develop the Project schedules.

B. The development of the Overall Project Schedule (OPS) shall be by a party who has experience performing CPM scheduling utilizing the scheduling software on projects of similar type, size, and complexity.

1.03 Submittals

A. Overall Project Schedule (OPS)

1. Submit the OPS within 10 days after date of the Notice to Proceed.

2. The Owner's Representative will review the schedule and return it within 5 days after receipt.

3. If required, resubmit corrected schedule within 5 days after receipt of a returned copy.

B. Near Term Schedule (NTS)

1. Submit the first Near Term Schedule within 10 days of the Notice to Proceed.

2. The Owner's Representative will review the schedule and return it within 5 days after receipt.

C. Schedule of Values (SOV)

1. Submit the SOV within 10 days after date of Notice to Proceed.

2. The Owner's Representative will review the SOV and return a reviewed copy within 5 days after receipt.

3. If required, resubmit corrected SOV within 5 days after receipt of a returned

copy, or before submittal of first Application for Payment.

D. Submit an update of the OPS, NTS, and narrative with each progress payment request. Provide each update on a CD, and an 11-inch x 17-inch copy.

1.04 Approval

A. Approval of the Contractor's construction schedule and revisions thereto shall in no way relieve the Contractor of any of Contractor's duties and obligations under the Contract. Approval is limited to the format of the schedule and does not in any way indicate approval of, or concurrence with, the Contractor's means, methods and ability to carry out the work.

1.05 Overall Project Schedule (OPS)

A. The Contractor shall submit to the Owner for approval a detailed OPS of the Contractor's proposed operations for the duration of the Project. The OPS shall be in the form of a Critical Path Method bar chart.

B. Critical Path Method Schedule

1. Each activity shall be identified by a separate bar. Activities with a duration of more than 30 days shall be sub-divided into separate activities. Activities shall be grouped into separate areas of construction of the entire Project.

2. The schedule shall include activities for shop drawing preparation and review, fabrication, delivery, and installation of major or critical path materials and equipment items.

3. The schedule shall show the proposed start and completion date for each activity. A separate listing of activity start and stop dates and working day requirements shall be provided.

4. The schedule shall identify the Notice to Proceed date, the Contract Completion date, major milestone dates, and a critical path.

5. The schedule shall be printed on a maximum 11-inch x 17-inch size paper. If the OPS needs to be shown on multiple sheets, a simplified, one page, summary bar chart showing the entire Project shall be provided.

6. The schedule shall have a horizontal time scale based on calendar days and shall identify the Monday of each week.

7. The schedule shall show the precedence relationship for each activity.

1.06 Near Term Schedule (NTS)

A. The Contractor shall develop and refine a detailed NTS showing the day-to-day

activities with committed completion dates that must be performed during the upcoming 30-day period. The detailed schedule shall represent the Contractor's best approach to the work that must be accomplished to maintain progress consistent with the OPS.

B. The NTS shall be in the form of a Critical Path method bar chart and shall include a written narrative description of all activities to be performed and describe corrective action to be taken for items that are behind schedule.

1.07 Updating

A. Show all changes occurring since previous submission of the updated schedule.

B. Indicate progress of each activity and show actual completion dates.

C. The Contractor shall be prepared to provide a narrative report at the Project Coordination Meetings. The report shall include the following:

1. A description of the overall Project status and comparison to the OPS.

2. Identify activities that are behind schedule and describe corrective action to be taken.

3. A description of changes or revisions to the Project and their effect on the OPS.

4. A description of the NTS of the activities to be completed during the next 30 days. The report shall include a description of all activities requiring participation by the Owner’s Representative and/or Owner.

Part 2 Products (Not Used)

Part 3 Execution (Not Used)

END OF SECTION

Section 01 3323
Shop Drawings, Product Data, and Samples

Part 1 General

1.01 Scope

A. The work under this Section includes submittal to the Owner's Representative of shop drawings, product data and samples required by the various Sections of these Specifications.

B. Submittal Contents: The submittal contents required are specified in each Section.

C. Definitions: Submittals are categorized as follows:

1. Shop Drawings

a. Shop drawings shall include technical data, drawings, diagrams, procedure and methodology, performance curves, schedules, templates, patterns, test reports, calculations, instructions, measurements and similar information as applicable to the specific item for which the shop drawing is prepared.

b. Provide newly-prepared information, on reproducible sheets, with graphic information at accurate scale (except as otherwise indicated) or appropriate number of prints hereof, with name or preparer (firm name) indicated. The Contract Drawings shall not be traced or reproduced by any method for use as or in lieu of detail shop drawings. Show dimensions and note dimensions that are based on field measurement. Identify materials and products in the work shown. Indicate compliance with standards and special coordination requirements. Do not allow shop drawings to be used in connection with the work without appropriate final "Action" markings by the Owner's Representative.

c. Drawings shall be presented in a clear and thorough manner. Details shall be identified by reference to sheet and detail, Specification Section, schedule or room numbers shown on the Contract Drawings.

d. Drawings to be submitted in pdf format, unless full-size hard copies are necessary for clarification.

e. Minimum detail sheet size shall be 8-1/2 x 11-inches.

f. Minimum Scale:

(1) Assembly Drawings Sheet, Scale: 1-inch = 30 feet.

(2) Detail Sheet, Scale: 1/4-inch = 1 foot.

2. Product Data

   a. Product data includes standard printed information on materials, products and systems, not specially prepared for this Project, other than the designation of selections from among available choices printed therein.

   b. Collect required data into one submittal for each unit of work or system, and mark each copy to show which choices and options are applicable to the Project. Include manufacturer's standard printed recommendations for application and use, compliance with standards, application of labels and seals, notation of field measurements which have been checked and special coordination requirements.

   c. Submit in pdf format, unless hard copies are necessary for clarification.

3. Samples

   a. Samples include both fabricated and un-fabricated physical examples of materials, products and units of work, both as complete units and as smaller portions of units of work, either for limited visual inspection or, where indicated, for more detailed testing and analysis.

   b. Provide units identical with final condition of proposed materials or products for the work. Include “range” samples, not less than three units, where unavoidable variations must be expected, and describe or identify variations between units of each set. Provide full set of optional samples where the Owner’s Representative selection is required. Prepare samples to match the Owner’s Representative sample where indicated. Include information with each sample to show generic description, source or product name and manufacturer, limitations and compliance with standards. Samples are submitted for review and confirmation of color, pattern, texture and “kind” by the Owner’s Representative. Owner’s Representative will note “test” samples, except as otherwise indicated, for other requirements, which are the exclusive responsibility of the Contractor.

4. Miscellaneous submittals related directly to the work (non-administrative) include warranties, maintenance agreements, workmanship bonds, project photographs, survey data and reports, physical work records, statements of applicability, quality testing and certifying reports, copies of industry standards, record drawings, field measurement data, operating and maintenance materials, overrun stock, security/protection/safety keys and similar information, devices and materials applicable to the work but not processed as shop drawings, product data or samples.

1.02 Specific Category Requirements

A. General: Except as otherwise indicated in the individual work sections, comply with general requirements specified herein for each indicated category of submittal. Submittals shall contain:

1. The date of submittal and the dates of any previous submittals.

2. The Project title.

3. Numerical submittal numbers, starting with 1.0, 2.0, etc. Revisions to be numbered 1.1, 1.2, etc.

4. The Names of:

   a. Contractor

   b. Supplier

   c. Manufacturer

5. Identification of the product, with the Specification Section number, permanent equipment tag numbers and applicable Drawing No.

6. Field dimensions, clearly identified as such.

7. Relation to adjacent or critical features of the work or materials.

8. Applicable standards, such as ASTM or Federal Specification numbers.

9. Notification to the Owner's Representative in writing, at time of submissions, of any deviations on the submittals from requirements of the Contract Documents.

10. Identification of revisions on resubmittals.

11. An 8 x 3-inch blank space for Contractor and Owner's Representative stamps.

12. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of products, field measurements and field construction criteria and coordination of the information within the submittal with requirements of the work and of Contract Documents.

13. Submittal sheets or drawings showing more than the particular item under consideration shall have all but the pertinent description of the item for which review is requested crossed out.

1.03 Routing of Submittals

A. Submittals and routine correspondence shall be routed as follows:

1. Supplier to Contractor (through representative if applicable)

2. Contractor to Owner's Representative

3. Owner's Representative to Contractor and Owner

4. Contractor to Supplier

Part 2 Products

NOTE:

All references to vendors and "approved manufacturers" are included for description of quality and content of the designated equipment/materials. Equivalent items may be accepted if they meet all standards of quality and purpose for the intended use, as determined by City of Sandy Springs.

2.01 Shop Drawings

A. Unless otherwise specifically directed by the Owner's Representative, make all shop drawings accurately to a scale sufficiently large to show all pertinent features of the item and its method of connection to the work.

B. Submit all shop drawings in the form of digital PDF.

2.02 Manufacturer's Literature

A. Where content of submitted literature from manufacturers includes data not pertinent to this submittal, clearly indicate which portion of the contents is being submitted for the Owner's Representative review.

B. Submit the number of copies which are required to be returned (not to exceed three) plus three copies which will be retained by the Owner's Representative.

2.03 Samples

A. Samples shall illustrate materials, equipment or workmanship and established standards by which completed work is judged.

B. Unless otherwise specifically directed by the Owner's Representative, all samples shall be of the precise article proposed to be furnished.

C. Submit all samples in the quantity which is required to be returned plus one sample which will be retained by the Owner's Representative.

2.04 Colors

A. Unless the precise color and pattern is specifically described in the Contract Documents, wherever a choice of color or pattern is available in a specified product, submit accurate color charts or sample "chips" and pattern charts to the Owner's Representative for review and selection.

B. Unless all available colors and patterns have identical costs and identical wearing capabilities, and are identically suited to the installation, completely describe the relative costs and capabilities of each.

Part 3 Execution

3.01 Contractor's Coordination of Submittals

A. Prior to submittal for the Owner's Representative review, the Contractor shall use all means necessary to fully coordinate all material, including the following procedures:

1. Determine and verify all field dimensions and conditions, catalog numbers and similar data.

2. Coordinate as required with all trades and all public agencies involved.

3. Submit a written statement of review and compliance with the requirements of all applicable technical Specifications as well as the requirements of this Section.

4. Clearly indicate in a letter or memorandum on the manufacturer's or fabricator's letterhead, all deviations from the Contract Documents.

B. Each and every copy of the shop drawings and data shall bear the Contractor's stamp showing that they have been so checked. Shop drawings submitted to the Owner's Representative without the Contractor's stamp will be returned to the Contractor for conformance with this requirement.

C. The Owner may backcharge the Contractor for costs associated with having to review a particular shop drawing, product data or sample more than two times to receive a "No Exceptions Taken" mark.

D. Grouping of Submittals

1. Unless otherwise specifically permitted by the Owner's Representative, make all submittals in groups containing all associated items.

2. No review will be given to partial submittals of shop drawings for items which interconnect and/or are interdependent. It is the Contractor's responsibility to assemble the shop drawings for all such interconnecting and/or interdependent items, check them and then make one submittal to the Owner's Representative along with Contractor's comments as to compliance, non-compliance or features requiring special attention.

E. Schedule of Submittals

1. Within 10 days of Contract award and prior to any shop drawing submittal, the Contractor shall submit a schedule showing the estimated date of submittal and the desired approval date for each shop drawing anticipated. A reasonable period shall be scheduled for review and comments. Time lost due to unacceptable submittals shall be the Contractor's responsibility. The schedule shall provide for submittal of items which relate to one another to be submitted concurrently.

3.02 Timing of Submittals

A. Make all submittals far enough in advance of scheduled dates for installation to provide all required time for reviews, for securing necessary approvals, for possible revision and resubmittal, and for placing orders and securing delivery.

B. In scheduling, allow sufficient time for the Owner's Representative review following the receipt of the submittal.

3.03 Reviewed Shop Drawings

A. Owner's Representative Review

1. Allow a minimum of 14 days for the Owner's Representative initial processing of each submittal requiring review and response, except allow longer periods where processing must be delayed for coordination with subsequent submittals. The Owner's Representative will advise the Contractor promptly when it is determined that a submittal being processed must be delayed for coordination. Allow a minimum of two weeks for reprocessing each submittal. Advise the Owner's Representative on each submittal as to whether processing time is critical to progress of the work, and therefore the work would be expedited if processing time could be foreshortened.

2. Acceptable submittals will be marked "No Exceptions Taken". A minimum of three copies will be retained by the Owner's Representative for Owner's Representative and the Owner's use and the remaining copies will be returned to the Contractor.

3. Submittals requiring minor corrections before the product is acceptable will be marked "Make Corrections Noted". The Contractor may order, fabricate and ship the items included in the submittals, provided the indicated corrections are made. Drawings must be resubmitted for review and marked "No Exceptions Taken" prior to installation or use of products.

4. Submittals marked "Amend and Resubmit" must be revised to reflect required changes and the initial review procedure repeated.

5. The "Rejected - See Remarks" notation is used to indicate products which are not acceptable. Upon return of a submittal so marked, the Contractor shall repeat the initial review procedure utilizing acceptable products.

6. Only two copies of items marked "Amend and Resubmit" and "Rejected - See Remarks" will be reviewed and marked. One copy will be retained by the Owner's Representative and the other copy with all remaining unmarked copies will be returned to the Contractor for resubmittal.

B. No work or products shall be installed without a drawing or submittal bearing the "No Exceptions Taken" notation. The Contractor shall maintain at the job site a complete set of shop drawings bearing the Owner's Representative stamp.

C. Substitutions: In the event the Contractor obtains the Owner's Representative approval for the use of products other than those which are listed first in the Contract Documents, the Contractor shall, at the Contractor's own expense and using methods approved by the Owner's Representative, make any changes to structures, piping and electrical work that may be necessary to accommodate these products.

D. Use of the "No Exceptions Taken" notation on shop drawings or other submittals is general and shall not relieve the Contractor of the responsibility of furnishing products of the proper dimension, size, quality, quantity, materials and all performance characteristics, to efficiently perform the requirements and intent of the Contract Documents. The Owner's Representative review shall not relieve the Contractor of responsibility for errors of any kind on the shop drawings. Review is intended only to assure conformance with the design concept of the Project and compliance with the information given in the Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site. The Contractor is also responsible for information that pertains solely to the fabrication processes or to the technique of construction and for the coordination of the work of all trades.

3.04 Resubmission Requirements

A. Shop Drawings

1. Revise initial Drawings as required and resubmit as specified for initial submittal, with the resubmittal number shown.

2. Indicate on Drawings all changes which have been made other than those requested by the Owner's Representative.

B. Project Data and Samples: Resubmit new data and samples as specified for initial submittal, with the resubmittal number shown.

END OF SECTION

Section 01 3330
Structural Submittals

Part 1 General

1.01 Section Includes

A. Structural submittals include shop drawings, design calculations, diagrams, illustrations, schedules, performance charts, nomenclature charts, samples, brochures and other data prepared by the Contractor or any subcontractor, manufacturer, supplier, fabricator, or distributor and which illustrate some portion of the Project.

1.02 Submittal Procedures

B. Submittals shall be accompanied by a transmittal letter with the following information:

1. Project name.

2. Contractor's name.

3. Date submitted.

4. Description of items submitted; identify work and product by Specification Section.

5. Number of drawings and other pertinent data.

C. Provide blank space on each submittal for the Design Professional's review stamp.

D. Contractor shall direct specific attention on the submittal to any deviation from the Contract Documents.

1.03 Contractor Responsibility

A. Contractor shall make all submittals in advance of installation or construction to allow the Design Professional sufficient time for review.

B. Contractor shall stamp and sign each sheet of shop drawings and product data, and sign or initial each sample to certify compliance with requirements of Contract Documents. SUBMITTALS RECEIVED WITHOUT THE CONTRACTOR'S STAMP OF REVIEW WILL BE RETURNED TO THE CONTRACTOR FOR REVIEW AND RESUBMITTAL.

C. Contractor shall understand that the submittal of the required documents does not constitute compliance with the requirements of the Contract Documents; only submittals reviewed by the Design Professional constitute compliance.

D. It is the Contractor's responsibility to furnish equipment, materials, and labor for the Project which meets the requirements of the codes and authorities quoted as well as the Contract Documents. Proprietary items specified herein only establish a minimum functional and aesthetic standard and it is incumbent upon the Contractor

to ascertain conformance of these proprietary items or any proposed substitution with the codes and authorities.

E. By reviewing, approving and submitting shop drawings, product data, or samples, Contractor thereby represents that he has determined and verified all field measurements, field construction criteria, materials, member sizes catalog numbers, and similar data and that he has checked and coordinated shop drawings with the requirements of the Project and of the Contract Documents.

F. Work requiring shop drawings, whether called for by the Contract Documents or requested by the Contractor, shall not commence until the submission has been reviewed by the Design Professional. Work may commence if the Contractor verifies the accuracy of the Design Professional's corrections and notations and complies with them without exception and without requesting change in Contract Sum or Contract Time.

1.04 Design Professional Review

A. Design Professional will review submittals with reasonable promptness.

B. Design Professional's review or corrections refer only to the general arrangement and conformance of the subject of the submittals with the design concept of the project and with the information given in the Contract Documents. Under no conditions should the Contractor consider the review to include the dimensions, quantities, and details of the items nor the approval of an assembly in which the item functions.

C. Design Professional's review shall not relieve the Contractor from responsibility for errors or omissions in the submittals.

D. Design Professional's review of submittals shall not relieve the Contractor of responsibility for any deviation from the requirements of the Contract Documents unless the Contractor has directed specific attention to the deviation at the time of submission and the Design Professional has given written approval to the specific deviation.

E. Design Professional's review of submittals shall not be construed as authorizing any change in the Contract Sum or Contract Time.

1.05 Shop Drawings

A. Present in a clear and thorough manner. Title each drawing with Project name and number; identify each element of drawings by reference to sheet number and detail of Contract Documents.

B. Reproduction of Structural Drawings for shop drawings is not permitted. Electronic drawing files will not be provided to the Contractor.

C. Identify field dimensions; show relationship to adjacent or critical features of Work or products.

D. A copy of the marked structural shop drawings with the Design Professional's review stamp is to be maintained at the job site.

1.06 Product Data

A. Submit only pages which are pertinent; mark each copy of standard printed data to identify pertinent products, referenced to Specification Section and Article number. Show reference standards, performance characteristics, and capacities; wiring and piping diagrams and controls; component parts; finishes; dimensions; and required clearances.

B. Modify manufacturer's standard schematic drawings and diagrams to supplement standard information and to provide information specifically applicable to the work. Delete information which is not applicable.

C. Provide manufacturer's preparation, assembly, and installation instructions.

1.07 Samples

A. Submit full range of manufacturer's standard finishes except where more restrictive requirements are specified, indicating colors, textures, and patterns.

B. Submit samples to illustrate functional characteristics of products, including parts and attachments as required by Design Professional.

C. Approved samples which are of proper size may be incorporated in Work.

D. Label each sample with identification.

E. Field Finishes: Provide full samples at Project, at location acceptable to Design Professional, as required by individual Specification Section. Install each sample complete and finished. Acceptable finishes in place may be retained in completed work.

1.08 Resubmittals

A. When submittals are returned to the Contractor with the Design Professional's corrections the Contractor shall make the required corrections. Upon request, resubmit one corrected set.

B. Contractor shall direct specific attention on the resubmittal to all revisions including those requested by the Design Professional on previous submission.

1.09 Distribution

A. Distribute reproductions of shop drawings, copies of product data, and samples which bear the Design Professional's review stamp to job site file, Record Documents file, subcontractors, suppliers, other affected contractors, and other entities requiring information.

B. Work shall be in accordance with and performed from the reviewed drawings.

Part 2 Products (Not Used)

Part 3 Execution (Not Used)

END OF SECTION

Section 01 4200
Codes and Standards

Part 1 General

1.01 Description

A. Whenever reference is made to conforming to the standards of any technical society, organization, body, code or standard, it shall be construed to mean the latest standard, code, specification or tentative specification adopted and published at the time of advertisement for Bids. This shall include the furnishing of materials, testing of materials, fabrication and installation practices. In those cases where the Contractor's quality standards establish more stringent quality requirements, the more stringent requirement shall prevail. Such standards are made a part hereof to the extent which is indicated or intended.

B. The inclusion of an organization under one category does not preclude that organization’s standards from applying to another category.

C. In addition, all work shall comply with the applicable requirements of local codes, utilities and other authorities having jurisdiction.

D. All material and equipment, for which a UL Standard, an AGA or NSF approval or an ASME requirement is established, shall be so approved and labeled or stamped. The label or stamp shall be conspicuous and not covered, painted, or otherwise obscured from visual inspection.

E. The standards which apply to this Project are not necessarily restricted to those organizations which are listed in Article 1.02.

1.02 Standard Organizations

A. Piping and Valves

ACPA	American Concrete Pipe Association
ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
AWWA	American Water Works Association
CISPI	Cast Iron Soil Pipe Institute
DIPRA	Ductile Iron Pipe Research Association
FCI	Fluid Controls Institute
MSS	Manufacturers Standardization Society
NCPI	National Clay Pipe Institute
NSF	National Sanitation Foundation
PPI	Plastic Pipe Institute
Uni-Bell	PVC Pipe Association

B. Materials

AASHTO	American Association of State Highway and Transportation Officials
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials

C. Painting and Surface Preparation

NACE	National Association of Corrosion Engineers
SSPC	Steel Structures Painting Council

D. Electrical and Instrumentation

AEIC	Association of Edison Illuminating Companies
AIEE	American Institute of Electrical Engineers
EIA	Electronic Industries Association
ICEA	Insulated Cable Engineers Association
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronic Engineers
IES	Illuminating Engineering Society
IPC	Institute of Printed Circuits
IPCEA	Insulated Power Cable Engineers Association
ISA	ISA – The Instrumentation, Systems, and Automation Society
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
REA	Rural Electrification Administration
TIA	Telecommunications Industries Association
UL	Underwriter's Laboratories
VRCI	Variable Resistive Components Institute

E. Aluminum

AA	Aluminum Association
AAMA	American Architectural Manufacturers Association

F. Steel and Concrete

ACI	American Concrete Institute
AISC	American Institute of Steel Construction, Inc.
AISI	American Iron and Steel Institute
CRSI	Concrete Reinforcing Steel Institute
NRMA	National Ready-Mix Association
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute

G. Welding

ASME	American Society of Mechanical Engineers
AWS	American Welding Society

H. Government and Technical Organizations

AIA	American Institute of Architects
APHA	American Public Health Association
APWA	American Public Works Association
ASA	American Standards Association
ASAE	American Society of Agricultural Engineers
ASCE	American Society of Civil Engineers
ASQC	American Society of Quality Control
ASSE	American Society of Sanitary Engineers
CFR	Code of Federal Regulations
CSI	Construction Specifications Institute
EDA	Economic Development Administration
EPA	Environmental Protection Agency
FCC	Federal Communications Commission
FmHA	Farmers Home Administration
FS	Federal Specifications
IAI	International Association of Identification
ISEA	Industrial Safety Equipment Association
ISO	International Organization for Standardization
ITE	Institute of Traffic Engineers
NBFU	National Board of Fire Underwriters
(NFPA)	National Fluid Power Association
NBS	National Bureau of Standards
NISO	National Information Standards Organization
OSHA	Occupational Safety and Health Administration
SI	Salt Institute
SPI	The Society of the Plastics Industry, Inc.
USDC	United States Department of Commerce
WEF	Water Environment Federation

I. General Building Construction

AHA	American Hardboard Association
AHAM	Association of Home Appliance Manufacturers
AITC	American Institute of Timber Construction
APA	American Parquet Association, Inc.
APA	American Plywood Association
BHMA	Builders Hardware Manufacturers Association
BIFMA	Business and Institutional Furniture Manufacturers Association
DHI	Door and Hardware Institute
FM	Factory Mutual Fire Insurance Company

HPMA	Hardwood Plywood Manufacturers Association
HTI	Hand Tools Institute
IME	Institute of Makers of Explosives
ISANTA	International Staple, Nail and Tool Association
ISDSI	Insulated Steel Door Systems Institute
IWS	Insect Screening Weavers Association
MBMA	Metal Building Manufacturers Association
NAAMM	National Association of Architectural Metal Manufacturers
NAGDM	National Association of Garage Door Manufacturers
NCCLS	National Committee for Clinical Laboratory Standards
NFPA	National Fire Protection Association
NFSA	National Fertilizer Solutions Association
NKCA	National Kitchen Cabinet Association
NWMA	National Woodwork Manufacturers Association
NWWDA	National Wood Window and Door Association
RMA	Rubber Manufacturers Association
SBC	SBCC Standard Building Code
SDI	Steel Door Institute
SIA	Scaffold Industry Association
SMA	Screen Manufacturers Association
SPRI	Single-Ply Roofing Institute
TCA	Tile Council of America
UBC	Uniform Building Code

J. Roadways

AREA	American Railway Engineering Association
DOT	Department of Transportation

K. Plumbing

AGA	American Gas Association
NSF	National Sanitation Foundation
PDI	Plumbing Drainage Institute
SPC	SBCC Standard Plumbing Code

L. Refrigeration, Heating, and Air Conditioning

AMCA	Air Movement and Control Association
ARI	American Refrigeration Institute
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
CGA	Compressed Gas Association
CTI	Cooling Tower Institute
HEI	Heat Exchange Institute
IIAR	International Institute of Ammonia Refrigeration
NB	National Board of Boilers and Pressure Vessel Inspectors

PFMA	Power Fan Manufacturers Association
SAE	Society of Automotive Engineers
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SMC	SBCC Standard Mechanical Code
TEMA	Tubular Exchangers Manufacturers Association

M. Equipment

AFBMA	Anti-Friction Bearing Manufacturers Association, Inc.
AGMA	American Gear Manufacturers Association
ALI	Automotive Lift Institute
CEMA	Conveyor Equipment Manufacturers Association
CMAA	Crane Manufacturers Association of America
DEMA	Diesel Engine Manufacturers Association
MMA	Monorail Manufacturers Association
OPEI	Outdoor Power Equipment Institute, Inc.
PTI	Power Tool Institute, Inc.
RIA	Robotic Industries Association
SAMA	Scientific Apparatus Makers Association

1.03 Symbols

A. Symbols and material legends shall be as scheduled on the Drawings.

Part 2 Products (Not Used)

Part 3 Execution (Not Used)

END OF SECTION

Section 01 4525
Structural Testing/Inspection Agency Services

Part 1 General

1.01 Section Includes

A. Section summarizes the responsibility of the Contractor and the Structural Testing/Inspection Agency in the performance of the testing/inspection specified in the Contract Documents.

B. Neither the observation of the Design Professional in the administration of the contract, nor tests/inspections by the Testing/Inspection Agency, nor approvals by persons other than the Design Professional shall relieve the Contractor from his obligation to perform the work in accordance with the Contract Documents.

1.02 Related Sections

A. Section 01 3330 - Structural Submittals.

1.03 References

A. ASTM D3740 - Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

B. ASTM E329 - Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction.

C. American Council of Independent Laboratories - Recommended Requirements for Independent Laboratories Qualifications.

1.04 Selection and Payment

A. Owner will employ and pay for the structural testing/inspection services that are required by the Contract Documents.

B. Contractor shall pay for any additional structural testing/inspection required for work or materials not complying with Contract Documents due to negligence or nonconformance.

C. Contractor shall pay for any additional structural testing/inspection required for his convenience.

D. Qualifications: Minimum Special Inspector qualifications shall be per Table 1704.2 of 2014 Georgia State Amendments to the International Building Code (2012 Edition).

1.05 Structural Testing/Inspection Requirement Summary

A. Specific structural testing/inspection requirements are given in the following specification sections:

Specification 31 2301 - Excavating, Backfilling, and Compacting for Structures

Part 2 Products (Not Used)

Part 3 Execution

3.01 Structural Preconstruction Meeting

A. A structural preconstruction meeting may be conducted at the construction site by the Design Professional to discuss quality issues. The parties involved may be the Design Professional, Contractor, Structural Testing/Inspection Agency, appropriate subcontractors, suppliers, and detailers.

3.02 Structural Testing/Inspection Agency's Responsibilities

A. Cooperate with the Contractor and provide timely service.

B. Upon arriving at the construction site, sign in and notify the Contractor of presence.

C. Select the representative samples that are to be tested/ inspected.

D. Perform tests/inspections as outlined in Contract Documents, the applicable codes, and as directed by the Design Professional.

E. Report work and materials not complying with Contract Documents immediately to the Contractor and Design Professional.

F. Leave copies of field notes with the Contractor prior to leaving the construction site. Field notes shall include the message given to the Contractor, date, time of message, name of Contractor's representative informed, type and location of work or materials tested/inspected, whether the work or materials complies with Contract Documents and name of the Structural Testing/Inspection Agency's representative.

G. Report and distribute results of tests/inspections promptly in the form of written reports as directed by the Design Professional.

H. Structural Testing/Inspection Agency shall not alter requirements of Contract Documents, approve or reject any portion of the work, or perform duties of the Contractor.

3.03 Contractor's Responsibilities

A. Provide copy of Contract Documents to the Structural Testing/Inspection Agency.

B. Arrange the preconstruction meeting to discuss quality issues.

C. Notify the Structural Testing/Inspection Agency sufficiently in advance of operations to allow assignment of personnel and scheduling of tests.

D. Cooperate with Structural Testing/Inspection Agency and provide access to work.

E. Provide samples of materials to be tested in required quantities.

F. Furnish copies of mill test reports when requested.

G. Provide storage space for Structural Testing/Inspection Agency's exclusive use, such as for storing and curing concrete testing samples.

H. Provide labor to assist the Structural Testing/Inspection Agency in performing tests/inspections.

END OF SECTION

Part 1 General

1.01 Scope

A. Temporary Construction Office

1. Provide:

a. Storage of materials and equipment.

2. Location must be approved by owner.

B. Temporary Storage Facilities

1. Each subcontractor shall provide for their own requirements to maintain covered, secure, and weatherproof areas for equipment or material storage.

2. Locate storage facilities where directed by Owner.

C. Sanitary Toilet Facilities

1. Provide and maintain temporary toilet facilities and enclosures for construction personnel.

2. Using permanent new facilities by personnel is prohibited.

3. Maintain in clean and sanitary condition.

D. Scaffolding: Type: Designed and installed by each Contractor or subcontractor for his own use for work during construction. Conform to special requirements of respective Contractor or subcontractor using scaffolding, applicable rules, and regulations of applicable building codes, and OSHA Standard 1926.451, Scaffolding, 1996 edition.

E. Progress Cleaning: Specified in Section 01 7400.

1.02 Temporary Controls

A. General: Follow requirements indicated in NFiPA 241-2000, *Safeguarding Construction, Alterations, and Demolition Operations.* Use requirements specified below if not at variance with this referenced document.

B. Barriers

1. Provide chainlink fence barriers to prevent unauthorized entry to construction areas and protect existing facilities and adjacent properties from construction

damage.

2. Provide protection to plant life designed to remain; replace damaged plant life with same type and size as damaged plant life.

3. Protect stored materials, site, and structures from damage.

C. Access Roads

1. Maintain circulation of traffic, both pedestrian and vehicular, and access to site by fire fighting, emergency, and police apparatus during construction.

2. Extend and relocate as construction activities progress; provide detours necessary for unimpeded traffic flow.

3. Provide and maintain access to fire hydrants, free of obstructions.

4. Provide means of removing mud from vehicle wheels before entering streets.

1.03 Relocation and Removal

A. Relocate temporary facilities and controls during construction required by progress of construction activities at no additional cost.

B. Removal

1. Remove temporary facilities and controls, including connections and debris resulting from temporary installation at construction activities completion, or at time of permanent utility connections, as applicable.

2. Clean and repair damage caused by installation or use of temporary facilities and controls.

Part 2 Products (Not Used)

Part 3 Execution (Not Used)

END OF SECTION

Section 01 5100
Erosion, Sedimentation and Pollution Controls

Part 1 General

1.01 Scope

A. The Work specified in this Section consists of furnishing, installing and maintaining temporary erosion controls and temporary sedimentation controls, and pollution controls (air, water, soil) as specified herein and as shown on Drawings. The work shall include all labor, equipment and materials, and performing all operations in connection with site preparation through final site stabilization.

B. Erosion and sediment control "Best Management Practices" shall be installed prior to land disturbing activities and concurrent land disturbing activities and shall be properly maintained until a permanent vegetative cover is provided on all disturbed areas. Contractor shall strictly adhere to Erosion, Sedimentation, and Pollution Control Plan.

C. Erosion control measures shall be maintained at all times. Added erosion and sedimentation control measures shall be installed if deemed necessary by on site inspections by the local governing authority.

D. Temporary erosion controls shall include grassing, mulching, watering, and reseeding onsite sloped surfaces, providing berms and/or ditches at the top of the slopes and providing interceptor ditches at the ends of berms and at those locations which will ensure that erosion during construction will be either eliminated or minimized. Contractor shall anticipate multiple temporary polyacrylamide (PAM), grassing and mulching applications to the construction site during the construction period.

E. Temporary sedimentation controls shall include silt dams, traps, barriers, and appurtenances (refer to ES&PCP) facilities, etc.

F. The Contractor is the “Operator” and along with the Owner, the Primary Permittee as defined in the Permit (see next sentence for definition of Permit). The Contractor is responsible for all daily, weekly, monthly or any other on-site inspections and maintenance of the Erosion, Sediment and Pollution Control measures as required by the Authorization To Discharge Under the National Pollutant Discharge Elimination System Storm Water Discharges Associated With Construction Activity for Stand Alone Construction Projects General Permit No. GAR 100001 (hereafter and above referred to as the Permit) as well as other specific responsibilities of the Permit including documentation of deficiencies and repairs of deficiencies. All such responsibilities of the Permit are hereby a part of Contractor’s work. All inspections shall be documented and copies of the documentation will be submitted to the Program Manager on a weekly basis. The contractor shall keep all records of inspections, repairs, maintenance, re-inspections and any other documentation required by the permit on site and available for review by the regulating authorities. Any punitive or other enforcement actions levied by any regulating authority for failure to comply with the permit are the responsibility of the Contractor and will be paid by the Contractor. All discharge sampling and reporting of sampling shall be the

responsibility of the Owner or the Owner's Testing Agency. Copies of the discharge sampling results will be provided to the contractor to incorporate into his jobsite documentation

1.02 Regulatory Requirements

A. The manual for Erosion and Sediment Control in Georgia, Fifth Edition, as published by the Georgia Soil and Water Conservation Commission, "Best Management Practices", shall apply to all land disturbing activities.

B. The State of Georgia Department of Natural Resources Environmental Protection Division "National Pollution Discharge Elimination System: General Permit No. GAR 100001" (NPDES GAR 100001), shall apply to all land disturbing activities for this Project.

1.03 Submittals

A. Schedule of Operations: Submit schedule of proposed operations conforming with the "Land Disturbance Activities Sequence" as delineated on the ES&PCP, including program for erosion control measures, logs, documentation, identified superintendent with required continuing education certification, maintenance of control facilities 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 sediment control measures.

B. Submit a sample of erosion control blanket material for all slope areas 3:1 and greater.

C. Submit a sample of erosion control blanket such as Bon Terra CSI, North American Green S75 or an approved equivalent for all slope areas which are three horizontal to one vertical (3:1) slopes and less.

D. Submit samples of anionic polyacrylamide (PAM) and PAM gel bars or logs.

1.04 Project Conditions

A. Furnish and install erosion control measures prior to or concurrent with any land disturbance activity. Contractor shall conform with the Land Disturbance Activities Sequence. Contractor shall protect the existing on-site lake from siltation and pollution trespass. Sediment trespass into lake shall be the Contractor's responsibility and said sediment shall be removed by the Contractor at no additional cost to the Owner.

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 erosion control measures until such time as permanent paving, planting and restoration of natural areas is effective in control of erosion from the site. Extent of erosion control construction shall be responsibility of Contractor.

D. Protect adjacent and downstream properties from any siltation or sedimentation from disturbed areas.

E. For disturbed areas left idle for fourteen calendar days, Contractor shall apply temporary grassing and mulch.

F. The Contractor is responsible for all quantities of soil erosion control measures regardless if shown on the Drawings. The extent of soil erosion control measures shown on the Drawings should be considered minimum.

1.05 Quality Criteria and Documentation

A. Procedures shall comply with "Manual for Erosion and Sediment Control in Georgia", Fifth Edition published by the Georgia Soil and Water Conservation Committee. In order to conform with the State of Georgia, Federal Clean Water Act, Contractor shall be required to file a "Notice of Intent" with the State's Environmental Protection Division (EPD) fourteen calendar days prior to land disturbance activities with both the Owner's signature and the Contractor's signature. Contractor will also be required to keep a log book on site documenting the Contractor's inspection of erosion control devices (minimum once/week and within 24 hours of any storm event of .5-inch or above) and noting any corrections or modifications. The Contractor shall document all rainfall events at the construction trailer within said logbook. This will be subject to review by the Georgia EPD. Contractor shall also file a "Notice of Termination" when the site is fully stabilized and all storm water discharge associated with the construction activity has ceased. The Contractor shall coordinate and assist the geotechnical testing firm with the required storm water monitoring requirement and maintain a logbook on site at all times with monitoring reports prepared by the geotechnical testing firm.

1.06 Protection of Adjacent Property and State Water Buffers

A. Adequately protect adjacent property including sidewalks, curbing, roadways, and all utilities therein. It shall be the Contractor's responsibility to restore to their original condition any damage to existing facilities resulting from the Contractor's activities.

B. When grading or clearing adjacent to property lines, mark all property lines between the Project and adjacent property owners to ensure no damage is done to adjacent property.

1.07 Protection of Existing Facilities

A. The Contractor shall be responsible for protection of all existing facilities which are to remain. Items included herein are existing pavements, water lines, sewer lines,

fences, drainage structures, survey monuments, power lines, telephone lines, etc. Contractor shall restore any damaged facilities due to construction activities, to their original condition at no additional cost to the Owner.

1.08 Protection of Existing Trees and Vegetation

A. Under no circumstances shall any vegetation be cut or otherwise damaged which has been shown on the Drawings to be saved, or marked by the Owner's Representative or Owner to be saved.

B. All trees and vegetation marked to be saved shall be protected by temporary barricades, be watered and maintained where necessary and replaced when damaged during construction. Root systems cut or damaged during construction shall be protected from additional damage and covered with soil as soon as possible.

1.09 Erosion, Sediment and Pollution Control Superintendent

A. Contractor shall provide a designated representative to remain on site during land disturbance activities with a minimum of five years experience in erosion, sediment and pollution control, along with erosion and sediment control continuing education credentials. Said representative shall oversee land disturbance operations with an emphasis on "being prepared" for rain events, through strict adherence to the land disturbance construction activities sequence, strict adherence to all "Best Management Practices" as defined in the "Manual for Erosion and Sediment Control in Georgia" and through proper earth shaping, terracing, berming, maximizing storm water travel lengths, minimizing storm water path slopes, immediate mulching, fertilizing, grassing, and site stabilization through every means possible. This designated representative shall be "Qualified Personnel" as defined by the NPDES GAR 100001 and shall be Level 1a and 1b trained in accordance with NPDES GAR 100001.

1.10 Hazardous Waste

A. All hazardous waste materials shall be disposed of in a manner specified by Georgia State Solid Management regulations. All personnel shall be informed and instructed regarding the correct procedure for waste disposal. Notices stating these procedures shall be posted in the construction office and the construction superintendent shall be responsible for ensuring that these procedures shall be followed.

1.11 Sanitary Waste

A. All sanitary waste shall be collected from the portable units, as necessary, by a Georgia State licensed sanitary waste management Contractor, or as required by local regulations.

1.12 Temporary Fueling Tank Area

A. Temporary fueling tanks shall have a Georgia E.P.D. approved secondary

containment (liner system) basin to prevent and/or minimize site contamination.

B. Temporary fueling tank locations shall be located remotely from drainage ways, drainage systems, and state waters (streams, springheads, etc.).

1.13 Equipment Maintenance Area

A. Equipment maintenance areas shall be clearly identified with signage. Said signage shall read as follows:

Equipment Maintenance Area Discharge of new or used oil, fuel, lubricants, etc., is prohibited. Utilize containment/capture systems. Recycle used oils, contaminated fuels and lubricants. Illegal discharges are subject to fines and penalties.

B. Sign shall be weather proof and have a minimum size of 36-inch x 36-inch.

C. Equipment Maintenance Area(s) shall be located remotely from drainage ways, drainage systems, and state waters (streams, springheads, etc.)

1.14 Storm Drain Inlet Labels

A. Storm Drain Inlet Labels - Storm structure tops shall be stenciled in accordance with detail provided in the Drawings. The stenciling shall be performed as the inlet tops are installed and within one week after any "pour in place" structure top.

1.15 Storm Water Runoff Quality Controls

A. The Contractor shall conform to the phasing, sequencing, installation, inspection, maintenance, and stabilization requirements of the approved "Erosion, Sedimentation, and Pollution Control Plan". The Contractor shall educate all construction personnel of the importance of limiting the area of construction disturbance through appropriate phasing and intermediate stabilization of areas that have reached appropriate grades. This includes installing perimeter areas of pavements and walks, proper and rapid seedbed preparation and installation of vegetation. The Contractor shall work diligently to develop a construction mindset with the on-site personnel, which shall focus on the daily reduction of exposed land disturbance. This shall improve storm water quality due to vegetative stabilization and also allows for more efficient construction activities during the winter "wet" season when pavement binder is in place for construction staging.

Part 2 Products

NOTE:

All references to vendors and "approved manufacturers" are included for description of quality and content of the designated equipment/materials. Equivalent items may be accepted if they meet all standards of quality and purpose for the intended use, as determined by City of Sandy Springs.

2.01 Temporary Grassing Materials

A. Lime: Lime shall be finely ground limestone (Dolomite) containing not less that 85% of total carbonates and shall be ground to such a fineness that 98% will pass through a 20-mesh sieve and not less that 70% will pass through a 100-mesh sieve.

B. Fertilizer: Fertilizer shall be complete commercial slow release fertilizer type formula complying with State and Federal fertilizer laws. The fertilizer shall be free-flowing for application with spreading equipment and delivered to the site in the original, unopened containers, which shall bear the manufacturer's certificate of compliance covering analysis. The Owner's Representative shall be furnished with duplicate copies of invoices for all fertilizer used on the Project. Fertilizer shall be the following:

1. 10-10-10; 10% Nitrogen (N), 10% Phosphorus (P), 10% Potassium (K).

2. Ammonia Nitrate

C. Grass Seed: Provide fresh, clean, new-crop seed complying with tolerance for purity and germination established by Official Seed Analysts of North America. Grass seed shall be labeled in accordance with U. S. Department of Agriculture Rules and Regulations under the Federal Seed Act in effect on the date of Invitation of Bids. Seed shall be furnished in sealed standard containers, unless exception is granted in writing by the Owner's Representative. Seed that has become wet, moldy, or otherwise damaged in transit or in storage will not be acceptable. Provide seed mixture composed of grass species, proportions and minimum percentages of purity, germination, and maximum percentage of weed seed, as specified.

1. Tall Fescue (Fescuta arundinacea). Seed: Fresh, clean new seed testing 98% for purity and 85% for germination.

2. Annual Ryegrass (Lolium temulentum). Seed: Fresh, clean, new seed testing 98% for purity and 85% for germination.

D. Water: Water used in this work shall be furnished by the Contractor and shall be suitable for irrigation and free from ingredients harmful to plant life. The Contractor shall furnish hose and other watering equipment required for the work, including water trucks and transport.

E. Hydromulch: Wood cellulose fiber containing no germination inhibiting or growth inhibiting agents. Characteristics shall be as follows:

1. Percent Moisture Content: 9.0% (+/- 3.0%).

2. Percent Organic Mater: 99.2% (+/- 0.8%).

3. Percent Ash Content: 0.8% (+/- .02%).

4. pH: 4.8 (+/- 0.5).

5. Water Holding Capacity: 150 grams water/100 grams fiber, minimum.

2.02 Rip Rap

A. Use only one method throughout the job.

B. Stone Rip Rap: Use sound, tough, durable stones resistant to the action of air and water. Slabby or shaley pieces will not be acceptable. Specific gravity shall be 2.0 or greater. Rip rap shall have less than 66 percent wear when tested in accordance with AASHTO T-96. Unless shown or specified otherwise, stone rip rap shall be Type 1 rip rap.

1. Type 1 Rip Rap: The largest pieces shall have a maximum volume of two cubic feet. At least 35 percent of the mass shall be comprised of pieces which weigh 125 pounds or more. The remainder shall be well graded down to the finest sizes. Rock fines shall comprise a maximum of 10 percent of the total mass. Rock fines are defined as material passing a No. 4 sieve. Rip rap size shall conform to Georgia Department of Transportation Section 805.01 Stone Dumped Rip Rap, Type 1.

C. Sand-Cement Bag Rip Rap

1. The bags shall be of cotton, burlap or fiber reinforced paper capable of containing the sand-cement mixture without leakage during handling and placing. Bags previously used for sugar or any other material which will adversely affect the sand-cement mixture shall not be used. Capacity shall be not less than 0.75 cubic foot, nor more than two cubic feet.

2. Sand and Portland cement shall be mixed at the maximum ratio of 5:1 by weight and shall obtain a minimum compressive strength of 500 psi in seven days. For sand-cement bag rip rap, the amount of water used shall be just enough to make up the optimum moisture content of the aggregate and cement, as determined by AASHTO T 134. When sand-cement rip rap is to be pre-bagged, the sand-cement shall be mixed dry, and after placing each course, the bags shall be wet until sufficient moisture is present for proper cement hydration.

2.03 Filter Fabric

A. Silt fence shall be GA DOT - Type "C", approved silt fence.

2.04 Filter Stone

A. Filter stone shall be crushed stone conforming to the Department of Transportation - State of Georgia - Standard Specifications - Construction of Roads and Bridges - 1993 - Table l800.01 H, Size as shown on details.

2.05 Erosion Control Blanket

A. Slopes > 3:1 (33% or greater)

1. Biodegradable netting impregnated with excelsior woodfiber such as manufactured by "Curlex"

2. "Ero-Mat" by Verdyol

3. "Bon Terra CS2"

4. Or approved equal

B. Slopes < 3:1 (33% or less)

1. "Bon Terra CS1"

2. North America Green S75

3. Or approved equal

2.06 Non-Woven Geotextile Fabric

A. Non-woven geotextile fabric shall be GEOTEX 1341 as manufactured by Synthetic Industries, Inc., or approved equal. Fabric shall be 12.5 oz. per square yard.

2.07 Polyacrylamide

A. Anionic Polyacrylamide shall be utilized on the Project in emulsion form and gel bars/logs.

Part 3 Execution

3.01 Erosion and Sedimentation Control

A. Land Disturbance Activity Sequence shall be adhered to by the Contractor.

B. Silt Fence: Trench six inch deep along silt fence line layout. Bury one foot of fabric as detailed. In areas of concentrated flow, install multiple rows of silt fence or brace with 4 x 4 timbers and hogwire. (Refer to GA D.O.T. Standard and Specifications, Section 171).

C. The Contractor shall provide erosion control check dams as shown and as per Georgia Department of Transportation Standards and Specifications, section 162.

D. Erosion and sedimentation controls shall be maintained in a condition which will retain unfiltered water.

E. The Contractor shall construct the sedimentation ponds and control devices prior to clearing and grubbing the site to ensure complete silt control.

F. When the silt or the debris level is greater than one foot above the bottom of the pond, the Contractor shall remove the silt or debris to restore the proper elevation for the bottom of the pond.

G. The Contractor shall have all erosion and sedimentation control devices in service and operating properly prior to completion and final acceptance of the Contract.

H. Responsibility: The Contractor shall be solely responsible for ensuring that no silt or debris leaves the immediate construction site. Any silt area disturbed shall be returned to its natural state as directed by the Owner's Representative at the Contractor's expense.

I. The Contractor has the option to submit additional control measures in the form of shop drawings.

J. Temporary seeding shall be provided for all exposed soil surfaces that are not to be fine graded or landscaped within 14 calendar days. The Contractor shall anticipate multiple temporary seeding applications during the Project construction period.

K. Temporary seeding shall be applied to any and all disturbed areas left idle for fourteen days and shall be applied no later than the 15th calendar day from last land disturbance activity (i.e. clearing, grubbing or grading).

L. Contractor shall provide temporary grassing and mulching for all disturbed areas within seven calendar days of reaching finished grades. Contractor shall reduce area of disturbance daily through use of temporary grassing and mulching.

3.02 Grading Operations

A. Grading Operations: Grading operations shall be scheduled so that the ground surface will be disturbed for the shortest possible time before permanent construction is installed. Large areas shall be maintained as flat as possible to minimize soil transport through surface flow. Contractor shall immediately install graded diversion channels, ditches, and berms to direct storm runoff to sediment and filtering basins. Contractor shall grade fill slopes in a manner which prevents surface areas from flowing over newly constructed fill slope areas through shaping and providing required temporary downlines or diversions to permanent storm structures as construction allows.

B. Storm Drainage System: As much of the permanent storm drainage system as

practical shall be initially installed and surface water diverted into the system. Contractor shall provide the required temporary inlet sediment traps immediately. Temporary inlet sediment traps shall be immediately installed, as base of structure is set and shall be adjusted up periodically as the grading operation raises the grades around the structure. The storm drainage system shall be completed as soon as conditions will allow.

1. Temporary sediment barriers shall be maintained around drainage structures until final subgrade preparation has begun.

C. Ground Cover

1. All exposed soil shall be protected by application of ground cover.

2. Ground cover may consist of any effective erosion preventative treatment such as straw or other mulches, planting, etc.

3. All grassing or planting operations shall include mulching as stabilization until ground cover by planting is effective.

3.03 Stabilization Practices

A. The Contractor shall be responsible for controlling soil erosion during all phases of construction, not only to preserve and protect slopes, drainage structures, pavement, and other facilities, but also to reduce potential sources of water pollution and damage to adjacent property.

B. Mulching: Contractor shall apply dry straw or hay and/or wood chip mulch to disturbed areas at a depth of two to three inches. Said mulch shall be uniformly applied by hand or mechanical equipment. Straw or hay mulch shall be pressed into the soil with a disk harrow with disk set straight or with special "Packer Disk". The edge of the disk should be dull enough not to cut the mulch but to press it into the soil leaving much of it in an erect position. Straw or hay mulch shall be anchored immediately after application.

C. Polyacrylamide (PAM): Contractor shall utilize anionic polyacrylamide as a temporary soil-binding agent to reduce soil erosion. PAM is available in emulsions, powders and gel bars or logs. PAM shall be utilized in conjunction with other "best management practices". PAM shall be utilized in direct soil surface applications where the timely establishment of vegetation is not feasible (including building pad and parking lot areas). PAM shall be applied in conjunction with temporary seeding efforts or as a separate hydro spray application. The maximum application of PAM, in pure form, shall not exceed 200 pounds/acre/year. Contractor shall install a PAM gel bar or log in each storm structure (secured with rope) and replace at the manufacturers recommended interval. Contractor shall apply PAM via hydrospreader to all disturbed areas per manufacturer’s recommendations. Do not mechanically disturb areas after application. Provide written dated certification of each application indicating square footages that were treated.

D. Temporary Stabilization: Topsoil stockpiles and disturbed areas of the site, where construction activity has ceased for at least fourteen calendar days, shall be stabilized with temporary seeding and/or mulch.

E. Lime and Fertilizer Rates: Lime shall be applied at a rate of one ton per acre and commercial fertilizer 6-12-12 shall be applied at the rate to 500 to 700 pounds per acre to disturbed areas being prepared for planting.

F. Seed Bed Preparation for Temporary Vegetation: 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 that will interfere with the work. Remove all stones two inches and larger in any given dimension.

G. Planting of Temporary Vegetation (Hydroseeding): Disturbed areas shall be seeded with Tall Fescue or Annual Ryegrass. Apply Tall Fescue at the rate of fifty pounds per acre. Apply Annual Ryegrass at a rate of forty pounds per acre. Disturbed areas shall be planted with a hydro-seeder after areas have been prepared for seeding, unless plans show otherwise. Existing trees and shrubs in hydro-seeded area shall be protected during Hydroseeding. Apply seed, fertilizer, lime, and fiber in one application. Temporary vegetative cover shall be maintained by the Contractor until the permanent lawn season, at which time the tall fescue or annual ryegrass shall be mowed down to the ground surface, the lawn area disc harrowed, the soil prepared for planting lawns and the permanent lawn planted or sodded as called for on the Plans. (Refer to Section 32 9000 – Landscape Materials).

H. Planting Seasons:

*Denotes optimum Planting Season

Tall Fescue: August 15 - November 1 (*September 1 - October 15).

Annual Ryegrass: August 1 - April 15 (*September 1 - December 10).

I. Reseeding: Reseed and provide straw cover for bare areas one square foot and larger to establish and maintain vegetative cover and to prevent sheet and rill erosion. Repair erosion damage as required and reseed.

J. Matting and Mulching: All seeding shall be covered with matting and/or mulch. After seeding, all slopes that exceed three feet (H): one foot (V) shall be covered with erosion control matting and/or blankets. The mats and/or blankets shall be installed as per the manufacturer's recommendations and Specifications using the recommended fastening hardware. Remaining seeded areas shall be covered with straw of hay spread at the rate of approximately two tons/acre or wood cellulose fiber applied at the rate of approximately 1,500 lbs/acre. Areas of the site that are to be paved shall be stabilized through the proper compaction of the soil and placement of a graded, stone aggregate base.

K. Rolling: Roll all seeded areas with roller weighting 60 to 90 pounds per linear foot of

roller before applying mulch. On steep slopes cover seeds by dragging spiked chains or similar methods.

L. Watering: Provide watering as required to establish and maintain healthy vegetative cover within local restrictions as applicable.

M. Permanent Stabilization: Disturbed areas of the site where finished grade has been achieved, and construction activity has ceased for at least fourteen calendar days, shall be stabilized with season dependent permanent seeding. The permanent seed mixture shall consist of ten pounds per acre of Hulled Sierra Bermuda Grass, and ten pounds per acre of Un-hulled Sierra Bermuda Grass. The seed mixture shall be hydro-seeded with a tank mixture of Polyacrylomide (PAM) and a tackifier. Polyacrylomide (PAM) application shall not exceed the rate as outlined in the "Manual for Erosion and Sediment Control in Georgia", Latest Edition. Per acre, shall be applied to the disturbed areas. After seeding, all slopes that exceed three feet (H): one foot (V) shall be covered with erosion control matting and/or blankets. The mats and/or blankets shall be installed as per the manufacturer's recommendations and Specifications using the recommended fastening hardware.

N. The Contractor shall be responsible for completing all permanent erosion control features at the earliest practical time. Temporary measures shall be used until permanent measures are completed.

O. Where erosion control facilities have been constructed, the Contractor shall maintain and restore such facilities as necessary to ensure proper functioning. After construction has been completed; remove sediment from erosion control facilities and grade the areas.

P. It shall be the Contractor's responsibility to maintain all access to the site in such manner as to prevent mud from washing or being tracked onto existing pavements. The Contractor shall provide a temporary hose bib system to wash truck tires or provide a water truck with a pressure hose for wash down of trucks and equipment entering the public right-of-way as necessary.

3.04 Structural Practices

A. Temporary Construction Entrance: A stabilized, stone aggregate construction entrance shall be constructed, as per the detail set forth in the Manual for Erosion and Sediment Control in Georgia, Latest Edition. The temporary construction entrance shall reduce vehicle tracking of sediments. Outgoing trucks shall have the tires washed prior to exiting the site onto any public street or right-of-way. Any mud, dirt, or rock that is tracked onto public streets shall be swept immediately and material placed within the perimeter controls.

B. Sediment Basins: Temporary sediment basins shall be constructed to contain and filter sixty-seven cubic yards of sediment per disturbed acre within that drainage basin. The temporary sediment basin shall be constructed as per the approved Erosion, Sedimentation, and Pollution Control Plan(s) and Details and as per the details(s) set forth in the Manual for Erosion and Sediment Control in Georgia, Latest

Edition.

C. Silt Barriers: A single row of GA DOT Type "C" silt fence shall be installed along the toe of all downstream slopes and a double row of Type "C" silt fence shall be installed adjacent to all state waters buffers, as pr the Manual for Erosion and Sediment Control in Georgia, Latest Edition.

D. Temporary Diversion Berms/Dikes: Temporary diversion berms/dikes shall be constructed as per the approved Erosion, Sedimentation, and Pollution Control Plan. The diversions shall be minimum six feet wide and shall be raised each day with finish grade during grading activities. The diversions shall be constructed to intercept and redirect runoff to the temporary sediment basin(s) and/or temporary storm drainage structure sediment inlet traps prior to the runoff reaching the perimeter sediment controls.

3.05 Dust Control

A. The Contractor shall keep airborne dust to a minimum by using water sprinkling or tossing and/or other suitable means to limit dust and dirt from rising and scattering in the air. Contractor shall water all disturbed earth no later than five days from last rain or last watering.

3.06 Pollution and Spill Prevention

A. The Contractor shall make every effort to control both air and water pollution. No tires, oils, asphalt, paint, or coated metals are permitted in combustible waste piles. Pollutants such as fuels, lubricants, bitumens, raw sewage, and other harmful materials will not be discharged into or near rivers, streams, or man-made channels. Equipment maintenance shall be performed with containment and capture of used oil. Contractor shall not pour or drain used lubricants or other necessary mechanical fluids onto the ground. Remove from site and deliver to a recycling center.

B. Material Management Practices: The following material management practices shall be used to reduce the risk of spills or other accidental exposure of materials and substances to storm water runoff. The Contractor shall follow good housekeeping practices onsite during the construction Project.

1. An effort shall be made to store only enough products required to do the job.

2. All materials stored onsite shall be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure.

3. Products shall be kept in their original containers with the original manufacturer's label.

4. Substances shall not be mixed with one another unless recommended by the manufacturer.

5. Whenever possible, all of product shall be used up before disposing of the

container.

6. Manufacturer's recommendations for proper use and disposal shall be followed.

7. The site Superintendent shall inspect daily to ensure proper use and disposal of materials onsite.

C. Hazardous Products: The Contractor shall use the following practices to reduce the risks associated with hazardous materials.

1. Products shall be kept in original containers unless they are not resealable.

2. Original labels and material safety data shall be retained with the product by the General Contractor. They contain important product information.

3. Surplus products shall be disposed of following and in conformance with local and State recommended methods.

D. Product Specific Practice: The following specific practices shall be followed for products stored on-site:

1. Petroleum Products: All onsite vehicles shall be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage. Petroleum products shall be stored in tightly sealed containers that shall be clearly labeled and stored in a clearly identified area. Any asphalt substances used onsite shall be applied according to the manufacturer's recommendations.

2. Fertilizers: Fertilizers used shall be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer shall be worked into the soil to limit the exposure to stormwater. Any fertilizers that are to be stored onsite shall be stored in a protected, securable enclosure. The contents of any partially used bags of fertilizers shall be transferred to a clearly labeled sealable plastic container to avoid spills.

3. Paints: All containers shall be tightly sealed and stored when not required for use. Excess paint shall not be discharged to the storm sewer system but shall be properly disposed of according to local and state regulations.

4. Concrete: Concrete trucks shall be allowed to wash out, discharge, and drum wash only at the identified equipment maintenance area(s). Maintenance areas shall be equipped with a discharge containment area (e.g., earth berms surrounding area). The containment area shall be cleaned up and removed from the site upon completion of concrete installation work.

E. Spill Prevention and Cleanup: The following practices shall be followed for spill prevention and cleanup:

1. Local, state, and Manufacturer's recommended methods for spill cleanup shall be clearly posted and site personnel shall be made aware of the procedures

and the location of the information and cleanup supplies.

2. Materials and equipment necessary for spill cleanup shall be kept in the material storage area onsite. Equipment and materials shall include but not be limited to brooms, dustpans, mops, rags, gloves, goggles, respirators, cat litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.

3. All spills shall be cleaned up immediately upon discovery.

4. The spill area shall be kept well ventilated and personnel shall wear the appropriate protective clothing to prevent injury from contract with a hazardous substance.

5. Spills of toxic or hazardous material shall be reported to the appropriate local or State government agency, regardless of size.

6. The spill prevention plan shall be adjusted to include measures to prevent this type of spill from reoccurring and how to clean up the spill if there is another one. A description of the spill, what caused it, and the cleanup measure shall also be included.

7. The General Contractor shall be responsible for assigning personnel to be responsible for spill prevention and cleanup coordination. The General Contractor shall designate, at a minimum, three site personnel to receive spill prevention and cleanup training. These individuals shall each become responsible for a particular phase of prevention and cleanup. The names of responsible spill personnel shall be posted in the material storage area and in the onsite construction office.

3.07 Maintenance

A. Inspect slope protection and erosion control elements after each rainfall. Clear all debris and accumulated sediment from behind barriers when one third full so their functional capacity is not reduced during the construction period.

3.08 Removal of Temporary Erosion Control Devices

A. As soon as permanent vegetative cover is established and accepted by the City, Contractor shall remove temporary devices, including sediment barriers, berms, silt traps, and similar devices. Contractor to remove retrofit structure and clean out all accumulated silt and debris in detention ponds to finished grades indicated on the Drawings.

B. Remove all debris resulting from temporary erosion control from Project site.

END OF SECTION

Section 01 6600
Storage and Protection

Part 1 General

1.01 Scope

A. The work under this Section includes, but is not necessarily limited to, the furnishing of all labor, tools and materials necessary to properly store and protect all materials, equipment, products and the like, as necessary for the proper and complete performance of the work.

1.02 Storage and Protection

A. Storage

1. Maintain ample way for foot traffic at all times, except as otherwise approved by the Engineer.

2. All property damaged by reason of storing of material shall be properly replaced at no additional cost to the Owner.

3. Packaged materials shall be delivered in original unopened containers and so stored until ready for use.

4. All materials shall meet the requirements of these Specifications at the time that they are used in the work.

5. Store products in accordance with manufacturer's instructions.

B. Protection

1. Use all means necessary to protect the materials, equipment and products of every section before, during and after installation and to protect the installed work and materials of all other trades.

2. All materials shall be delivered, stored and handled to prevent the inclusion of foreign materials and damage by water, breakage, vandalism or other causes.

3. Substantially constructed weathertight storage sheds, with raised floors, shall be provided and maintained as may be required to adequately protect those materials and products stored on the site which may require protection from damage by the elements.

C. Replacements: In the event of damage, immediately make all repairs and replacements necessary for the approval of the Engineer and at no additional cost to the Owner.

D. Equipment and products stored outdoors shall be supported above the ground on suitable wooden blocks or braces arranged to prevent excessive deflection or bending between supports. Items such as pipe, structural steel and sheet construction products shall be stored with one end elevated to facilitate drainage.

E. Unless otherwise permitted in writing by the Engineer, building products and materials such as cement, grout, plaster, gypsumboard, particleboard, resilient flooring, acoustical tile, paneling, finish lumber, insulation, wiring, etc., shall be stored indoors in a dry location. Building products such as rough lumber, plywood, concrete block and structural tile may be stored outdoors under a properly secured waterproof covering.

F. Tarps and other coverings shall be supported above the stored equipment or materials on wooden strips to provide ventilation under the cover and minimize condensation. Tarps and covers shall be arranged to prevent ponding of water.

1.03 Extended Storage

A. In the event that certain items of major equipment such as air compressors, pumps and mechanical aerators have to be stored for an extended period of time, the Contractor shall provide satisfactory long-term storage facilities which are acceptable to the Engineer. The Contractor shall provide all special packaging, protective coverings, protective coatings, power, nitrogen purge, desiccants, lubricants and exercising necessary or recommended by the manufacturer to properly maintain and protect the equipment during the period of extended storage.

1.04 Owner Furnished Equipment

A. The Contractor shall provide storage and protection for all Owner furnished equipment and materials, including extended storage as specified above.

Part 2 Products (Not Used)

Part 3 Execution (Not Used)

END OF SECTION

Section 01 7123
Construction Staking

Part 1 General

1.01 Scope

A. Construction staking shall include all of the surveying work required to layout the work and control the location of the finished Project. The Contractor shall have the full responsibility for constructing the Project to the correct horizontal and vertical alignment, as shown on the Drawings, as specified, or as ordered by the Engineer. The Contractor shall assume all costs associated with rectifying work constructed in the wrong location.

B. From the information shown on the Drawings and the information to be provided as indicated under Project Conditions below, the Contractor shall:

1. Be responsible for setting reference points and/or offsets, establishment of baselines, and all other layout, staking, and all other surveying required for the construction of the Project.

2. Safeguard all reference points, stakes, grade marks, horizontal and vertical control points, and shall bear the cost of re-establishing same if disturbed.

3. Stake out the permanent and temporary easements or the limits of construction to ensure that the Work is not deviating from the indicated limits.

4. Be responsible for all damage done to reference points, baselines, center lines and temporary bench marks, and shall be responsible for the cost of re-establishment of reference points, baselines, center lines and temporary bench marks as a result of the operations.

C. Baselines shall be defined as the line to which the location of the work is referenced, i.e., edge of pavement, road centerline, property line, right-of-way or survey line.

1.02 Project Conditions

A. The Drawings provide the location and/or coordinates of principal components of the Project. The alignment of some components of the Project may be indicated in the Specifications. The Engineer may order changes to the location of some of the components of the Project or provide clarification to questions regarding the correct alignment.

1.03 Quality Assurance

A. The Contractor shall furnish documentation, prepared by a surveyor currently registered in the State in which the Project is located, confirming that staking is being done to the horizontal and vertical alignment shown in the Contract Documents. This

requires that the Contractor hire, at the Contractor's own expense, a currently registered surveyor, acceptable to the Owner, to provide ongoing construction staking or confirmation of such.

B. Any deviations from the Drawings shall be confirmed by the Engineer prior to construction of that portion of the Project.

1.04 Site Work

A. Staking Precision: The precision of construction staking shall match the precision of a component's location indicated on the Drawings. Staking of utilities shall be done in accordance with generally accepted practice for the type of utility.

B. Cut Sheets

1. Cut sheets shall be prepared by the Contractor and shall be utilized for basis of payment and for confirming that the profile is as shown on the Drawings.

2. The survey, from which cut sheets are prepared, may be performed prior to or after clearing and grubbing operations. Using the elevation of the bench mark shown, the surveyor shall obtain an elevation on every other bench mark shown on the Drawings and provide this information to the Engineer.

3. No installation of the sewer shall commence prior to approval of the cut sheets.

4. Submittal of cut sheets shall be in accordance with Section 01 3323 of these Specifications.

5. Cut sheets shall provide the station (to the nearest 1 foot) and the elevation (to the nearest 0.1 foot) at maximum 100 foot intervals, plus at each change in slope of the ground and at each manhole centerline. The cut sheet shall also show the invert elevation of the sewer at the corresponding sewer station. From a straight line interpolation of the data, the Contractor shall calculate and record the station of each point where there is a change in the cut brackets indicated on the Bid form. The Contractor shall calculate and record the length of the sewer between each change in cut bracket. The Contractor shall also indicate the pipe material and class as well as the type of bedding. The slope of the sewer shall also be indicated between manholes. At least one offset hub shall be provided at each manhole. Its elevation and the resulting cut from the hub to the manhole invert shall also be shown on the cut sheets.

Part 2 Products (Not Used)

Part 3 Execution (Not Used)

END OF SECTION

Section 01 7400
Cleaning

Part 1 General

1.01 Scope

A. This Section covers the general cleaning which the Contractor shall be required to perform both during construction and before final acceptance of the Project unless otherwise shown on the Drawings or specified elsewhere in these Specifications.

1.02 Quality Assurance

A. Daily, and more often if necessary, conduct inspections verifying that requirements of cleanliness are being met.

B. In addition to the standards described in this Section, comply with all pertinent requirements of governmental agencies having jurisdiction.

1.03 Waste Materials

A. The Contractor shall handle hazardous waste and materials in accordance with applicable local, state, and federal regulations. Waste shall also be disposed of in approved landfills as applicable.

B. The Contractor shall prevent accumulation of wastes which create hazardous conditions.

C. Burning or burying rubbish and waste materials on the site shall not be allowed.

D. Disposal of hazardous wastes or materials into sanitary or storm sewers shall not be allowed.

E. Store volatile waste in covered metal containers. Remove from Project site daily.

1. Allow no volatile wastes to accumulate on Project site.

2. Provide adequate ventilation during use of volatile substances.

F. Do not burn or bury waste materials or rubbish on Project site. Comply with governmental and environmental regulatory requirements for disposal of waste.

G. Dispose of no volatile wastes such as mineral spirits, oil or paint thinner in storm or sanitary drains, on pavements, in gutters, or on Project site.

H. Dispose of no waste or cleaning materials containing materials harmful to plant growth on Project site. As quickly as possible, clean up materials which are accidentally spilled.

I. Graffiti or other distasteful comments or illustrations authored on any building materials used on Project is prohibited. Monitor Project for violations of this criteria, and, if found, take appropriate action immediately to cover, clean, or replace defaced materials.

1.04 Disposal of Surplus Materials

A. Unless otherwise shown on the Drawings, specified or directed, the Contractor shall legally dispose off the site all surplus materials and equipment from demolition and shall provide suitable off-site disposal site, or utilize a site designated by the Owner.

1.05 Cleaning Materials and Equipment

A. Provide all required personnel, equipment and materials needed to maintain the specified standard of cleanliness.

1.06 Compatibility

A. Use only the cleaning materials, methods and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material or as approved by the Owner's Representative.

1.07 Progress Cleaning

A. General

1. Do not allow the accumulation of scrap, debris, waste material and other items not required for construction of this work.

2. At least each week, and more often if necessary, completely remove all scrap, debris and waste material from the job site.

3. Provide adequate storage for all items awaiting removal from the job site, observing all requirements for fire protection and protection of the environment.

B. Site

1. Daily, and more often if necessary, inspect the site and pick up all scrap, debris and waste material. Remove all such items to the place designated for their storage.

2. Restack materials stored on site weekly.

3. At all times maintain the site in a safe, neat and orderly condition which meets the approval of the Owner's Representative.

C. Structures

1. Weekly, and more often if necessary, inspect the structures and pick up all scrap, debris and waste material. Remove all such items to the place designated for their storage.

2. Weekly, and more often if necessary, sweep all interior spaces clean. “Clean”, for the purpose of this subparagraph, shall be interpreted as meaning free from dust and other material capable of being removed by using a hand-held broom.

3. As required preparatory to installation of successive materials, clean the structures or pertinent portions as recommended by the manufacturer of the successive material.

4. Schedule cleaning operation so that dust and other contaminants resulting from cleaning operations will not fall on wet, recently painted surfaces.

1.08 Final Cleaning

A. Definitions: Unless otherwise specifically specified, “clean” for the purpose of this Article shall be interpreted as the level of cleanliness generally provided by commercial building maintenance subcontractors using commercial quality building maintenance equipment and materials.

B. General: Prior to completion of the work, remove from the job site all tools, surplus materials, equipment, scrap, debris and waste.

C. Site: Unless otherwise specifically directed by the Owner’s Representative, hose down all paved areas on the site and all public sidewalks directly adjacent to the site; rake clean other surfaces of the grounds. Completely remove all resultant debris.

D. Structures:

1. Remove all traces of soil, waste material, splashed material, and other foreign matter to provide a uniform degree of exterior cleanliness. Visually inspect all exterior surfaces and remove all traces of soil, waste material, and other foreign matter. Remove all traces of splashed materials from adjacent surfaces. If necessary to achieve a uniform degree of exterior cleanliness, hose down the exterior of the structure. In the event of stubborn stains not removable with water, the Owner’s Representative may require light sandblasting or other cleaning at no additional cost to the Owner.

2. Visually inspect all interior surfaces and remove all traces of soil, waste material, smudges, and other foreign matter. Remove all paint droppings, spots, stains and dirt from finished surfaces.

3. Polish all surfaces requiring the routine application of buffed polish. Provide and apply polish as recommended by the manufacturer of the material being

polished.

E. Post-Construction Cleanup: All evidence of temporary construction facilities, haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, or any other evidence of construction, as directed by the Owner's Representative.

F. Restoration of Landscape Damage: Any landscape feature damaged by the Contractor shall be restored as nearly as possible to its original condition at the Contractor's expense. The Owner's Representative will decide what method of restoration shall be used.

G. Timing: Schedule final cleaning as approved by the Owner's Representative to enable the Owner to accept the Project.

H. Clean all finished surfaces in accord with manufacturer's product data and requirements specified in trade sections, prior to Date of Substantial Completion. All general and specific cleaning shall be performed prior to Contractor's request that the Project or portion thereof be inspected for Final Certification.

I. Remove dust, debris, oils, stains, fingerprints, and labels from exposed interior and exterior finish surfaces, including glazing materials.

J. Repair, patch, and touch-up marred surfaces to match adjacent finishes. Replace materials which cannot be repaired or patched.

K. Clean disturbed areas of Project site of debris:

1. Broom-clean paved surfaces. Remove oil and similar deleterious substances.

2. Remove debris from grassed and landscaped areas and from undisturbed areas.

L. All exposed exterior concrete shall be cleaned by appropriate methods (pressure washed) to remove oil stains, including but not limited to mud stains.

1.09 Cleaning During Owner's Occupancy

A. Should the Owner occupy the work or any portion thereof prior to its completion by the Contractor and acceptance by the Owner, responsibilities for interim and final cleaning of the occupied spaces shall be as determined by the Owner's Representative in accordance with the Supplementary Conditions of the Contract Documents.

Part 2 Products (Not Used)

Part 3 Execution (Not Used)

END OF SECTION

Section 01 7836
Warranties and Bonds

Part 1 General

1.01 Description

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

B. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties:

1. Refer to the General Conditions Section of the Specifications.

2. Refer to the Special Provisions Section of the Specifications.

3. Refer to the Construction Drawings.

4. All conditions of this Section shall also apply to warranties stated in supporting Specification Sections.

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

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

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

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

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

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

1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

2. Where the Contract Documents require a special warranty, or similar commitment, the Owner reserves the right to refuse to accept the work, until the Contractor presents evidence that entities required to countersign such commitments are willing to do so.

H. Submit written warranties to the Owner's Representative prior to the date certified for Substantial Completion. If the Owner's Representative Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion, Contractor shall submit written warranties to the Owner's Representative.

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, the Contractor shall submit properly executed warranties to the Owner's Representative 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, the Contractor shall prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner's Representative, for approval prior to final execution.

1. Refer to Divisions 1 through 32 Sections for requirements for submitting special warranties.

J. Contractor shall bind warranties and bonds in heavy-duty, 2-inch, 3-ring binders, sized to receive 8 by 10-inch documents.

1. Provide dividers with covered tabs for each 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". Include project name, location, and name of the Contractor in the title information.

3. When warranted construction requires operation and maintenance manuals, Contractor shall provide three additional copies of each required warranty for inclusion in each O & M Manual.

Part 2 Products (Not Used)

Part 3 Execution

3.01 General

A. List of Warranties: Refer to Construction Drawings and Specifications.

B. Schedule: Provide warranties on products and installations as required in the Contract Documents.

END OF SECTION

Section 01 7839
Closeout Submittals

Part 1 General

1.01 Scope

A. Closeout includes general requirements in preparation for Final Completion and Final Payment. Closeout is directly related to “Final Certification” and may be a single time period for entire work or a series of time periods for parts of the work accepted as substantially complete.

1.02 Prerequisites to Substantial Completion

A. Prior to requesting Substantial Completion, complete the following and list all known exceptions.

1. If Final Certification is being requested for a portion of the work, define such portion.

2. Submit Application for Payment:

   a. Submit sworn statement indicating 100 percent completion of the work claimed as complete.

   b. List incomplete items, value of incomplete work, and reasons for being incomplete.

   c. Include documentation for completion.

3. Indicate accounting changes to Contract Sum.

4. Submit for that portion of the work:

   a. Specific Warranties.

   b. Workmanship/maintenance bonds.

   c. Maintenance agreements.

   d. Final certifications.

   e. Record drawings.

   f. Maintenance manuals.

   g. Project photographs, if pertinent to Project activities.

   h. Damage or settlement survey.

5. Obtain and submit releases enabling:

    a. Owner's use of the work.

    b. Access to services and utilities.

    c. Occupancy permits.

    d. Operating certificates.

6. Advise Owner of pending insurance change-over requirements.

7. Obtain and submit operating certificates, final inspection/test certificates, and similar releases enabling Owner's full and unrestricted use of the work and access to services and utilities.

8. Deliver tools, spare parts, extra stocks of materials, and similar physical items to Owner.

9. Touch-up and otherwise repair and restore marred exposed finishes.

B. Observation Procedures

1. Upon receipt of Contractor's request, Owner's Representative will either proceed observation or advise Contractor of prerequisites not fulfilled.

2. Following initial observation, Owner's Representative will either prepare Certificate of Final Certification or advise Contractor of work which must be performed prior to issuance of certificate.

3. Re-observe when requested and assured work has been substantially completed.

4. Results of completed observation will form initial "punch list" for final acceptance.

1.03 Prerequisites to Final Acceptance

A. General: Prior to requesting Owner's Representative's observation for certification of Final acceptance and Final payment, complete the following. List known exceptions.

1. Indicate accounting changes to Contract Sum.

2. Submit Final Application for Payment with:

    a. Final releases.

    b. Supporting documentation not previously submitted and accepted.

c. Certificates of insurance for Products and Completed Operations where required.

3. Submit copy of Owner's Representative's Final Punch List. Contractor shall certify each item has been completed or resolved for acceptance.

4. Submit final meter readings for utilities.

5. Submit:

a. Specific warranties, workmanship/maintenance bonds, maintenance agreements, final certifications, and similar documents not submitted at time of Substantial Completion.

b. Record drawings and maintenance manuals not submitted at time of Substantial Completion.

c. Final Project photographs.

6. Submit consent of surety.

7. Finishes manuals, provide three copies:

a. Assemble manuals bound in hard cover binders, presenting for Owner's guidance full details of all finish materials used in the building including care and maintenance.

b. Include a list of all finishes and their product names, numbers, colors, and cleaning and maintenance data. Include a list of installers and service representatives with company names and addresses, names of individual contacts, and telephone numbers.

c. Submit documents in suitable transfer cases indexed and marked for each division of the work.

8. Submit executed contracts for extended maintenance or service required by the Contract Documents to Owner's Representative for transfer to Owner.

9. Revise and submit evidence of final (continuing) requirements.

10. Complete final clean-up.

11. Place legal advertisements in newspaper(s) in compliance with state law.

B. Re-observance Procedure:

1. Upon receipt of Contractor's notice that work has been completed, including punch list items and excepting incomplete items delayed because of acceptable circumstances, Owner's Representative will observe work.

2. Upon completion of observation, Owner's Representative will either prepare

certificates of Final Certification or advise Contractor of work not completed or obligations not fulfilled.

3. If necessary procedure will be repeated.

1.04 Record Document Submittals

A. General

1. Furnish three complete sets of required documents.

2. Do not use required documents for construction purposes.

3. Protect from deterioration and loss in a secure fire resistive location.

B. Record Drawings

C. As-Built Drawings – Utilities and Storm Drainage:

1. As-built record drawings are to be prepared by the Contractor and submitted to the Engineer to incorporate into CAD. At Project closeout, submit record drawings of the final utilities and storm drainage installation. As-built drawings to be clearly and neatly drawn on a base of the original design. Submittals of approved as-built drawings will precede any application for final payment by the Contractor.

D. Record Project Manual

1. Maintain two copies of Project Manual, including addenda, Change Orders, and similar modifications.

2. Mark up variations occurring in actual work continually. Changes will be reviewed monthly for completeness and accuracy with the Application for Payment.

3. Record substitutions and selection of options.

4. Cross reference with other documents.

E. Record Product Data

1. Maintain two copies of each Product Data Submittal.

2. Mark up significant variations in the actual work. Include:

a. Variations in product as delivered to site.

b. Variations from manufacturer’s instructions and recommendations for installation.

3. Cross-reference with Change Orders and mark up record drawings and

Specifications.

F. Record Sample Submittal: Immediately prior to Substantial Completion, Owner's Representative will meet with Contractor at site, and determine which, if any, samples to be transmitted to Owner. Comply with Owner's Representative's instructions for packaging, identification marking, and delivery to Owner's sample storage place. Dispose of other samples.

G. Maintenance and Operating Manuals

1. Maintain three (3) copies of maintenance and operating information and organize into sets of manageable size. Manuals divisions shall match organization and location of Specification Sections indicated in Project Manual. In addition to hardcopies, contractor shall provide digital copies.

2. Bind into heavy duty 3-ring binders, minimum 2-inch size, permanently identified and indexed with thumb tabs, and provide in pdf format with separate file for each specific section. In addition to hardcopies, contractor shall provide digital copies.

3. Include:

a. Name of Project, nature of information, Contractor/subcontractor and name and address of local parts supplier and service organization.

b. Emergency instruction.

c. Spare parts or materials.

d. Warranties.

e. Wiring diagrams.

f. Recommend turn-around cycles.

g. Inspection procedures.

h. Applicable shop drawings.

i. Applicable product data.

j. Procedures for maintenance and cleaning of all flooring, cabinetry, counter surfaces and other materials used.

H. Miscellaneous Record Submittals

1. Refer to other Sections of these Specifications for requirements of miscellaneous record keeping and submittals in connection with performance of the work.

2. Immediately prior to Date(s) of Submittal Completion:

a. Complete miscellaneous records and place in good order.

b. Identify and bind or file.

c. Make ready for continued use and reference.

I. Inspection Reports: Submit certificates from applicable local governmental agencies that the construction has been inspected as required by laws or ordinances and that the building is approved for occupancy. In addition to hardcopies, contractor shall provide digital copies.

J. Warranties: In accord with Contract Conditions, provide warranties as follows:

1. Contractor shall furnish his warranty and shall require each subcontractor to furnish his warranty, in writing. Assemble, bind, label, and transmit warranties as required for other manuals above. Unless specifically indicated otherwise in individual Sections, the period for warranties shall begin on the Date of Substantial Completion and shall continue for one year. Warranties shall state the Date of Substantial Completion and the date on which the warranty expires. In addition to hardcopies, contractor shall provide digital copies.

2. Contractor shall forward manufacturers' and installers' warranties to the design professional as specified in the individual Specification Sections. Assemble, bind, label, and transmit warranties as required for other manuals above. Unless specifically indicated otherwise in individual Sections, the period for warranties shall begin on the Date of Substantial Completion. Warranties shall state the Date of Substantial Completion and the date on which the warranty expires. In addition to hardcopies, contractor shall provide digital copies.

1.05 Operating/Maintenance Instructions

A. Coordinate demonstrations and trial operations of equipment for Owner's designated personnel, and complete such demonstrations prior to Date of Final Certification. Each installer of work requiring maintenance or operation shall:

1. Meet with Owner's personnel, at Project site to provide basic instructions needed for proper operation and maintenance of entire work.

2. Provide instructions by manufacturer's representatives as required.

3. Review maintenance manuals, record documentation, tools, spare parts and materials, lubricants, fuels, identification materials, control sequences, hazards, cleaning, and similar procedures and facilities.

4. Review maintenance and operations in relation to warranties and similar continuing commitments.

1.06 Continuing Inspections

A. Comply with Owner's request to participate in inspections at end of each time period required by specific warranties or similar components. Participate in general inspection of work approximately one year beyond Date(s) of Submittal Completion.

Part 2 Products (Not Used)

Part 3 Execution (Not Used)

END OF SECTION

Section 03 6200
Non-Shrink Grout

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Section includes non-shrink grout to be used for pressure grout applications under settled slabs, and where specified in Contract Documents.

1.02 RELATED SECTIONS

A. Section 013330 - Structural Submittals.

B. Section 01410 - Structural Testing/Inspection Agency Services.

1.03 REFERENCES

A. ASTM C1107 – Standard Specificaiton for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).

B. ASTM C1090 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens).

1.04 QUALITY ASSURANCE

A. Structural Testing/Inspection Agency shall perform the following quality related items:

1. Perform compressive strength tests in accordance with ASTM C1090 with 2-inch x 2-inch cubes. Test one cube at three days, two cubes at seven days and three cubes at 28 days. Perform one test for each ten bags of grout used or one test in accordance with day of grouting.

1.05 SUBMITTALS

A. Submit product data sheets for review.

PART 2 PRODUCTS

2.01 GROUT

A. Provide a non-shrink, non-metallic grout that complies with ASTM C1107.

B. Grout shall have a minimum compressive strength of 5000 psi at 28 days.

C. Grout shall be pumpable for pressure grouting applications.

2.02 WATER

A. Provide clean, potable water.

PART 3 EXECUTION

3.01 HANDLING

A. Store and protect non-shrink grout from moisture and contamination.

3.02 PREPARATION

A. Remove mud, dirt and other foreign materials from areas to be grouted.

B. Provide port holes for pressure grout. See drawings for maximum spacing.

3.03 MIXING

A. Mix grout to its fluid, self-leveling consistency in accordance with manufacturers recommendations. Do not retemper grout. Do not exceed manufacturer's maximum limit on water content or use at a consistency which produces free bleeding. Mix grout in a paddle-type mortar mixer. Do not mix by hand.

3.04 PLACEMENT

A. Consolidate grout to provide uniformity. Do not vibrate grout.

B. Use forms to contain grout.

C. Place grout continuously from one port hole until full depth grout has passed the next port hole.

D. Avoid trapped air when pumping grout.

3.05 PROTECTION

A. Protect grout and areas to be grouted from excessive heat and cold in accordance with manufacturer's specifications. Protect grout from excessive drying shrinkage resulting from wind or direct sunlight. Protect areas grouted from excessive vibrations for three days.

END OF SECTION

Section 31 1000
Site Preparation

Part 1 General

1.01 Scope

A. This section described 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.

B. Comply with applicable codes, ordinances, rules, regulations and laws of local, municipal, state or federal authorities having jurisdiction.

1.02 Clearing and Grubbing

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

B. Clearing

1. All vegetation such as trees, shrubs, brush, logs, upturned stumps and roots of downed trees, and other similar items shall be removed and disposed of properly by the Contractor as specified below. Cultivated growth shall be removed and trees felled as necessary within the construction work site and as indicated.

2. 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.

3. All buildings, fences, lumber piles, trash and obstructions, except utility poles shall be removed and disposed of by the Contractor. Any work pertaining to utility poles shall comply with the requirements of the appropriate utility.

4. All fences adjoining any excavation or embankment that may be damaged or buried shall be carefully removed, stored and replaced.

C. 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 roadways or two feet below finish grade, whichever is lower.

1.03 Preliminary Grading

A. Before beginning construction, the Contractor shall grade the entire work site to conform, in general, to the finish elevations shown on the Drawings. The Drawings

show both existing contour elevations and finished contour elevations.

1.04 Testing and Inspection Services

A. Soil testing will be performed by an independent testing laboratory selected 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 two feet of lift; one test for each 5,000 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 retesting where initial tests reveals non-conformance with specified requirements.

D. Inspection:

1. Earthwork operations, suitability of excavated materials for fill and backfill, and placing the compaction of fill and backfill is subject to inspection. The Engineer will observe earthwork operations.

2. Foundations and shallow spread footing foundations are required to be inspected by a geotechnical engineer to verify suitable bearing and construction.

Part 2 Products (Not Used)

Part 3 Execution

3.01 Preparation

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

3.02 Clearing

A. Clear areas required for access to site and execution of work.

B. Remove trees and shrubs within the area to be cleared.

C. Clear undergrowth and deadwood, without disturbing subsoil.

3.03 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 or body of water, or in any street or alley. No debris shall be deposited upon any private property except with written consent of the property owner. In no case shall any material be left on the Project, shoved onto abutting private properties, or be buried in embankments or trenches on the Project.

B. Burning of any kind is not permitted on site.

END OF SECTION

Section 31 1100
Clearing and Grubbing

Part 1 General

1.01 Scope

A. Clearing and grubbing includes, but is not limited to, removing from and relocating on the Project site trees, stumps, roots, brush, structures, abandoned utilities, trash, debris, and all other materials found on or near the surface of the ground in the construction area and understood by generally accepted engineering practice not to be suitable for construction of the type contemplated. Strict precautionary measures that prevent damage to existing features to remain are part of the work.

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

1.02 Quality Assurance

A. The Contractor shall comply with applicable codes, ordinances, rules, regulations, and laws of local, municipal, state or federal authorities having jurisdiction over the Project. The Contractor shall obtain all required permits of a temporary nature for construction operations.

1.03 Job Conditions

A. Location of the work: The area to be cleared and grubbed shall not extend beyond the disturbance limits shown on the Drawings.

Part 2 Products (Not Used)

Part 3 Execution

3.01 Scheduling of Clearing

A. The Contractor shall clear only that area of the construction site that has adequate erosion and sediment control measures in place. This area shall be determined from the Contractor's Progress Schedule.

B. The Owner’s Representative may permit clearing for additional areas provided that temporary erosion and sedimentation controls are in place and a satisfactory stand of temporary grass is established. Should a satisfactory stand of grass not be possible, no additional clearing shall be permitted beyond that specified above.

C. A satisfactory stand of grass shall have no bare spots larger than one square yard. Bare spots shall be scattered and the bare area shall not comprise more than one percent of any given area.

3.02 Clearing and Grubbing

A. Materials to be cleared, grubbed and removed from the Project site include, but are not limited to, all trees, stumps, roots, brush, trash, organic matter, paving, miscellaneous structures, debris, and abandoned utilities.

B. Grubbing shall consist of completely removing roots, stumps, trash, and other debris from all graded areas so that topsoil is free of roots and debris. Topsoil is to be left sufficiently clean so that further picking and raking will not be required.

C. All stumps, roots, foundations, and planking embedded in the ground shall be removed and disposed of. 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 roadways or two feet below finish grade, whichever is lower.

D. Surface rocks and boulders shall be grubbed from the soil and removed from the site if not suitable as rip rap.

E. Only areas where construction does not fall beneath the drip lines or the critical root zone (CRZ) of trees to remain shall be grubbed by heavy tractors with root rakes. Raking shall generally proceed along the contour rather than up and down slopes so as to inhibit soil erosion.

F. Where construction is to take place beneath or within the drip line or critical root zone of a tree or trees, the Contractor shall conform to the requirements of Section 31 1300 tree protection. No tracked vehicles or root rakes will be permitted in any designated tree save area or beneath the drip line or the critical root zone of trees to remain.

G. Where the tree limbs interfere 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 utility.

H. Any work pertaining to utility poles shall comply with the requirements of the appropriate utility.

I. All fences adjoining any excavation or embankment that, in the Contractor's opinion, may be damaged or buried, shall be carefully removed, stored, and replaced. Any fencing that, in the Project Landscape Architect's opinion, is significantly damaged shall be replaced with new fence material.

J. Stumps and roots shall be grubbed and removed to a depth not less than two feet below grade. All holes or cavities which extend below the subgrade elevation of the proposed work shall be filled with suitable material, compacted to the same density as surrounding material or as noted on plans.

K. The Contractor shall be responsible for all damages to existing improvements resulting from Contractor’s operations.

3.03 Disposal of Debris

A. The debris 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 or body of water, or in any street or alley. No debris shall be deposited upon any private property except with written consent of the property owner. In no case shall any material or debris be left on the Project, shoved onto abutting private properties or buried on the Project.

B. Burning of any kind is prohibited on site.

END OF SECTION

Section 31 1300
Tree Protection and Demolition

Part 1 General

1.01 Scope

A. Tree Protection, selective site clearing, and pruning shall be accomplished on 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 vegetation, and selective pruning as directed by the Owner's Representative in the field, and miscellaneous structures, topsoil stripping, protection of existing trees designated to remain, erosion control, and wetland protection.

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 at all times 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 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 City 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.

E. Provide protection for roots over 1-1/2-inch diameter that are cut during construction operation. Coat any cut faces with an 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.

F. Repair or replace trees and vegetation damaged by construction operations, in a manner acceptable to the Owner's Representative. 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.

G. 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.

H. Tree Penalty

1. The intent of this clause is to emphasize the importance of all trees to be saved. All trees 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 hurt. Accidental damage due to dead trees falling, equipment breakdown, or any act on the part of the operator which appears to the Owner's Representative 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 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 Owner's Representative.

2. All trees on the site shall be saved except those marked specifically to be removed on the plans and those marked specifically on the site by the Owner's Representative to be removed. No tree, either those marked for removal on the site, or any other tree may be removed from the site prior to the Owner's Representative's inspection.

3. Penalties for damage to or removal of any tree not specifically approved by the Owner's Representative on the site will be as follows:

TREE PENALTY TABLE					
Large Trees				Small Flowering Evergreen Trees & Shrubs	
Caliper (inches)	Height (feet)		Penalty	Height (feet)	Penalty
1 1/2- 2	14		$135.00	6 - 8	130.00
2 - 2 1/2	16		$150.00	8 - 10	150.00
3 1/2- 3	16		$182.00	10 - 12	200.00
4 - 3 1/2	16		$212.00	12 - 14	250.00
6 - 4 1/2	20		$295.00	16 - 18	375.00
7 1/2- 5	22		$370.00	18 - Up	-
8 - 6	26		$475.00	Follow large tree schedule	
9 - 7			$600.00	using caliper of trunk	
10 - 8			$650.00		
8-11			$1,000.00		
11 - 18			$2,000.00		
18 - 24			$6,000.00		
24 - 52			$12,000.00		

4. Trees will be graded by the Owner's Representative 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.

5. 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.

6. Berm Protection: In areas where the existing topography must remain undisturbed but trees must be removed, the trees shall be cut off flush and removed without disruption the existing soil conditions. Berms along creeks must not be disturbed except where designated on the plans. These areas, if so designated, shall not be used for any purpose during construction.

Part 2 Products (Not Used)

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. Notify the Owner's Representative at least five full working days prior to commencing the 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

A. All lines, grades, levels, and bench marks 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 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 made early in the construction process and preserved for reference during construction.

D. The purpose of the staking, with inspection and adjustment by the Owner's Representative, 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 Owner's Representative. 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 Owner's Representative at least five working days before inspection of the stake-out must be made. During the inspection the Owner's Representative will adjust the stake-out as necessary to fit the trees, topography, and all other objects and conditions on the site. At this time the Owner's Representative 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 Owner's Representative. 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

A. Remove all items of construction indicated on Drawings to be removed.

B. Remove all existing construction that interferes with new construction with prior approval of Owner's Representative.

C. Do not remove water, gas, and electric meters, unless noted otherwise on the Drawings. Removal and relocation of meters shall be performed by the respective utility companies.

D. All items of salvable value, unless otherwise specified by the Owner, shall become the property of the Contractor and shall be removed from the site. All other materials and all debris resulting from demolition shall be removed from the site as the work progresses, and disposed of in accordance with local regulations.

3.06 Mulch

A. 3-inch 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. Mulch cleared by clearing operations to be used on-site in landscape beds and for the mulch trail shall be double ground. Stockpile in locations directed by Owner.

3.07 Topsoil Removal

A. Topsoil is defined as friable clay loam surface soil found and depth of not less than 4-inches. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects of more than 1/4-inch in diameter, and other objectionable materials.

B. Strip topsoil to whatever depths encountered, in such a manner as to prevent intermingling with the underlying subsoil or other objectionable material.

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. Stockpile topsoil in storage piles in areas where directed. Construct storage pile to freely drain surface water. Cover storage pile as necessary to prevent windborne dust and erosion. Do not stockpile inside critical root zones of trees.

3.08 Clearing

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

B. 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 trails, asphalt roadway, and in areas to receive heavy grading. Do not remove stumps in areas to remain natural. Do not use root rakes.

3.09 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. Dumpsters, pallets of/and materials, vehicles or equipment and equipment attachments may not turn or park under the tree preservation areas.

F. Staging and operations may occur in the open field areas where there are no trees or where approved by Owner.

3.10 Fill Placement

A. Where fill dirt is necessary to establish acceptable finished grades over tree roots, Contractor shall:

1. Rake away mulch and humus.

2. Fill up with Size #57 crushed stone to within 2-inches of finish grade.

3. Lay 2-inch crusher run base to finish grade.

4. Cover with pine straw mulch.

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 existing vegetation and trees.

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 natural mulch areas disturbed by the construction activity shall be repaired by raking back to natural grade and covering with 3-inch 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

Section 31 2000
Earthwork

Part 1 General

1.01 Scope

A. This Section includes earthwork and related operations, including, but not limited to, clearing and grubbing the construction site, dewatering, excavating all classes of material encountered, pumping, draining and handling of water encountered in the excavations, handling, storage, transportation and disposal of all excavated and unsuitable material, construction of fills and embankments, backfilling around structures and pipe, backfilling all trenches and pits, compacting, all sheeting, shoring and bracing, preparation of subgrades, surfacing and grading, and any other similar, incidental, or appurtenant earthwork operation which may be necessary to properly complete the work.

B. The Contractor shall provide all services, labor, materials and equipment required for all earthwork and related operations necessary or convenient to the Contractor for furnishing complete work as shown on the Drawings or specified in these Contract Documents.

1.02 General

A. The elevations shown on the Drawings as existing are taken from the best existing data and are intended to give reasonably accurate information about the existing elevations. They are not precise and the Contractor shall become satisfied as to the exact quantities of excavation and fill required.

B. Earthwork operations shall be performed in a safe and proper manner with appropriate precautions being taken against all hazards.

C. All excavated and filled areas for structures, trenches, fills, topsoil areas, embankments and channels shall be maintained by the Contractor in good condition at all times until final acceptance by the Owner. All damage caused by erosion or other construction operations shall be repaired by the Contractor using material of the same type as the damaged material.

D. Earthwork within the rights-of-way of the Department of Transportation, the County Road Department and the respective cities shall be done in accordance with requirements and provisions of the permits issued by those agencies for the construction within their respective rights-of-way. Such requirements and provisions, where applicable, shall take precedence and supersede the provisions of these Specifications.

E. The Contractor shall control grading in a manner to prevent surface water from running into excavations. Obstruction of surface drainage shall be avoided and means shall be provided whereby storm water can be uninterrupted in existing gutters, other

surface drains or temporary drains. Free access must be provided to all fire hydrants, watergates and meters.

F. Excavation work shall include the removal and subsequent handling of all materials excavated or otherwise removed in performance of the work, regardless of the type, character, composition or condition thereof.

G. Tests for compaction and density shall be conducted by the Engineer or by an independent testing laboratory selected by the Owner. Costs of compaction tests performed by an independent testing laboratory shall be paid for directly by the Owner and not as a part of this Contract. The Contractor shall make all necessary excavations and shall supply any samples of materials necessary for conducting compaction and density tests. The cost of all retests made necessary by the failure of proper scheduling and materials to conform to the requirements of these Contract Documents shall be paid by the Contractor.

H. All earthwork operations shall comply with the requirements of OSHA Construction Standards, Part 1926, Subpart P, Excavations, Trenching, and Shoring, and Subpart O, Motor Vehicles, Mechanized Equipment, and Marine Operations, and shall be conducted in a manner acceptable to the Engineer.

I. It is understood and agreed that the Contractor has made a thorough investigation of the surface and subsurface conditions of the site and any special construction problems which might arise as a result of nearby watercourses and floodplains, particularly in areas where construction activities may encounter water-bearing sands and gravels or limestone solution channels. The Contractor shall be responsible for providing all services, labor, equipment and materials necessary or convenient to the Contractor for completing the work within the time specified in these Contract Documents.

Part 2 Products

NOTE:

All references to vendors and "approved manufacturers" are included for description of quality and content of the designated equipment/materials. Equivalent items may be accepted if they meet all standards of quality and purpose for the intended use, as determined by City of Sandy Springs.

2.01 Materials and Construction

A. Earthwork Materials

1. Fill Material, General

a. Approval Required: All fill material shall be subject to the approval of the Engineer.

b. Notification: For approval of imported fill material, notify the Engineer at

least one week in advance of intention to import material, designate the proposed borrow area and permit the Engineer to sample as necessary from the borrow area for the purpose of making acceptance tests to prove the quality of the material.

2. On-Site Fill Material: All on-site fill material shall be soil exclusive of organic matter, frozen lumps or other deleterious substances. On-site fill material shall contain no rocks or lumps over 3-inches maximum in dimension.

3. Imported Fill Materials: All imported fill material shall meet the requirements of on-site fill material.

4. Sand Cushions and Sand Fill: Sand cushions and sand fill shall consist of a sand-gravel fill of such gradation that 100 percent will pass a 3/8-inch sieve and not more than 10 percent by weight is lost by washing.

5. Coarse Aggregate: Coarse aggregate shall conform to the Georgia Department of Transportation Standard Specifications for Construction of Roads and Bridges, 800.01 for No. 57 Stone, Group II and shall have the following gradation:

6. Fine Aggregate: All fine aggregate shall conform to the Georgia Department of Transportation Standard Specifications for Construction of Roads and Bridges, 801.01 and shall have the following gradation:

Sieve Size	Percent Passing
No. 4	100
No. 16	25 - 75
No. 100	0 - 25

7. Pea Gravel: Pea gravel shall be clean, naturally rounded aggregate, 1/8 to 3/4-inch in diameter per ASTM C 33.

8. Top Soil: Dark organic weed free loam, free of muck.

B. Sheeting, Bracing and Timbering: The Contractor shall furnish, place and maintain all sheeting, bracing and timbering required to properly support trenches and other excavations in open cut and to prevent all movement of the soil, pavement, structures or utilities outside of the trench or pit.

1. General

a. Cofferdams and bracing design, including computations, shall be prepared before commencing construction operations. Drawings and design computations shall be signed and sealed by a professional engineer registered in the State of Georgia. The Drawings and design computations shall not be submitted to the Engineer.

b. Sheeting, bracing and timbering shall be so placed as to allow the work to be constructed to the lines and grades shown on the Drawings and as ordered by the Engineer, Owner, and Owner's Representative.

c. If at any time the method being used by the Contractor for supporting any material or structure in or adjacent to any excavation is not reasonably safe, the Contractor shall provide additional bracing and support necessary to furnish the added degree of safety.

d. All sheeting in contact with the concrete or masonry shall be cut off as directed by the Engineer and left in place.

2. Timber: Timber may be substituted for steel sheet piling when approved by the Engineer. Timber for shoring, sheeting or bracing shall be sound and free of large or loose knots and in good condition. Size and spacing shall be in accordance with OSHA regulations.

3. Steel Sheet Piling: Steel sheet piling shall be the continuous interlock type. The weight, depth and section modulus of the sheet piling shall be sufficient to restrain the loads of earth pressure and surcharge from existing foundations and/or live loads. Procedure for installation and bracing shall be so scheduled and coordinated with the removal of the earth that the ground under existing structures shall be protected against lateral movement at all times. The Contractor shall provide closure and sealing between sheet piling and existing facilities. Steel piling within three feet of an existing building, structure or pipeline shall remain in place, unless otherwise directed by the Engineer.

4. Remove bracing and sheeting in units when backfill reaches the point necessary to protect the structures and adjacent property. Leave sheeting in place when in the opinion of the Engineer it cannot be safely removed. Cut off sheeting left in place at least two feet below the surface.

C. Other Materials: All other materials not specifically described but required for proper completion of the work of this Section shall be as selected by the Contractor subject to the approval of the Engineer.

D. Stockpile Area: The stockpile area shown on the Drawings, or as directed by the Engineer, shall be used to stockpile soil material for backfilling around structures and to stockpile needed topsoil.

Part 3 Execution

3.01 General

A. Safety: Comply with local regulations and with the provisions of the "Manual of Accident Prevention in Construction" of the Associated General Contractors of America, Inc., Occupational Safety and Health Act and all other applicable safety

regulations.

B. Topsoil

1. Remove all topsoil to a depth at which subsoil is encountered, from all areas under buildings, pavements, and from all areas which are to be cut to lower grades or filled.

2. With the Engineer's approval, topsoil to be used for finish grading may be stored on the site.

3. Other topsoil may be used for fill in non-critical areas with approval of the Engineer.

4. Properly dispose of all excess topsoil off site.

C. Bracing and Sheeting

1. Furnish, put in place, and maintain all sheeting, bracing and shoring as may be required to properly support the sides of all excavations and to prevent all movement of earth which could in any way injure the work, adjacent property or workers.

2. Properly support all excavations in locations indicated on the Drawings and where necessary to conform to all pertinent rules and regulations and these Specifications, even though such locations are not indicated on the Drawings.

3. Exercise care in the removal of sheeting, shoring, bracing and timbering to prevent collapse or caving of the excavation faces being supported and damage to the work and adjacent property.

4. Do not leave any sheeting or bracing in the trench or excavation after completion of the work, unless approved by the Engineer.

D. Obstructions

1. Remove and dispose of all trees, stumps, roots, boulders, sidewalks, driveways, pavement, pipes and the like, as required for the performance of the work.

2. Exercise care in excavating around catch basins, inlets and manholes so as not to disturb or damage these structures.

3. Avoid removing or loosening castings or pushing dirt into catch basins, inlets and manholes.

4. Damaged or displaced structures or casting shall be repaired, replaced and dirt entering the structures during the performance of the work shall be removed at no additional cost to the Owner.

E. Utilities to be Abandoned

1. When pipes, conduits, sewers or other structures are removed from the trench leaving dead ends in the ground, such ends shall be fully plugged or sealed with brick and non-shrink grout.

2. Abandoned structures such as manholes or chambers shall be entirely removed unless otherwise specified or indicated on the Drawings.

3. All materials from abandoned utilities which can be readily salvaged shall be removed from the excavation and stored on the site at a location as directed by the Owner.

4. All salvageable materials will remain the property of the Owner unless otherwise indicated by the Owner.

F. Extra Earth Excavation: In case soft or excessively wet material which, in the opinion of the Engineer, is not suitable, is encountered below the final subgrade elevation of an excavation or underneath a structure, the Engineer may order the removal of this material and its replacement with crushed stone or other suitable material in order to make a suitable foundation for the construction of the structure.

G. Cutting Paved Surfaces and Similar Improvements

1. Remove existing pavement as necessary for installing pipe utilities and appurtenances or as otherwise shown on the Drawings.

2. Before removing any pavement, mark the pavement neatly, paralleling pipe lines and existing street lines. Space the marks the width of the trench.

3. Break asphalt pavement along the marks using jack hammers or other suitable tools. Break concrete pavement along the marks by use of jack hammers or by scoring with a rotary saw and breaking below the score by the use of jack hammers or other suitable tools.

4. Do not pull pavement with machines until completely broken and separated from pavement to remain.

5. Do not disturb or damage the adjacent pavement. If the adjacent pavement is disturbed or damaged, remove and replace the damaged pavement. No additional payment will be made for removing and replacing damaged adjacent pavement.

6. Remove and replace sidewalks disturbed by construction for their full width and to the nearest undisturbed joint.

7. The Contractor may tunnel under curbs that are encountered. Remove and

replace any curb disturbed by construction to the nearest undisturbed joint.

3.02 Excavation

A. Method

1. All excavation shall be by open cut from the surface except as indicated on the Drawings.

2. All excavations for pipe appurtenances and structures shall be made in such manner and to such depth and width as will give ample room for building the structures and for bracing, sheeting and supporting the sides of the excavation, for pumping and draining groundwater and wastewater which may be encountered, and for the removal from the excavation of all materials excavated.

3. Take special care so that the soil below the bottom of the structure to be built is left undisturbed.

B. Grades

1. Excavate to grades indicated on the Drawings.

2. Where excavation grades are not indicated on the Drawings, excavate as required to accommodate installation.

C. Disposal of Excavated Material

1. Remove and properly dispose of all excavated material not needed to complete filling, backfilling and grading.

2. Dispose of excavated material off site at locations secured by the Contractor and in accordance with all requirements of federal, state, county and municipal regulations. No debris of any kind shall be deposited in any stream or body of water, or on any street or alley. No debris shall be deposited on any private property except by written consent of the property owner. In no case shall any material be left on the Project, shoved onto abutting private properties, or be buried in embankments or trenches on the Project.

3.03 Excavating for Structures

A. Earth Excavation

1. Earth excavation shall include all substances to be excavated other than rock. Earth excavation for structures shall be to limits not less than two feet outside wall lines, to allow for formwork and inspection, and further as necessary to permit the trades to install their work. All materials loosened or disturbed by excavation shall be removed from surfaces to receive concrete or crushed

stone.

2. No separate payment will be made for earth excavation. The cost of such work and all costs incidental thereto shall be included in the price bid for the item to which the work pertains.

B. Rock Excavation

1. Definition of Rock: Any material which cannot be excavated with a single-tooth ripper drawn by a crawler tractor having a minimum draw bar pull rated at not less than 56,000 pounds (comparable to Caterpillar D 8K or comparable to Caterpillar 977 front-end loader, and occupying an original volume of at least one cubic yard). The Engineer shall be the sole determinant as to the limits to which the material is classified as rock.

2. Excavation: Where rock is encountered within excavation for structures, it shall be excavated to the lines and grades indicated on the Drawings or as otherwise directed by the Engineer. The Contractor shall be responsible for obtaining any blasting permits required.

3. Blasting: Blasting operations shall be conducted in accordance with all existing ordinances and regulations. All structures shall be protected from the effects of the blast. The blasting shall be done by licensed experienced workers. Dispose of excavated rock in accordance with applicable federal, state, county and local regulations.

   a. If, in the sole opinion of the Engineer, the Contractor persistently uses excessive blasting charges or blasts in an unsafe or improper manner, the Engineer will direct the Contractor to employ an independent, qualified blasting consultant, approved by the Engineer, to supervise the preparation for each blast and approve the quantity of each charge. The cost of the blasting consultant will be paid for by the Contractor and the Contractor shall not be reimbursed through the Contract allowance. The qualified blasting consultant when required to perform drilling and blasting will be paid for by the Contractor.

   b. The Contractor will notify the Inspector before any charge is set and prior to blasting. Following review by the inspector regarding the proximity (normally within 300 linear feet) of permanent structures to the blasting site, the Engineer may direct the Contractor to employ an independent qualified specialty subcontractor, approved by the Engineer, to monitor the blasting by use of seismograph, identify areas where light charges must be used, conduct pre-event and post-event inspections of all structures, including photographs or videos, and maintain a detailed written log. The cost of this independent qualified specialty subcontractor will be paid for through the Contract allowance. The specialty subcontractor allowance will be used only to pay for a specialty subcontractor when directed by the Engineer to monitor blast, conduct pre-event and/or post-event inspections and maintain a log of these

activities.

c. Any damage done shall be promptly repaired by the Contractor at the Contractor's own expense.

d. Rock excavation will be paid for as an extra in addition to payment for earth excavation provided for elsewhere in these Specifications. Payment will be made for measured quantity of rock excavated, at the unit price bid per cubic yard. The unit price for rock excavation shall include the cost of rock excavation, the cost of handling sufficient and suitable fill material and all costs incidental thereto. The allowable volume of rock excavation for payment, unless otherwise authorized by the Engineer, shall be based on the following measurements:

i. Horizontal measurement shall be to the actual dimension of the excavation, but not exceeding one foot in the clear outside the outer surface of the structure or a minimum of two feet from a wall.

ii. Depth measurement shall be made from the original top of rock to the bottom of the structure as constructed, or to the bottom of the rock, if above grade.

4. No allowance shall be made for overcutting or for excavation below the required elevations. The Engineer must be given reasonable notice to measure all rock.

5. If excess excavation is made or the material becomes disturbed so as to require removal below final subgrade elevations or beyond the prescribed limits, the resulting space shall be refilled with Class “C” concrete in accordance with Section 03 3000 of these Specifications.

C. Excavation for Foundations: Footings and slabs on grades shall rest on undisturbed earth, rock or compacted materials to insure proper bearing.

1. Unsuitable Foundation Material

a. Any material in the opinion of the Engineer which is unsuitable for foundation shall be removed and replaced with compacted crushed stone, or with compacted fill material as directed by the Engineer. Crushed stone shall meet the requirements of the Georgia Department of Transportation Specification 800.01 for No. 57 stone.

b. No determination of unsuitability will be made until all requirements for dewatering are satisfactorily met.

c. Payment for removal and replacement of unsuitable material not shown on the Drawings shall be made at the unit price bid.

2. Foundation in Rock

a. Foundations for a structure shall be on similar materials. Should excavation for a foundation be partially in rock, the Contractor shall undercut that portion of the rock 12-inches and bring the excavation to grade with compacted crushed stone.

b. Where ordered by the Engineer, undercutting of rock and replacement with crushed stone will be paid for at the unit price bid for rock excavation. The quantity shall equal one foot of depth over the horizontal dimensions authorized by the Engineer.

3. Pipe Trenches beneath Structures

a. Where piping or conduit passes beneath footings or slabs resting on grade, trenches shall be excavated to provide a minimum of 6-inches clearance from all surfaces of the pipe or conduit. The trench shall be backfilled to the base of the structure with concrete.

b. No separate payment will be made for concrete backfill of trenches beneath structures. The cost of this work and all costs incidental to it shall be included in the price bid for the item to which the work pertains.

4. Unauthorized Excavation

a. Care shall be taken that excavation does not extend below bottom levels of footings or slabs on earth or rock. Should the excavation, through carelessness or neglect, be carried below such levels, the Contractor shall fill in the resulting excess excavation with concrete under footings and compacted crushed stone or other approved material under slabs. Crushed stone or gravel shall meet the Georgia Department of Transportation Specification 800.01 for No. 57 stone. Should excavation be carried beyond outside lines of footings such excess excavation shall be filled with concrete, or formwork shall be provided, as directed by the Engineer.

b. Additional costs of corrective work, made necessary by unauthorized excavation of earth or rock, shall be borne by the Contractor.

D. Unsuitable Bearing

1. If suitable bearings for foundations are not encountered at the elevations indicated on the Drawings, immediately notify the Engineer.

2. Do not proceed further until instructions are received and necessary measurements made for purposes of establishing additional volume of excavation.

3.04 Fill

A. Controlled Fill

1. The fill for roadways, parking areas, walks, structures, and building slabs on grade shall be controlled fill.

2. After the existing ground or excavated area has been proofrolled and examined by the Engineer, all holes and other irregularities shall be filled and compacted before the main fill is placed.

3. The fill shall be placed in even layers not exceeding 10-inches in depth and shall be thoroughly compacted as herein specified.

4. If an analysis of the soil being placed shows a marked difference from one location to another, the fill being placed shall not be made up of a mixture of these materials.

5. Each different type of material shall be handled continuously so that field control of moisture and density may be based upon a known type of material.

6. No fill shall be placed following a heavy rain without first making certain on isolated test areas that compaction can be obtained without damage to the already compacted fill.

B. Proofrolling

1. All areas where roadways, parking areas, sidewalks, structures, and buildings are to be constructed on cut areas, compacted fill, and other areas where indicated on the Drawings, shall be proofrolled to detect soft spots prior to the placement of fill material and after placement of fill, which shall be construction of foundations.

2. Proofrolling shall consist of moving a 20-30 ton loaded dump truck or other pneumatic tire roller over the subgrade before the subgrade is shaped. Proofrolling shall be witnessed by the Engineer.

3. Subgrade shall be proofrolled with six passes of the truck or roller. Depressions that develop during the proofrolling operation shall be filled with suitable material and those filled areas shall be proofrolled with six passes of the roller. If, after having been filled and proofrolled, the subgrade still contains depressions, the area shall be undercut to the full depth of the soft material or five feet whichever is less, backfilled, recompacted, and rolled to achieve a subgrade acceptable to the Engineer.

4. After the proofrolled subgrade has been accepted by the Engineer, the surface of the subgrade shall be finish rolled with a smooth steel wheel roller weighing not less than 10 tons. Finished surface of the subgrade shall be within a tolerance of 1/4-inch at every point.

5. Conduits, pipes, culverts and underdrains shall be neither disturbed nor

damaged by proofrolling operations. Rollers shall neither pass over, nor approach closer than five feet to, conduits, pipes, culverts and underdrains unless the tops of those products are deeper than three feet.

C. Placement

1. Prior to placement of any material in embankments, the area within embankment limits shall be stripped of topsoil and all unsuitable materials removed as described under Article 3.02. The area shall then be scarified to a depth of at least 6-inches.

2. Fill materials shall be placed in continuous approximately horizontal layers extending the full width of the embankment cross-section and the full dimension of the excavation where practical and having a net compacted thickness of not over 6-inches.

3. Fill materials shall be placed at optimum moisture content within practicable limits (not less than one percent below optimum). Optimum moisture shall be maintained by sprinkling the layers as placed or by allowing materials to dry before placement.

D. Compaction

1. Fill materials shall be compacted to dry densities as determined by the Standard Proctor Compaction Test performed in accordance with ASTM D 698.

2. Fill materials supporting roadways, parking areas, sidewalks, structures, and buildings, and backfill around structures, buildings, and walls shall be compacted to 95 percent of the maximum dry density. The top 12-inches of fill material supporting roadways, parking areas, sidewalks, structures, and buildings shall be compacted to 98 percent of the maximum dry density. Fill placed for general site grading shall be compacted to 90 percent of the maximum dry density.

3. Compaction of embankments shall be by sheepsfoot rollers with staggered, uniformly spaced knobs and suitable cleaning devices. The projected area of each knob and the number and spacing of the knobs shall be such that the total weight of the roller and ballast when distributed over the area of one row of knobs shall be 250 psi. Placement and compaction of materials shall extend beyond the final contours sufficiently to insure compaction of the material at the resulting final surface. Final contours shall then be achieved by a tracked bulldozer shaping the face of the embankment.

4. Compaction of backfill around structures shall be accomplished by heavy power tamping equipment.

5. If tests indicate that density of fill is less than that specified, the area shall be

either recompacted or undercut, filled, and compacted until specified density is achieved.

E. Final Grading: Upon completion of construction operations, the area shall be graded to finish contour elevations and grades shown on the Drawings. Graded areas shall be made to blend into conformation with remaining ground surfaces. All surfaces shall be left smooth and free to drain.

F. Excess Material

1. Any excess earth excavation and unsuitable materials shall be placed on the site as directed by the Engineer. Surfaces and slopes of waste fills shall be left smooth and free to drain.

2. No separate payment will be made for backfilling. The cost of all such work and all costs incidental thereto shall be included in the price bid for the item to which the work pertains.

G. Moisture

1. All fill shall be compacted with the moisture content as established by the 98 percent intercept on the moisture density curves or the moisture content at the shrinkage limit, whichever is less.

2. If fill material is too wet, provide and operate approved means to assist the drying of the fill until suitable for compaction.

3. If fill material is too dry, provide and operate approved means to add moisture to the fill layers.

3.05 Backfilling

A. Backfill carefully to restore the ground surface to its original condition. Dispose of surplus material.

B. Compact backfill underlying roadways, parking areas, sidewalks, retaining wall, structures, and buildings to 95 percent of the maximum dry density.

C. Backfill for Pipe

1. Initial: Place initial backfill material carefully around the pipe above bedding in uniform 6-inch layers to a depth of at least 18-inches above the pipe bell. Compact each layer thoroughly with suitable hand tools. Do not disturb or damage the pipe. Backfill on both sides of the pipe simultaneously to prevent side pressures. Initial backfill material is earth material excavated from the trench which is clean and free of rock, organics, and other unsuitable material.
If materials excavated from the trench are not suitable for use as initial backfill material, obtain suitable materials elsewhere.

2. Final: After initial backfill material has been placed and compacted, backfill with general excavated material. Place backfill material in uniform layers and thoroughly compact with heavy power tamping tools of the “Wacker” type.

3. Settlement: If trenches settle, re-fill and grade the surface to conform to the adjacent surfaces.

4. Additional Material

   a. Where final grades above the pre-existing grades are required to maintain minimum cover, additional fill material will be shown on the Drawings.

   b. Utilize excess material excavated from the trench if the material is suitable. No additional payment will be made for additional material when excavated materials are used.

   c. If excess excavated materials are not suitable, or if the quantity available is not sufficient, provide suitable additional fill material.

D. Backfilling around Structures

1. General

   a. Remove debris from excavations before backfilling.

   b. Do not backfill against foundation walls until so directed by the Engineer nor until all indicated perimeter insulation and/or waterproofing is in place.

   c. Protect such insulation and/or waterproofing during filling operations.

   d. Wherever possible, backfilling shall be simultaneous on both sides of walls to equalize lateral pressures.

   e. Do not backfill against walls until all permanent construction is in place to furnish lateral support on both top and bottom of wall.

   f. Backfilling against walls is to take place after all the concrete in the affected members has attained the specified strengths.

2. Materials: Backfill material placed against structures built or encountered during the work of this Section shall be suitable fill material. No broken concrete, bricks or similar materials will be permitted as backfill.

3.06 Grading

A. General: Perform all rough and finish grading required to attain the elevations

indicated on the Drawings. Perform finish grading to an accuracy of + 0.10 foot.

B. Compact backfill underlying roadways, parking areas, sidewalks, structures and buildings to 95 percent of the maximum dry density. The top 12-inches of backfill shall be compacted to 98 percent of the maximum dry density.

C. Treatment after Completion of Grading

1. After grading is completed, permit no further excavation, filling or grading, except with the approval of the Engineer.

2. Use all means necessary to prevent the erosion of freshly graded areas during construction and until such time as permanent drainage and erosion control measures have been installed.

3.07 Surface Water Control

A. Regulations and Permits: Obtain all necessary soil erosion control permits in accordance with the Georgia Soil Erosion and Sedimentation Control Act and all pertinent rules, laws, and regulations of all applicable federal, state, county and municipal regulatory agencies.

B. Unfavorable Weather

1. Do not place, spread or roll any fill material during unfavorable weather conditions.

2. Do not resume operations until moisture content and fill density are satisfactory to the Engineer.

C. Provide berms or channels to prevent flooding of subgrade. Promptly remove all water collected in depressions.

D. Pumping and Drainage

1. Provide, maintain and use at all times during construction adequate means and devices to promptly remove and dispose of all water from every source entering the excavations or other parts of the work.

2. Dewater by means which will insure dry excavations, preserve final lines and grades. Do not disturb or displace adjacent soil.

3. All pumping and drainage shall be done with no damage to property or structures and without interference with the rights of the public, owners of private property, pedestrians, vehicular traffic or the work of other contractors, and in accordance with all pertinent laws, ordinances and regulations.

4. Do not overload or obstruct existing drainage facilities.

3.08 Settlement

A. The Contractor shall be responsible for all settlement of backfill, fills and embankments which may occur within one year after final acceptance of the Work by the Owner.

B. The Contractor shall make, or cause to be made, all repairs or replacements made necessary by settlement within 30 days after receipt of written notice from the Engineer or Owner.

3.09 Cleaning

A. Upon completion of the work of this Section, remove all rubbish, trash and debris resulting from construction operations. Remove surplus equipment and tools. Leave the site in a neat and orderly condition acceptable to the Owner and Engineer, and in conformance with these Specifications.

END OF SECTION

Section 31 2301
Excavating, Backfilling, and Compacting for Structures

Part 1 General

1.01 Section Includes

A. Section includes the excavation, backfilling and compacting required for the structures shown in the Contract Drawings.

1.02 Related Sections

A. Section 01 3330 - Structural Submittals.

B. Section 01 4525 - Structural Testing/Inspection Agency Services.

1.03 References

A. ASTM D422 - Standard Test Method for Particle-Size Analysis of Soils.

B. ASTM D698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3).

C. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

D. ASTM D1586 - Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils.

E. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

F. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.04 Definitions

A. Granular subbase: Granular fill directly beneath slabs-on-grade.

B. Structural fill: Fill under the structure other than the granular subbase.

1.05 Submittals

A. Upon request, submit soil test reports performed by the Structural Testing/Inspection Agency.

1.06 Quality Assurance

A. Structural Testing/Inspection Agency shall perform the following quality related items:

1. Verify structural fill complies with specifications.

2. Determine particle size, liquid limit, plastic limit, plasticity index and maximum density of each type of soil.

3. Observe proofrolling.

4. Perform a sufficient number of field density tests to verify compaction of structural fill. As a minimum, perform one test per lift for every 2500 square feet of fill placed.

5. Verify foundation bearing capacity.

6. Verify quantities of material removed and quantities of material placed where Unit Prices are involved.

1.07 Survey

A. Prior to construction, have structure location staked and certified by a licensed surveyor. If discrepancies between actual lines and elevations exist, notify Design Professional before proceeding with layout of structure.

1.08 Subsurface Conditions

A. Contractor may examine the site and make his own subsurface explorations at no additional cost to the Owner. Notify Owner prior to making any subsurface explorations.

1.09 Existing Utilities

A. Locate existing underground utilities by careful hand excavation. If utilities are to remain in place, provide protection from damage during construction operations.

B. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Do not interrupt existing utility service facilities occupied and used by Owner or others, unless written permission is given by the Owner's Representative and then only after temporary utility services have been provided.

C. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult the Design Professional immediately for directions.

D. Repair damaged utilities to satisfaction of utility owner at no additional cost to the Owner or the contract.

1.10 Notice

A. Notify the Design Professional 48 hours prior to the beginning of any excavation work.

Part 2 Products

NOTE:

All references to vendors and "approved manufacturers" are included for description of quality and content of the designated equipment/materials. Equivalent items may be accepted if they meet all standards of quality and purpose for the intended use, as determined by City of Sandy Springs.

2.01 Granular Subbase

A. Granular subbase shall be sound and free-draining, such as sand, gravel or crushed stone with less than 10% passing the 200 sieve. Maximum diameter shall be 1-1/2 inches.

2.03 Structural Fill

A. Structural fill shall be silty sand, clay, silty clay, or sandy clay with a plasticity index of less than 30, maximum particle size of four inches with not more than 30 percent greater than 3/4-inch.

B. Structural fill shall be free of organics, debris and deleterious materials.

Part 3 Execution

3.01 Stripping

A. Strip vegetation, topsoil, roots, and other unsuitable material to a depth determined by the Structural Testing/Inspection Agency but not less than one foot, nor less than 10 feet outside the perimeter of the structure.

B. Stockpile sufficient amounts of topsoil as required to cover areas to be landscaped with a minimum of six inches of material.

3.02 Excavation

A. Excavation shall be considered unclassified.

B. Perform excavation to the depths and limits on the Drawings and as specified herein.

C. Do not excavate to full depth when there is probability of frost forming or ground freezing in excavation before concrete is placed.

D. Undercutting may be required in areas that exhibit excessive water surfacing during proofrolling.

E. Ground water may be encountered during the foundation excavation. Provide a system for controlling the ground water to a level at least three feet below the lowest point of the excavation.

F. Keep excavations dry by sloping ground away from holes and trenches.

3.03 Proofrolling

A. After stripping or excavation and before any fill placement, fill areas shall be inspected and approved by testing agency.

B. Areas found to be soft or pumping shall have the soft soil removed and replaced with structural fill and compacted as outlined herein.

3.04 Placement of Structural Fill

A. Do not place structural fill on subgrade that contains frost, mud or is frozen.

B. Structural fill shall be placed and compacted in 8-inch thick loose layers.

C. Compact structural fill to 98 percent of the maximum dry density as measured by Standard Proctor, ASTM D698, with water content within +/-5 percent of the optimum moisture content.

3.05 Placement of Granular Subbase

A. Do not place granular subbase on subgrade that contains frost, mud or is frozen.

B. Compact granular subbase to 95 percent of the maximum dry density as measured by Standard Proctor, ASTM D698, with the water content within +/-5 percent of the optimum moisture content.

3.06 Clean Up

A. Remove excess excavated materials from job site and upon completion. Leave site in clean condition.

END OF SECTION

Part 1 General

1.01 Scope

A. The work under this Section consists of furnishing all labor, equipment and materials and performing all operations in connection with the trench excavation and backfill required to install the site utilities, including all pipelines, electrical conduits and duct banks shown on the Drawings and as specified.

B. Excavation shall include the removal of any trees, stumps, brush, debris or other obstacles which remain after the clearing and grubbing operations, which may obstruct the work, and the excavation and removal of all earth, rock or other materials to the extent necessary to install the utility and appurtenances in conformance with the lines and grades shown on the Drawings and as specified.

C. Backfill shall include the refilling and compaction of the fill in the trenches and excavations up to the surrounding ground surface or road grade at crossing.

D. The trench is divided into five specific areas:

1. Foundation: The area beneath the bedding, sometimes also referenced to as trench stabilization.

2. Bedding: The area above the trench bottom (or foundation) and below the bottom of the barrel of the pipe.

3. Haunching: The area above the bottom of the barrel of the pipe up to a specified height above the bottom of the barrel of the pipe.

4. Initial Backfill: The area above the haunching material and below a plane 18-inches above the top of the barrel of the pipe.

5. Final Backfill: The area above a plane 18-inches above the top of the barrel of the pipe.

E. The choice of method, means, techniques and equipment rests with the Contractor. The Contractor shall select the method and equipment for trench excavation and backfill depending upon the type of material to be excavated and backfilled, the depth of excavation, the amount of space available for operation of equipment, storage of excavated material, proximity of manmade improvements to be protected, available easement or right-of-way and prevailing practice in the area.

1.02 Quality Assurance

A. Density: All references to “maximum dry density” shall mean the maximum dry density

defined by the “Maximum Density-Optimum Moisture Test”, ASTM D 698, except that for non-cohesive materials “maximum dry density” shall mean the maximum index density as determined by the “Maximum Index Density of Soils Using a Vibratory Table”, ASTM D 4253. Determination of the density of foundation, bedding, haunching, or backfill materials in place shall meet with the requirements of ASTM D 1556, “Density of Soil In Place by the Sand Cone Method”, ASTM D 2937, “Density of Soil In Place by the Drive-Cylinder Method” or ASTM D 2922, “Density of Soil and Soil-Aggregate In Place by Nuclear Methods (Shallow Depth)”.

B. Sources and Evaluation Testing: Testing of materials to certify conformance with the Specifications shall be performed by an independent testing laboratory in accordance with Special Provisions. All imported fill materials shall meet the requirements of on-site fill materials.

1.03 Safety

A. Perform all trench excavation and backfilling activities in accordance with the Occupational Safety and Health Act of 1970 (PL 91-596), as amended. The Contractor shall pay particular attention to the Safety and Health Regulations Part 1926, Subpart P “Excavation, Trenching & Shoring” as described in OSHA publication 2226.

Part 2 Products

NOTE:

All references to vendors and "approved manufacturers" are included for description of quality and content of the designated equipment/materials. Equivalent items may be accepted if they meet all standards of quality and purpose for the intended use, as determined by City of Sandy Springs.

2.01 Trench Foundation Materials

A. Crushed stone shall be utilized for trench foundation (trench stabilization) and shall meet the requirements of the Georgia Department of Transportation Specification 800.01, Group I (limestone, marble or dolomite) or Group II (quartzite, granite or gneiss). Stone size shall be between No. 57 and No. 4, inclusive.

2.02 Bedding and Haunching Materials

A. Unless specified otherwise, bedding and haunching materials shall be crushed stone as specified below.

B. Crushed stone utilized for bedding and haunching shall meet the requirements of the Georgia Department of Transportation Specification 800.01, Group I (limestone, marble or dolomite) or Group II (quartzite, granite or gneiss). Stone size shall be No. 57.

C. Fine Aggregate: All fine aggregate shall conform to the Georgia Department of Transportation Standard Specifications for Construction of Road and Bridges, 801.01.

D. Earth materials utilized for bedding and haunching shall be suitable materials selected from materials excavated from the trench. Suitable materials shall be clean and free of rock larger than 2-inches at its largest dimension, organics, cinders, stumps, limbs, frozen earth or mud, man-made wastes and other unsuitable materials. Should the material excavated from the trench be saturated, the saturated material may be used as earth material, provided it is allowed to dry properly and it is capable of meeting the specified compaction requirements. When necessary, earth bedding and haunching materials shall be moistened to facilitate compaction by tamping. If materials excavated from the trench are unsuitable for use as bedding or haunching material, provide select material conforming to the requirements of this Section at no additional cost to Owner.

2.03 Initial Backfill

A. Initial backfill material shall be crushed stone or earth materials as specified for bedding and haunching materials.

B. Earth materials utilized for initial backfill shall be suitable materials selected from materials excavated from the trench. Suitable materials shall be clean and free of rock larger than 2-inches at its largest dimension, organics, cinders, stumps, limbs, frozen earth or mud, man-made wastes and other unsuitable materials. Should the material excavated from the trench be saturated, the saturated material may be used as earth material, provided it is allowed to dry properly and it is capable of meeting the specified compaction requirements. When necessary, initial backfill materials shall be moistened to facilitate compaction by tamping. If materials excavated from the trench are not suitable for use as initial backfill material, provide select material conforming to the requirements of this Section.

2.04 Final Backfill

A. Final backfill material shall be general excavated earth materials, shall not contain rock larger than 2-inches at its greatest diameter, cinders, stumps, limbs, man-made wastes and other unsuitable materials. If materials excavated from the trench are not suitable for use as final backfill material, provide select material conforming to the requirements of this Section.

2.05 Select Backfill

A. Select backfill shall be materials which meet the requirements as specified for bedding, haunching, initial backfill or final backfill materials, including compaction requirements.

2.06 Concrete

A. Concrete for bedding, haunching, initial backfill or encasement 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 C 94. Reinforcing steel shall conform to the requirements of ASTM A 615, Grade 60.

Part 3 Execution

3.01 Trench Excavation

A. Topsoil and grass shall be stripped a minimum of 6-inches over the trench excavation site and stockpiled separately for replacement over the finished grading areas.

B. Trenches shall be excavated to the lines and grades shown on the Drawings with the centerlines of the trenches on the centerlines of the utilities and to the dimensions which provide the proper support and protection of the utility and other structures and accessories.

C. Trench Width for Pipelines

1. The sides of all trenches shall be vertical to a minimum of one foot above the top of the pipe. Unless otherwise indicated on the Drawings, the maximum trench width shall be equal to the sum of the outside diameter of the pipe plus two feet. The minimum trench width shall be that which allows the proper consolidation of the haunching and initial backfill material.

2. Excavate the top portion of the trench to any width within the construction easement or right-of-way which will not cause unnecessary damage to adjoining structures, roadways, pavement, utilities, trees or private property. Where necessary to accomplish this, provide sheeting and shoring.

3. Where rock is encountered in trenches, excavate to remove boulders and stones to provide a minimum of 9-inches clearance between the rock and any part of the pipe barrel or manhole.

4. Wherever the prescribed maximum trench width is exceeded, the Contractor shall use the next higher Class or Type of bedding and haunching as shown on the Drawings for the full trench width as actually cut. The excessive trench width may be due to unstable trench walls, inadequate or improperly placed bracing and sheeting which caused sloughing, accidental over-excavation, intentional over-excavation necessitated by the size of the Contractor's tamping and compaction equipment, intentional over-excavation due to the size of the Contractor's excavation equipment, or other reasons beyond the control of the Engineer or Owner.

D. Depth

1. The trenches shall be excavated to the required depth or elevation which allow

for the placement of the utilities and bedding to the dimensions shown on the Drawings.

2. Water Mains

   a. Depth of Trenches: Excavate trenches to provide depths as shown on the Drawings. The depth of cover shall not exceed that as shown on the Drawings by more than two feet, without approval of the Engineer.

   b. Excavate trenches to provide a minimum cover of four feet. Within the right-of-way of highways, streets or roadways, also excavate to place the top of the pipe a minimum of three feet below the nearest pavement edge or drainage ditch.

   c. Excavate trenches to provide minimum cover of 18-inches for service lines.

   d. Increase the depth of cover where specifically shown on the Drawings and where necessary to avoid interference with underground utilities and obstructions.

3. Where rock is encountered in trenches for pipelines, excavate to the minimum depth which will provide clearance below the pipe barrel of 8-inches for pipe 21-inches in diameter and smaller and 12-inches for larger pipe, valves and manholes. Remove boulders and stones to provide a minimum of 6-inches clearance between the rock and any part of the pipe, manhole or accessory.

E. Excavated Materials

1. Excavated materials shall be placed adjacent to the work to be used for backfilling as required. Top soil shall be carefully separated and lastly placed in its original location.

2. Excavated material shall be placed sufficiently back from the edge of the excavation to prevent caving of the trench wall, to permit safe access along the trench and not cause any drainage problems. Excavated material shall be placed so as not to damage existing landscape features or man-made improvements.

3.02 Sheeting, Bracing and Shoring

A. Sheeting, bracing and shoring shall be performed in the following instances:

1. Where sloping of the trench walls does not adequately protect persons within the trench from slides or cave-ins.

2. In caving ground.

3. In wet, saturated, flowing or otherwise unstable materials. The sides of all trenches and excavations shall be adequately sheeted, braced and shored.

4. Where necessary to prevent damage to adjoining buildings, structures, roadways, pavement, utilities, trees or private properties which are required to remain.

5. Where necessary to maintain the top of the trench within the available construction easement or right-of-way.

B. In all cases, excavation protection shall strictly conform to the requirements of the Occupational Safety and Health Act of 1970, as amended.

C. Timber: Timber for shoring, sheeting, or bracing shall be sound and free of large or loose knots and in good, serviceable condition. Size and spacing shall be in accordance with OSHA regulations.

D. Steel Sheeting and Sheet Piling: Steel sheet piling shall be the continuous interlock type. The weight, depth and section modulus of the sheet piling shall be sufficient to restrain the loads of earth pressure and surcharge from live loads. Procedure for installation and bracing shall be so scheduled and coordinated with the removal of the earth that the ground under existing structures shall be protected against lateral movement at all times. The Contractor shall provide closure and sealing between sheet piling and existing facilities.

E. Trench Shield: A trench shield or box may be used to support the trench walls. The use of a trench shield does not necessarily preclude the additional use of bracing and sheeting. When trench shields are used, care must be taken to avoid disturbing the alignment and grade of the pipe or disrupting the haunching of the pipe as the shield is moved. When the bottom of the trench shield extends below the top of the pipe, the trench shield will be raised in 6-inch increments with specified backfilling occurring simultaneously. At no time shall the trench shield be “dragged” with the bottom of the shield extending below the top of the pipe or utility.

F. Remove bracing and sheeting in units when backfill reaches the point necessary to protect the pipe and adjacent property. Leave sheeting in place when in the opinion of the Engineer it cannot be safely removed or is within three feet of an existing structure, utility, or pipeline. Cut off any sheeting left in place at least two feet below the surface.

G. Sheet piling within three feet of an existing structure or pipeline shall remain in place, unless otherwise directed by the Engineer.

3.03 Trench Rock Excavation

A. Definition of Trench Rock: Any material which cannot be excavated with conventional excavating equipment, and is removed by drilling and blasting, and occupies an original volume of at least one-half cubic yard.

B. Blasting: Provide licensed, experienced workmen to perform blasting. Conduct blasting operations in accordance with all existing ordinances and regulations. Protect all buildings and structures from the effects of the blast. Repair any resulting damage. If the Contractor repeatedly uses excessive blasting charges or blasts in an unsafe or improper manner, the Engineer may direct the Contractor to employ an independent blasting consultant to supervise the preparation for each blast and approve the quantity of each charge.

C. Removal of Rock: Dispose of rock off site that is surplus or not suitable for use as rip rap or backfill.

D. The Contractor shall notify the Engineer prior to any blasting. Additionally, the Contractor shall notify the Engineer and local fire department before any charge is set.

E. Following review by the Engineer regarding the proximity of permanent buildings and structures to the blasting site, the Engineer may direct the Contractor to employ an independent, qualified specialty subcontractor, approved by the Engineer, to monitor the blasting by use of seismograph, identify the areas where light charges must be used, conduct pre-blast and post-blast inspections of structures, including photographs or videos, and maintain a detailed written log.

3.04 Dewatering Excavations

A. Dewater excavation continuously to maintain a water level two feet below the bottom of the trench.

B. Control drainage in the vicinity of excavation so the ground surface is properly pitched to prevent water running into the excavation.

C. There shall be sufficient pumping equipment, in good working order, available at all times, to remove any water that accumulates in excavations. Where the utility crosses natural drainage channels, the work shall be conducted in such a manner that unnecessary damage or delays in the prosecution of the work will be prevented. Provision shall be made for the satisfactory disposal of surface water to prevent damage to public or private property.

D. In all cases, accumulated water in the trench shall be removed before placing bedding or haunching, laying pipe, placing concrete or backfilling.

E. Where dewatering is performed by pumping the water from a sump, crushed stone shall be used as the medium for conducting the water to the sump. Sump depth shall be at least two feet below the bottom of the trench. Pumping equipment shall be of sufficient quantity and/or capacity to maintain the water level in the sump two feet below the bottom of the trench. Pumps shall be a type such that intermittent flows can be discharged. A standby pump shall be required in the event the operating pump or pumps clog or otherwise stop operation.

F. Dewater by use of a well point system when pumping from sumps does not lower the water level two feet below the trench bottom. Where soil conditions dictate, the Contractor shall construct well points cased in sand wicks. The casing, 6 to 10-inches in diameter, shall be jetted into the ground, followed by the installation of the well point, filling casing with sand and withdrawing the casing.

3.05 Trench Foundation and Stabilization

A. The bottom of the trench shall provide a foundation to support the pipe and its specified bedding. The trench bottom shall be graded to support the pipe and bedding uniformly throughout its length and width.

B. If, after dewatering as specified above, the trench bottom is spongy, or if the trench bottom does not provide firm, stable footing and the material at the bottom of the trench will still not adequately support the pipe, the trench will be determined to be unsuitable and the Engineer shall then authorize payment for trench stabilization.

C. Should the undisturbed material encountered at the trench bottom constitute, in the opinion of the Engineer, an unstable foundation for the pipe, the Contractor shall be required to remove such unstable material and fill the trench to the proper subgrade with crushed stone or surge stone as directed by the Engineer.

D. Where the replacement of unsuitable material with crushed stone or surge stone does not provide an adequate trench foundation, the trench bottom shall be excavated to a depth of at least two feet below the specified trench bottom. Place filter fabric in the bottom of the trench and support the fabric along the trench walls until the trench stabilization, bedding, haunching and pipe have been placed at the proper grade. The ends of the filter fabric shall be overlapped above the pipe.

E. Where the replacement of unsuitable material with crushed stone or surge stone does not provide an adequate trench foundation, the trench bottom shall be excavated to a depth of at least two feet below the specified trench bottom. Place the crushed stone or surge stone in the bottom of the trench and compact. Place the filter fabric over this stone and support the fabric along the trench walls until the bedding, haunching and pipe have been placed at the proper grade. The ends of the fabric shall be laid over the haunching material prior to the placement of the initial backfill.

F. Where trench stabilization is provided, the trench stabilization material shall be compacted to at least 90 percent of the maximum dry density, unless shown or specified otherwise.

3.06 Bedding and Haunching

A. Prior to placement of bedding material, the trench bottom shall be free of any water, loose rocks, boulders or large dirt clods.

B. Bedding material shall be placed to provide uniform support along the bottom of the

pipe and to place and maintain the pipe at the proper elevation. The initial layer of bedding placed to receive the pipe shall be brought to the grade and dimensions indicated on the Drawings. All bedding shall extend the full width of the trench bottom. The pipe shall be placed and brought to grade by tamping the bedding material or by removal of the excess amount of the bedding material under the pipe. Adjustment to grade line shall be made by scraping away or filling with bedding material. Wedging or blocking up of pipe shall not be permitted. Applying pressure to the top of the pipe, such as with a backhoe bucket, to lower the pipe to the proper elevation or grade shall not be permitted. Each pipe section shall have a uniform bearing on the bedding for the length of the pipe, except immediately at the joint.

C. At each joint, excavate bell holes of ample depth and width to permit the joint to be assembled properly and to relieve the pipe bell of any load.

D. After the pipe section is properly placed, add the haunching material to the specified depth. The haunching material shall be shovel sliced, tamped, vigorously chinked or otherwise consolidated to provide uniform support for the pipe barrel and to fill completely the voids under the pipe, including the bell hole. Prior to placement of the haunching material, the bedding shall be clean and free of any water, loose rocks, boulders or dirt clods.

E. Gravity Sewers and Accessories: Lay PVC pipe with minimum Class “B” bedding. Lay all other pipe with Class “C” bedding, unless shown or specified otherwise.

1. Class “A” (Bedding Factor - 2.8): Excavate the bottom of the trench flat at a minimum depth as shown on the Drawings, below the bottom of the pipe barrel. Lay pipe to line and grade on concrete block. Place concrete to the full width of the trench and to a height of one-fourth of the outside diameter of the pipe above the invert.

2. Class “B” (Bedding Factor - 1.9): Excavate the bottom of the trench flat at a minimum depth as shown on the Drawings, below the bottom of the pipe barrel. Place and compact bedding material to the proper grade. Haunching material shall then be carefully placed by hand and compacted to provide full support under and up to the centerline of the pipe.

3. Class “C” (Bedding Factor - 1.5): Excavate the bottom of the trench flat at a minimum depth as shown on the Drawings, below the bottom of the pipe barrel. Place and compact bedding material to the proper grade. Haunching material shall then be carefully placed by hand and compacted to provide full support under and up to a height of one-fourth the outside diameter of the pipe above the bottom of the pipe barrel.

4. HDPE Pipe: Excavate the bottom of the trench flat at a minimum depth as shown on the Drawings, below the bottom of the pipe barrel. Place and compact bedding material to the proper grade. Haunching material shall be carefully placed by hand and compacted to provide full support under and up to 18-inches over the top of the pipe for pipe 42-inches in diameter and larger, and 12-inches over the top of the pipe for pipe 36-inches in diameter and smaller.

5. Type 5: Excavate the bottom of the trench flat at a minimum depth as shown on the Drawings, below the bottom of the pipe barrel. Place and compact bedding material to the proper grade before installing pipe. After the pipe has been brought to the proper grade, haunching material shall be carefully placed by hand and compacted to the top of the pipe.

F. Manholes: Excavate to a minimum of 12-inches below the planned elevation of the base of the manhole. Place and compact crushed stone bedding material to the required grade before constructing the manhole.

G. Water Mains

1. Ductile Iron Pipe

a. Unless otherwise shown on the Drawings or specified, utilize earth materials for bedding and haunching. Type 2, 3, 4 and 5 bedding shall be as detailed on the Drawings.

b. Unless specified or shown otherwise, bedding shall meet the requirements for Type 2 Pipe Bedding. Unless specified or shown otherwise for restrained joint pipe and fittings, bedding shall meet the requirements for Type 3 Pipe Bedding.

c. Where the depth of cover over the piping exceeds 16 feet, the pipe bedding shall meet the requirements of Type 4 Pipe Bedding. Where the depth of cover over the piping exceeds 20 feet, the pipe bedding shall meet the requirements of Type 5 Pipe Bedding.

d. Type 4 or Type 5 Pipe Bedding called for on the Drawings, specified or ordered by the Engineer, shall meet requirements for Type 4 or Type 5 Pipe Bedding, utilizing crushed stone bedding and haunching material.

2. Polyvinyl Chloride Pipe

a. Unless shown otherwise on the Drawings, utilize earth materials for bedding and haunching.

b. Unless shown otherwise on the Drawings, bedding and haunching shall meet the requirements for Type 2 Pipe Bedding, as detailed on the Drawings.

3. Prestressed Concrete Cylinder Pipe: Bedding and haunching shall meet the requirements of Type 3 Pipe Bedding.

H. Polyethylene Pipe for Gas Service

1. Unless otherwise shown on the Drawings, use fine aggregate materials for bedding and haunching.

2. Unless otherwise shown on the Drawings, bedding and haunching shall meet the requirements for Type 5 pipe bedding as detailed on the Drawings.

I. Excessive Width and Depth

1. Gravity Sewers: If the trench is excavated to excess width, provide the bedding class with the next higher bedding factor. Crushed stone haunching and initial backfill may be used in lieu of Class “A” bedding, where Class “A” bedding is necessitated by excessive trench width.

2. Water Mains: If the trench is excavated to excess width, provide the next higher type or class of pipe bedding, but a minimum of Type 4, as detailed on the Drawings.

3. If the trench is excavated to excessive depth, provide crushed stone to place the bedding at the proper elevation or grade.

J. Compaction: Bedding and haunching materials under pipe, manholes and accessories shall be compacted to a minimum of 90 percent of the maximum dry density, unless shown or specified otherwise.

3.07 Initial Backfill

A. Initial backfill shall be placed to anchor the pipe, protect the pipe from damage by subsequent backfill and ensure the uniform distribution of the loads over the top of the pipe.

B. Place initial backfill material carefully around the pipe in uniform layers to a depth of at least 18-inches above the pipe barrel or duct bank. Layer depths shall be a maximum of 6-inches for pipe 18-inches in diameter and smaller and a maximum of 12-inches for pipe larger than 18-inches in diameter.

C. Backfill on both sides of the pipe simultaneously to prevent side pressures.

D. Compact each layer thoroughly with suitable hand tools or tamping equipment.

E. Initial backfill shall be compacted to a minimum 90 percent of the maximum dry density, unless shown or specified otherwise.

F. If materials excavated from the trench are not suitable for use as backfill materials, provide select backfill material conforming to the requirements of this Section.

3.08 Concrete Encasement for Pipelines

A. Where concrete encasement is shown on the Drawings for pipelines, excavate the trench to provide a minimum of 6-inches clearance from the bell of the pipe. Lay the pipe to line and grade on concrete blocks. In lieu of bedding, haunching and initial

backfill, place concrete to the full width of the trench and to a height of not less than 6-inches above the pipe bell. Do not backfill the trench for a period of at least 24 hours after concrete is placed.

3.09 Final Backfill

A. Backfill carefully to restore the ground surface to its original condition.

B. The top 6-inches shall be topsoil obtained as specified in “Trench Excavation” of this Section.

C. If materials excavated from the trench are not suitable for use as backfill materials, provide select backfill material conforming to the requirements of this Section.

D. After initial backfill material has been placed and compacted, backfill with final backfill material. Place backfill material in uniform layers, compacting each layer thoroughly as follows:

1. In 6-inch layers, if using light power tamping equipment, such as a “jumping jack”.

2. In 12-inch layers, if using heavy tamping equipment, such as hammer with tamping feet.

3. In 24-inch layers, if using a hydra-hammer.

E. Settlement: If trench settles, re-fill and grade the surface to conform to the adjacent surfaces.

F. Final backfill shall be compacted to a minimum 90 percent of the maximum dry density, unless specified otherwise.

3.10 Additional Material

A. Where final grades above the pre-construction grades are required to maintain minimum cover, additional fill material will be as shown on the Drawings. Utilize excess material excavated from the trench, if the material is suitable. If excess excavated materials are not suitable, or if the quantity available is not sufficient, provide additional suitable fill material.

3.11 Backfill Under Roads

A. Compact backfill underlying pavement and sidewalks, and backfill under dirt and gravel roads to a minimum 95 percent of the maximum dry density. The top 12-inches shall be compacted to a minimum of 98 percent of the maximum dry density.

3.12 Backfill Along Restrained Joint Pipe

A. Backfill along restrained joint pipe shall be compacted to a minimum 90 percent of the maximum dry density.

3.13 Detection Tape

A. Where required, detection tape shall be buried 4 to 10-inches beneath the ground surface directly over the top of the pipe. Should detection tape need to be installed deeper, the Contractor shall provide 3-inch wide tape. In no case shall detection tape be buried greater than 20-inches from the finished grade surface.

3.14 Testing and Inspection

A. The soils testing laboratory is responsible for the following:

1. Compaction tests in accordance with Article 1.02 of this Section.

2. Field density tests for each two feet of lift, one test for each 500 feet of pipe installed or more frequently if ordered by the Engineer.

3. Inspecting and testing stripped site, subgrades and proposed fill materials.

B. The Contractor's duties relative to testing include:

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 re-testing where initial tests reveal non-conformance with specified requirements.

4. Providing excavation as necessary for laboratory personnel to conduct tests.

C. Inspection

1. Earthwork operations, acceptability of excavated materials for bedding or backfill, and placing and compaction of bedding and backfill is subject to inspection by the Engineer.

2. Foundations and shallow spread footing foundations are required to be inspected by a geotechnical engineer, who shall verify suitable bearing and construction.

D. Comply with applicable codes, ordinances, rules, regulations and laws of local, municipal, state or federal authorities having jurisdiction.

END OF SECTION

Section 32 1216
Asphalt Paving

Part 1 General

1.01 Related Documents

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

1.02 Summary

A. Section Includes:

1. Cold milling of existing hot-mix asphalt pavement.

2. Hot-mix asphalt patching.

3. Hot-mix asphalt paving.

4. Hot-mix asphalt paving overlay.

5. Asphalt surface treatments.

6. Pavement-marking paint.

1.03 Definition

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

1.04 Submittals

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

1. Job-Mix Designs:For each job mix proposed for the Work.

1.05 Quality Assurance

A. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of GDOT for asphalt paving work.

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

1.06 Delivery, Storage, and Handling

A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.

B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.07 Project Conditions

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

1. Prime Coat: Minimum surface temperature of 60 deg F.

2. Tack Coat: Minimum surface temperature of 60 deg F.

3. Slurry Coat: Comply with weather limitations in ASTM D 3910.

4. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.

5. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces deg at a minimum ambient or surface temperature of 40 deg F for oil-based materials, 55 deg F for water-based materials, and not exceeding 95 deg F.

Part 2 Products

NOTE:
All references to vendors and "approved manufacturers" are included for description of quality and content of the designated equipment/materials. Equivalent items may be accepted if they meet all standards of quality and purpose for the intended use, as determined by City of Sandy Springs.

2.01 Aggregates

A. General: Use materials and gradations that have performed satisfactorily in previous installations.

B. Coarse Aggregate: ASTM D 692, sound; angular crushed stone, crushed gravel.

C. Fine Aggregate: ASTM D 1073 or AASHTO M29, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.

1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.

2.02 Asphalt Materials

A. Comply with Georgia Department of Transportation Standard Specifications for each mix indicated on the Drawings.

B. Water: Potable.

2.03 Auxiliary Materials

A. Pavement-Marking Paint: Use traffic line paints that meet the applicable requirements of GDOT Section 870.2.02.

1. Color: As indicated.

2.04 Mixes

A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction and complying with the following requirements:

1. Comply with Georgia Department of Transportation Standard Specifications for each mix indicated on the Drawings.

2. Base Course: as indicated on the Drawings.

3. Surface Course: as indicated on the Drawings.

B. Emulsified-Asphalt Slurry: ASTM D 3910, Type 2.

Part 3 Execution

3.01 Examination

A. Verify that subgrade is dry and in suitable condition to begin paving.

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

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.

2. Proof roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.

3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Engineer, and replace with compacted backfill or fill as directed.

C. Proceed with paving only after unsatisfactory conditions have been corrected as verified by the Engineer.

3.02 Cold Milling

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

1. Mill to depth indicated.

2. Mill to a uniform finished surface free of excessive gouges, grooves, and ridges.

3. Control rate of milling to prevent tearing of existing asphalt course.

4. Repair or replace curbs, manholes, and other construction damaged during cold milling.

5. Excavate and trim unbound-aggregate base course, if encountered, and keep material separate from milled hot-mix asphalt.

6. Keep milled pavement surface free of loose material and dust.

3.03 Patching

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

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

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.

2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

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

3.04 Repairs

A. Leveling Course: Install and compact leveling course consisting of hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch in existing pavements.

1. Install leveling wedges in compacted lifts not exceeding 3 inches thick.

B. Crack and Joint Filling: Remove existing joint filler material from cracks or joints to a depth of 1/4 inch.

1. Clean cracks and joints in existing hot-mix asphalt pavement.

2. Use emulsified-asphalt slurry to seal cracks and joints less than ¼ inch wide. Fill flush with surface of existing pavement and remove excess.

3. Use hot-applied joint sealant to seal cracks and joints more than ¼ inch wide. Fill flush with surface of existing pavement and remove excess.

3.05 Surface Preparation

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

B. Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of 0.15 to 0.50 gal./sq. yd. Apply enough material to penetrate and seal but not flood surface. Allow prime coat to cure.

1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.

2. Protect primed substrate from damage until ready to receive paving.

C. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd.

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.

2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.06 Hot Mix Asphalt Placing

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a

manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.

2. Spread mix at minimum temperature of 250 deg F.

3. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.

4. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

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

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.

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

3.07 Joints

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

1. Clean contact surfaces and apply tack coat to joints.

2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.

3. Offset transverse joints, in successive courses, a minimum of 24 inches.

4. Construct transverse joints at each point where paver ends a day’s work and resumes work at a subsequent time. Construct these joints using either “bulkhead” or “papered” method according to AI MS-22, for both “Ending a Lane” and “Resumption of Paving Operations.”

5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.

6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.08 Compaction

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

1. Complete compaction before mix temperature cools to 185 deg F.

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

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

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

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

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

F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to the specified density and surface smoothness.

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

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

3.09 Installation Tolerances

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

1. Base Course: Plus or minus 1/2 inch.

2. Surface Course: Plus 1/4 inch, no minus.

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

1. Base Course: 1/4 inch.

2. Surface Course: 1/8 inch.

3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

3.10 Pavement Marking

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Engineer.

B. Allow paving to age for 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 wet film thickness of 15 mils.

1. Broadcast glass beads uniformly into wet pavement markings at a rate of 6 lb/gal. where indicated.

3.11 Field Quality Control

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.

C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

D. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to GDOT standards.

E. Replace and compact hot-mix asphalt where core tests were taken.

F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.12 Disposal

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

1. Do not allow milled materials to accumulate on-site.

B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for oil-based materials, 55 g F deg for water-based materials, and not exceeding 95 deg F. Two coats shall be applied after 30 days or asphalt cure.

END OF SECTION

Section 32 1313
Portland Cement Concrete Paving

Part 1 General

1.01 Scope

A. Concrete paving with steel mesh or polypropylene fiber as indicated.

1.02 Submittals

A. Prepare and submit the proposed concrete mix design to be used. Design mix is to be approved by the Owner's Representative prior to commencing work. See Concrete Mix Design.

B. Upon request, provide a certificate from the manufacturer or supplier that materials designated by reference to COE, AASHTO, ASTM, or ACI standards meet the latest edition requirements of these agencies.

C. Test results of cores as may be required.

D. Sample areas as indicated in Section 3.01, C.

1.03 Quality Assurance

A. Qualifications: All Contractors or subcontractors performing work under this section shall be qualified to do such work and hold the appropriate registration, license, or other permit as required by state or local law.

B. Requirements of Regulatory Agencies: Contractor shall procure all permits and licenses, and give all notices necessary and incidental to the due and lawful prosecution of the work.

C. Testing

1. Owner shall provide and pay for the services of an independent testing laboratory for conducting field testing and inspection.

2. The Contractor shall cooperate with laboratory personnel at all times.

3. In the event that the concrete does not meet the required strength to the satisfaction of the Owner's Representative, the Contractor shall remove that portion of construction in question and rebuild it all at his/her own expense.

D. Performance Requirements

1. Place no surfacing on frozen or saturated subgrade.

2. Wavy, undulating, or ponding surfaces will not be acceptable and must be

replaced at the Contractor's expense.

E. Product Delivery, Storage, and Handling

1. Store cement and aggregate in such a manner as to prevent deterioration or contamination with foreign matter. Store each size of aggregate separately and in such a manner as to maintain segregation. Cement which has become caked, partially set, or otherwise deteriorated will be rejected. Any material which has become damaged or contaminated will be rejected.

2. No materials or lumber shall be stored within the fenced area of protected trees.

F. Materials

1. Materials designated by specific manufacturer's trade names are approved, subject to compliance with the quality and performance indicated by the manufacturer.

2. Instructions and specifications published by the manufacturer of such materials are included in and are a part of these Specifications.

G. Concrete Mix Design

1. Establish concrete mix design proportions per ACI 318, Chapter 4.

2. Indicate type and quantities of material used, the fresh unit weight, slump air contact, aggregate analysis, dry weight of aggregates, saturated weight of aggregates, and comprehensive strength at 28 days.

3. Verify mix designs with results of a laboratory trial batch.

4. An independent testing laboratory shall verify that the materials used meet all applicable ASTM specifications.

5. Mix designs not conforming to the above will be rejected.

6. Payment for the design and verifying the concrete mix design will be by the supplier.

7. Submit concrete mix design with supporting data confirming compliance with the above.

8. Concrete mix shall include polypropylene fibers mixed with the above.

1.04 Job Conditions

A. Contractor shall be familiar with the site, the Drawings, the Specifications, special provisions, and plan requirements and is responsible for calling any discrepancies or potential problems to the attention of the Owner's Representative.

B. Protection

1. Contractor shall provide adequate protective measures such as barricades, flags, lights, signage/fence, bridging, or other measures to ensure the safety of passersby and the work itself. Such measures shall be in accordance with federal, state, or local law.

2. Contractor shall take special measures to prevent travel over concrete pavement until it has had sufficient time to cure.

C. Environmental Requirements: Excess or waste materials will not be allowed to accumulate on the site. No cleaning of tools or equipment will be permitted where the residue would be harmful to the construction, the soil, or plant materials.

D. Scheduling: Contractor shall coordinate his/her work with that of other Contractors to ensure efficient and orderly progress of the work.

E. Work in Public Right-of-Way: All concrete paving and aprons in public right-of-way are to conform to the standard requirements of the community.

F. Surveyor: Contractor shall provide the services of a registered surveyor to lay out the work and check the grades during its progress.

G. Construction Stakes: Construction stakes shall be set to mark the general location, alignment, elevation, and grade of this work. The Contractor shall assume full responsibility for dimension and elevations from such stakes.

Part 2 Products

NOTE:
All references to vendors and "approved manufacturers" are included for description of quality and content of the designated equipment/materials. Equivalent items may be accepted if they meet all standards of quality and purpose for the intended use, as determined by the Owner.

2.01 Materials

A. Fabric Steel: Cold drawn steel wire conforming to ASTM A 82 with the following exception: Galvanized wire shall be completely covered in a workmanlike manner with a coating of pure zinc of uniform thickness, so applied that it will adhere firmly to the surface of the wire. The minimum weight of zinc coating shall be 0.8 ounces of zinc per square foot of surface as determined by ASTM A 90.

B. Fiber Reinforcement: Polypropylene fiber.

C. Dowel Bars: One inch smooth round, straight steel bars 18-inches long, one end coated with heavy grease and provided with approved tight-fitting metal sleeve.

D. Reinforcing Steel: ASTM A 615.

E. Cement

1. Conform to ASTM C 150, Type II (use one brand only).

2. Cement used shall conform to that cement on which the selection of concrete proportions was based.

3. Minimum Cement Content:

a. In areas exposed to a freeze-thaw cycle or the use of de-icing salts, concrete shall be produced with a minimum cement content of 560 pounds per cubic yard and an entrained air content of 6 percent ± 2 percent by volume.

b. In areas where freeze-thaw durability is not essential, concrete shall be produced with a minimum cement content of 520 pounds per cubic yard and an entrained air content of 6 percent ± 2 percent by volume.

F. Aggregate

1. Conform to ASTM C 33.

2. The maximum coarse aggregate size shall be not more than one-fourth of the slab thickness.

G. Admixtures: Air-entraining admixtures for concrete shall conform to ASTM C 260.

H. Water: All mixing water shall be clean and free from deleterious amounts of acids, alkalis or organic materials, pr ACI 318.

I. Retarder: “Rugasol” as manufactured by Sika Chemical Corporation or approved equal.

J. Curing Compound: Clear or translucent conforming to ASTM C 309.

K. Expansion Joint Material: Asphalt impregnated premolded fiber material of the size indicated on the plans and meeting ASTM D 1751.

L. Joint Sealer: Sonolastic Pavement Joint Sealer, or approved equal.

M. Polypropylene Fiber Admixture: 3/4-inch long fibers meeting ASTM C 1116-89 at the rate of 1-1/2 pounds of fibers per cubic yard of concrete. Mix per manufacturer’s recommendations.

N. Construction or Contraction/Control Joint Material Alternate: Key-Loc Joint system as manufactured by Form-A-Key Products Division, Louisville, Kentucky 40214 (1-800-662-5576). Approved equal may also be used.

2.02 Mixes

A. Concrete

1. Concrete shall be “ready-mixed” meeting ASTM C94.

2. Concrete above ground where detailed shall develop minimum 3,500 psi at 28 days and be air-entrained, see plans.

3. Concrete below ground where detailed shall develop minimum 3,000 psi at 28 days and be air-entrained, see plans.

4. Concrete which has set prior to placement shall be discarded.

B. Concrete Slump

1. Minimum slump shall be 2-inches.

2. Maximum slump shall be 4-inches.

Part 3 Execution

3.01 Installation

A. Concrete paving and walks shall be constructed in accordance with the following provisions:

1. Slopes: The Contractor shall construct all paving in accordance with the spot elevations, details, and cross-sections. This shall include the cross-slopes, expansion joints, construction joints, and finish. In addition, the following shall apply to the construction of paving where not otherwise covered by details; provide grade stakes not more than 25 feet apart for all walk construction; check top of forms for grade before placing concrete; introduce short vertical curves in walks as shown on the Drawings or at points where change in walk grade exceeds two percent. For a distance of two feet from top to bottom of steps, the walk slope shall not exceed 1/2-inch per foot. Provide maximum 1/4-inch per foot crown or cross-slope in the direction indicated on the Drawings. Pitch walks to make slight adjustments in slope at walk intersections as necessary or directed to provide proper drainage.

2. Dimensions: Concrete paving shall be of one-course construction of the thickness and width shown on the Drawings.

3. Expansion Joints: Provide expansion joints, not more than 30 feet apart, at walk junctions and intersections, at top and bottom of steps, and where walks abut curb returns, buildings, platforms, or other fixed structures, or terminate at curbs. Locate expansion joints at such points where concrete panels are not larger than 250 square feet. At walk junctions and intersections, the required expansion joints shall be located at the end of each rounding or fillet. Expansion joints shall be at right angles to the slab and extend to within 1/4-

inch of the surface.

4. Isolation Joints: Isolation joints shall be used to isolate fixed objects abutting or within the paved area. They shall contain premolded joint filler as shown on the Drawings and shall be sealed at the top, all in a manner similar to that specified for expansion joints.

5. Control or Contraction Joints: Control or contraction joints shall be formed by one of the following methods as indicated on the Drawings; sawing, forming by hand, or forming by premolded filler. Joint depth shall be a minimum of one-fourth of the slab thickness. Hand formed joints shall have a maximum edge of 1/4-inch. Sawing of joints shall be as soon as the concrete has hardened sufficiently to permit sawing without excessive raveling. All joints shall be completed before uncontrolled shrinkage cracking occurs. Joints shall be continuous across the slab, unless interrupted by full-depth premolded joint filler.

6. “Picture-framing” will not be permitted unless specifically indicated on the Drawings.

B. Placement

1. Before placing concrete, free-standing water, snow, ice, or other foreign materials shall be removed from the subgrade or aggregate base.

2. All forms shall be thoroughly cleaned, secured in position, and coated with a form release agent.

3. If metal keyway is used to form a specified joint, it shall be clean, secure in position to ensure a straight joint and proper depth, and coated with a form release agent. The metal keyway is to be removed prior to pouring adjacent grids.

4. Concrete shall be placed, struck off, consolidated, and finished to plan grade with a mechanical finishing machine, vibrating screed, or by hand-finishing methods when approved. In lieu of fixed forms, the Contractor may place concrete with a slipform paver designed to spread, consolidate, screed, and float finish the freshly placed concrete in one complete pass of the machine. Pavement is to be pitched to area drains or perimeter areas to remove water and shall conform to finished grades as established on the plans.

C. Finishing

1. There are three types of concrete finishes throughout the project. Contractor shall review all concrete finish locations with the Owner’s representative prior to commencement. Each type of finish shall be indicated in a 3’ x 3’ sample area for Owner’s Representative review and approval. Approval of subsequent finishing shall match the approved sample.
   a. Smooth Trowel Finish (beneath all roof lines of pavilions, shelters, kiosk and restroom): Tamp and screed the concrete true to grade and section,

bringing sufficient mortar to the surface for finishing and give a smooth trowel finish. Round all edges, including those along expansion joints and grooves, to a 1/4-inch radius. Where a pavement changes at an adjacent concrete paving, provide a 1/4" beveled trowel joint.

b. Broom Textured Finish (all surfaces not beneath an architectural structure or roof over have where the grade is 1 1/2% to 5%): Tamp and screed the concrete true to grade and section, bringing sufficient mortar to the surface for finishing and give a wood or carpet-float finish provided that where the walk grade exceeds five percent, the surface shall be given a bolted or broomed finish as directed by the Owner's Representative. Round all edges, including those along expansion joints and grooves, to a 1/4-inch radius. Where a walk terminates at a curb, finish the walk 1/4-inch above the curb, providing a neat bevel.

c. Rough Broom Textured Finish (all surfaces greater than 5% to 13%): Tamp and screed the concrete true to grade and section, bringing sufficient mortar to the surface for finishing and give a wood or carpet-float finish. The surface shall be given a rough broom finish as directed by the Owner's Representative. Finish shall have twice the roughness of a regular broom finish. Round all edges, including those along expansion joints and grooves, to a 1/4-inch radius.

D. Curing

1. Concrete shall be cured by protecting it from loss of moisture, rapid temperature change, and mechanical injury for at least three days after placement. After all free water has disappeared from the surface, a liquid membrane-forming compound or other approved curing material shall be uniformly sprayed on all exposed surfaces. The rate of application shall be in accordance with the manufacturer's recommendations.

2. When concrete is being placed in cold weather and the temperature may drop below 35° F, straw or hay insulated curing blankets or other suitable materials shall be provided to prevent freezing of concrete. Concrete damaged by freezing or other weather action shall be removed and replaced at the Contractor's expense.

E. Protection: Remove no forms for 24 hours after pouring concrete. Protect concrete walks from pedestrian traffic for a period of three days after pouring.

3.02 Plasticized Concrete

A. If the Contractor requests a slump in excess of the above specified, it shall be obtained by addition of an approved plasticizer, rather than water, and shall conform to ASTM C 494, Type F (Mighty 150 or FX 326).

B. The Owner's Representative shall approve the admixture and content prior to use by the Contractor. The Contractor shall also test admixtures in combination with job cements under conditions to be expected on the job site prior to their actual

incorporation into any full-scale field project.

C. If plasticized concrete is used, melamine-based high range water reducers shall be utilized; control slump shall be 3-inches; air entrainment shall be 6 percent ± 1 percent; the water-cement ratio shall be 0.47; and the compressive water reducer shall be 0.3 percent to 0.4 percent by weight of cement.

3.03 Existing Roads, Walks, and Curbs

A. Cut, patch, and replace existing roads, walks, and curbs as required for new construction.

B. Repair or replace existing surfacing damaged by construction activities. All such work is to match existing.

C. Meet all requirements as may be established by local governing agencies.

3.04 Cleanup

A. Upon completion of the work, Contractor will remove all equipment, tools, rubbish, excess materials, or other debris from the site and all parts of the work shall be left in a clean and finished condition acceptable to the Owner.

END OF SECTION

Part 1 - General

1.01 Section Includes

A. Concrete segmental retaining wall units
B. Geosynthetic reinforcement
C. Leveling pad base
D. Drainage aggregate
E. Reinforced Backfill
F. Drainage pipe
G. Pre-fabricated Drainage Composite
H. Geotextile Filter
I. Impervious Materials
J. Construction Adhesive

1.02 Related Sections

A. Section 01 2000 – Unit Costs
B. Section 31 2000 – Earthwork
C. Section 31 2301 – Earthwork for Structures
D. Section 33 4100 – Storm Utility Drainage Piping
E. Section 32 3223 – Soil Nail Wall

1.03 References

A. American Association of State Highway Transportation Officials (AASHTO)
   1. AASHTO M288 Geotextile Specification for Highway Applications
   2. AASHTO Standard Specifications for Highway Bridges
   3. AASHTO T-27 Test Method for Gradation Limits
B. American Society for Testing and Materials (ASTM)
   1. ASTM C33 Standard Specification for Concrete Aggregates
   2. ASTM C90 Standard Specification for Load Bearing Concrete Masonry Units
   3. ASTM C140 Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
   4. ASTM C150 Standard Specification for Portland Cement
   5. ASTM C595 Standard Specification for Blended Hydraulic Cements
   6. ASTM C1262 Standard Test Method for Evaluating the Freeze-Thaw Durability of Manufactured Concrete Masonry Units and Related Concrete Units
   7. ASTM C1372 Standard Specification for Segmental Retaining Wall Units
   8. ASTM D422 Standard Test Method for Particle-Size Analysis of Soils
   9. ASTM D448 Standard Classification for Sizes of Aggregate for Road and Bridge Construction
   10. ASTM D698 Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/f3)(600 kN-m/m3)
   11. ASTM D1248 Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable

12. ASTM D1556 Standard Test Method for Density and Unit Weight of Soil In Place by the Sand Cone Method
13. ASTM D1557 Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/f^3)(2700 kN-m/m^3)
14. ASTM D2166 Standard Test Method for Unconfined Compressive Strength of Cohesive Soil
15. ASTM D2487 Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)
16. ASTM D2922 Standard Test Method for Density of Soil and Soil-Aggregate In Place by Nuclear Methods (Shallow Depth)
17. ASTM D3034 Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer pipe and Fittings
18. ASTM D3080 Standard Test Method for Direct Shear Test of Soils Under Consolidated Drained Conditions
19. ASTM D4318 Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
20. ASTM D4491 Standard Test Method for Water Permeability of Geotextiles by the Permittivity Method
21. ASTM D4595 Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method
22. ASTM D4632 Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
23. ASTM D4873 Standard Guide for Identification, Storage and Handling of Geosynthetics
24. ASTM D5084 Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.
25. ASTM D5262 Standard Test Method for Evaluating the Unconfined Tension Creep Behavior of Geosynthetics
26. ASTM D5321 Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method
27. ASTM D5818 Standard Practice for Obtaining Samples of Geosynthetics from a Test Section for Assessment of Installation Damage
28. ASTM D6637 Standard Test Method for Determining Tensile Properties of Geogrids by the Single or Multi-Rib Tensile Method
29. ASTM D6638 Standard Test Method for Determining Connection Strength Between Geosynthetic Reinforcement and Segmental Concrete Units
30. ASTM D6706 Standard Test Method for Measuring Geosynthetic Pullout Resistance in Soil
31. ASTM F405 Standard Specification for Corrugated Polyethylene (PE) Tubings and Fittings
32. ASTM G51 Standard Test Method for Measuring pH of Soil for Use in Corrosion Testing
33. ASTM G57 Standard Test Method for Field Measurement of Soil Resistivity Using the Wenner Four-Electrode Method

C. Federal Highway Administration
   1. Mechanically Stabilized Earth Walls and Reinforced Soil Slope Design and Construction Guidelines (FHWA NHI-00-043, March 2001)

D. National Concrete Masonry Association (NCMA)
   1. NCMA Design Manual For Segmental Retaining Walls, Second Edition (1997)

2. NCMA SRWU-1 Connection Strength of Segmental Retaining Wall Units and Geosynthetic
3. NCMA SRWU-2 Determination of Shear Strength Between Segmental Concrete Units

E. Geo-synthetic Research Institute (GRI)
1. GG1 Standard Test Method for Geosynthetic Rib Tensile Strength
2. GG2 Standard Test Method for Geosynthetic Junction Strength
3. GG4-91 Determination of Geosynthetic Long Term Design Strength
4. GG5-91 Geosynthetic Pullout

1.04 Definitions

A. Mechanically Stabilized Earth (MSE): Successive horizontal layers of high tensile strength reinforcement placed between layers of compacted soil or gravel to form an earth structure which acts as a gravity mass enabling grade changes of near vertical faces.
B. Concrete Segmental Retaining Wall (SRW) Units: Dry-stacked masonry units used as the retaining wall fascia.
C. Reinforced Backfill: Soil which is used as fill behind the SRW unit, and within the reinforced soil mass (if applicable).
D. Drainage Aggregate: Material used (if applicable) within, between, and directly behind the concrete retaining wall units as well as within sub drains, blanket and chimney drains.
E. Geotextile Filter: Material used for separation and filtration of dissimilar soil/gravel types.
F. Foundation Soil: Soil mass supporting the leveling pad and reinforced soil zone of the retaining wall system.
G. Geosynthetic Reinforcement: Polymeric material designed specifically to reinforce the soil mass.
H. Pre-fabricated Drainage Composite: three-dimensional geosynthetic drainage medium encapsulated in a geotextile filter, used to transport water.
I. Impervious Materials: Clay soil or low permeability soil (ML, CL, CH) as well as geosynthetic used to prevent water percolation into the drainage zone behind the wall.
J. Global Stability: The general mass movement of a soil reinforced structure and adjacent soil mass.
K. Project Geotechnical Engineer: A registered engineer who provides site observations, recommendations for foundation support, and verifies soil shear strength parameters.

1.05 Predesign Submittals

Due to the design-build nature of Segmental Retaining Wall Systems, contractors shall provide a system specific submittal package to the Owner's Engineer for approval. The MSE structure contractor shall provide a submittal package to the Owner a minimum of 30 business days prior to the anticipated start of design by the Design Build Contractor. The following items must be submitted to qualify for product acceptance.

A. Submit the following for approval
1. Product Data
a. Material description and installation instructions for each manufactured product specified including Segmental Retaining Wall Units (SRW), if applicable, and Geosynthetic Reinforcement.

   b. Name and address of the production facility where the proposed SRW units, if applicable, will be manufactured. All units to be manufactured at the same facility.
   c. Notarized letter from the SRW manufacturer stating that the units supplied for this project are manufactured in complete compliance with Section 2.01 of this specification. The letter shall state that the SRW units shown in the attached test reports are representative samples of the plants normal mix design and regular production runs.
2. Certifications:
   a. The contractor shall submit documentation describing the geosynthetic manufacturer's quality control program during the manufacturing process. The geosynthetic manufacturer shall have a manufacturing quality control program that includes QC testing no less frequently than each 400,000 sf of production. All QC testing shall be performed by an independent GAI-LAP facility. The testing, as a minimum, shall include Tensile Strength per ASTM D4595.
3. Test Reports:
   a. Independent laboratory reports indicating compressive strength and moisture absorption of the concrete retaining wall units from the proposed production facility. Only tests performed within the past 6 months will be considered current and valid.
   b. Independent test reports verifying the long-term design strength properties (creep, installation damage, and durability) and soil interaction properties of the geosynthetic reinforcement.
   c. Independent test reports verifying the connection capacity between the geosynthetic reinforcement and the concrete retaining wall units, if applicable.
4. Wall Design Engineer Qualifications:
   a. Current insurance policy verifying professional liability and errors and omissions insurance coverage for an aggregate and per claim limit of at least two million dollars ($2,000,000).
   b. Notarized letter certifying the proposed SRW Design Engineer is a licensed professional engineer in the state of wall installation and has a minimum of 10 years of SRW system design experience.
5. Retaining Wall Installer Qualifications:
   a. Notarized statement showing that the retaining wall installer has installed a minimum of 1,000,000 square feet of segmental retaining walls.
   b. The Retaining Wall Installer shall furnish five (5) project references of similar size and scope to this project including the wall(s) height and square footage. References shall include the contact information of Owner or General Contractor.

1.06 Final Submittals

A. Submit the following for approval
   1. Samples:
      a. Furnish one unit demonstrating the color, face pattern, and texture of the SRW unit if specified by the project Architect or Owner.
      b. Furnish 12-inch square or larger piece of the geosynthetic reinforcement specified.
   2. Shop Drawings:

a. Four (4) sets of the retaining wall system design, including wall profiles and elevation views, geosynthetic reinforcement layout, pertinent details, and drainage provisions. The design shall include details and profiles of the stairwell, concrete stairs, and circular pipe penetration. A registered professional engineer licensed in the state of wall installation shall sign and certify that the shop drawings are designed in accordance with the project civil plans and specifications.
b. Propriety product literature indicating which Segmental Retaining Wall (SRW) units and soil reinforcement are proposed for use on the project including color, face style and texture. The contractor shall select a standard gray, nonclimbable (horizontal ledges less than ½"), standard 8" block with a sloping top. Architect or Owner shall select color, face style and texture.

3. Design Calculations:
   a. Two (2) sets of engineering design calculations prepared in accordance with the NCMA Design Manual for Segmental Retaining Walls, Second Edition, 1997 or FHWA NHI-00-043. Analysis shall include Internal, External, Global Stability, and Bearing Capacity Calculations, pipe penetration and installation, signed and sealed by a registered professional engineer in the state.
   b. The computer programs SRWall and MSEW with most current version are acceptable. Detailed hand calculations demonstrating compliance with this Specification must be submitted if no computer program is used. No proprietary design software will be allowed.
   c. The FHWA method based on NHI-00-043 and Demo 82 are the same with respect to external stability and internal stability. The difference between NHI-00-043 and Demo 82 is related to connection analyses as follows:
      - Demo 82 (ASD) is based on short-term connection tests, which are typical.
      - NHI-043 (ASD) is based on long-term creep connection tests. NHI-043 (ASD) method is applicable only if a creep connection test is performed.
      - If a creep connection test has not been performed, then Demo 82 (ASD) must be used for the connection analysis.
   d. Overall stability calculations with respect to global external, compound internal and translation stability can be determined using the following computer program: ReSSA (v2.0).

1.07 Design And Permitting Requirements

A. Designs for MSE structures shall be in accordance with NCMA or FHWA NHI-00-043 Mechanically Stabilized Earth Walls and Reinforced Soil Slopes Design and Construction Guidelines.
B. All MSE structures shall be constructed on City of Sandy Springs property.
C. Reinforced fill material shall have a minimum angle of internal friction of 30 degrees. Contractor is responsible for ensuring and documenting the reinforced fill meets the specified parameters including but not limited to strength, grain size, and compaction. The project geotechnical engineer must provide reinforced, retained, and foundation soil parameters.
D. Design Criteria for all MSE structures including segmental block designs shall be performed in compliance with NCMA or FHWA NHI-00-043 (2001) design method. Submittals not meeting these design criteria as specified will be rejected until resubmittals

compliance is verified. The owner's review engineer reserves all rights in determining compliance for plan approval.

1. Internal Stability:
    a. Minimum Factor of Safety on Tensile Overstress 1.0
    b. Minimum Factor of Safety on Geogrid Pullout (peak load criterion) 1.5
    c. Minimum Factor of Safety on Facing Shear (peak load criterion) 1.5
    d. Minimum Factor of Safety Geogrid/Block Connections (peak load criterion)1.5
    e. Minimum Factor of Safety for Uncertainties 1.5
    f. Minimum Factor of Safety for Sliding 1.5
2. External Stability:
    a. Minimum Factor of Safety Against Base Sliding 1.5
    b. Minimum Factor of Safety Against Overturning 2.0
    c. Minimum Factor of Safety for Bearing Capacity 2.0
    d. Minimum Factor of Safety for Rapid Drawdown 1.125
3. Global Stability:
    a. Minimum Factor of Safety for Global Stability 1.3

E. Design shall also address hydrostatic loading, seismic loading, rapid drawdown, surcharge, and backslopes where appropriate. Minimum Design Live Load of 150 psf shall be used for all MSE structures supporting landscape areas. Minimum Design Live Load of 250 psf shall be used for MSE structures supporting parking lots, entrance drives, service drives and other areas subject to traffic. For detention ponds, full hydrostatic pressure must be modeled in the reinforced and retained zones, extending back indefinitely up to the 100 year flood elevation. SRWall does not appropriately analyze strip loads. MSEW based on FHWA design method must be used to accurately model strip loads (i.e. – building foundation walls and unusual loadings such as heavy equipment, etc.)

F. Minimum reinforcement length shall be 70 percent of the MSE structure height. Reinforcement coverage at each layer shall be 100 percent (no gaps).

G. Seismic analyses must be performed if the project is located in a seismic impact zone, i.e., a horizontal acceleration coefficient greater than or equal to 0.1g. Seismic factors of safety to be 1.125 minimum factor of safety. Refer to NEHRP seismic maps.

H. The maximum vertical distance between layers of soil reinforcement shall be limited to the FHWA allowed spacing for segmental block systems with the highest reinforcement layer located a maximum of 1.5 feet below finished grade at the top of wall.

I. Drainage Aggregate shall be placed within, between, and a minimum of 12" (inches) behind all segmental concrete facing units to provide not only drainage but as a compaction aid.

J. The Design Build Contractor is responsible for the design and permitting for this work. The Contractor is responsible for all submittal material and fees for the permit approval and issuance for the work from the City of Sandy Springs Planning and Development Department and the City of Sandy Springs Building Department.

1.08 Delivery, Storage and Handling

A. Segmental Concrete Facing Units and Accessories: Deliver, store, and handle materials in accordance with manufacturer's recommendations, in such a manner as to prevent damage. Check the materials upon delivery to assure that proper material has been received. Store above ground on wood pallets or blocking. Remove damaged or otherwise unsuitable material, when so determined, from the site.

1. Exposed faces of concrete wall units shall be free of chips, cracks, stains, and other imperfections detracting from their appearance, when viewed from a distance of 10 feet.
2. Prevent mud, wet cement, adhesives and similar materials that may harm appearance of units, from coming in contact with system components.

B. Geosynthetics (including geosynthetic reinforcement, geotextile filter, pre-fabricated drainage composite) shall be delivered, stored, and handled in accordance with ASTM D4873.

1.09 Extra Materials

A. Furnish Owner with 10 replacement segmental concrete facing units, when applicable, identical and from the same lot run as those installed on the Project.

Part 2 Products

2.01 Materials

A. Segmental Retaining Wall units shall meet the following requirements:
   1. Physical Requirements
      a. Compressive strength and Absorption: Concrete retaining wall units shall be tested in accordance with ASTM C140, Sections 6, 8 and 9. Concrete retaining wall units shall meet requirements of ASTM C1372, except the compressive strength requirements will be increased to a minimum of 3,500 psi and the maximum water absorption shall be limited to 8 percent, and unit height dimensions shall not vary more than plus or minus 1/16 inch from that specified in the ASTM reference, not including textured face. Dimensions shall not vary more than +/- 1/16 inch as measured from the lowest to highest point across the top surface of the unit from a level base plane. Test shall be performed within the past 6 months to be considered current and valid.
      b. Modular units provide an in-place weight of 100-pcf to 120-pcf including the unit fill (vertical core systems only), which is contained within the nominal dimension of the unit. Units shall have angled sides capable of concave and convex alignment curves.
      c. Minimum inter-unit shear strength of 500 lbs/ft at 2 psi normal pressure per NCMA SRWU-2 and minimum geosynthetic to SRW unit peak connection strength of 500 lbs/ft at 2 psi normal pressure per NCMA SRWU-1.
      d. SRW units exposed faces shall be free of chips, cracks, or other imperfections when viewed from a distance of 10 feet under diffused lighting.
      e. Segmental Retaining Wall units with a face thickness of less than four inches are limited to wall heights of 15 feet. Only units with face thickness four inches or more are allowed on walls over 15 feet in height.
      f. Color: Natural Grey]
      g. Face Pattern Geometry: Straight or Beveled, per owner’s preference upon submittal.
      h. Texture: Split Rock Face that exposes the natural aggregates.
      i. Batter: Segmental wall units must include an integral batter control shear connector to provide a consistent setback for each wall course.

B. Geosynthetic Reinforcement shall be manufactured with high-tenacity polyester or HDPE in a grid structure. No high strength geotextiles are allowed. For segmental block unit designs, the geosynthetic reinforcement must meet the long-term design strength, soil interaction, and connection capacity requirements as required by the design of the retaining wall.

1. Geosynthetic Reinforcement – The geosynthetic strength used in the design shall follow FHWA NHI-00-043 or NCMA where:

$$T_{Allowable} = \frac{T_{Ultimate}}{RF \times FS} = \frac{T_{Ultimate}}{RF_{CR} \times RF_{ID} \times RF_{D} \times FS}$$

2. Tult shall be the minimum average roll value (MARV) ultimate tensile strength per ASTM D4595.
3. RFcr, Creep Reduction Factor shall follow FHWA NHI-00-043 Appendix B or NCMA with results extrapolated to a 75 year design life. A minimum of one 10,000 hour creep tension test per ASTM D5262 is required to determine RFcr. Short term testing by itself is not sufficient.
4. RFid, Installation Damage reduction factor, shall be obtained from construction damage tests for each product proposed for use with project specific, representative or more severe backfill and construction techniques. The backfill soil used, if other than project specific, shall have a D50>0.6mm (No. 30 sieve). Testing shall be consistent with ASTM D5818. Default Rfid value of 3.0 shall be used if such testing has not been conducted. The minimum RFid allowed shall be 1.10.
5. RFd, Durability reduction factor, is the combined partial factor for potential biological and chemical degradation. A default Rfd of 2.0 shall be used if durability testing has not been conducted. The minimum RFd allowed shall be as follows:
   a. PET 1.1
   b. HDPE 1.1
6. Direct Sliding Coefficient, Cds value shall be determined from pullout tests per GRI:GS-6. The maximum pullout force used to determine Cds shall be limited to the lesser of Ta or the force that yields 1.5 inches displacement. The minimum Cds value shall not be greater than 0.8 where the Cds value is determined as follows:

$$Cds = \frac{F}{L\sigma_N \tan\Phi}$$ Where

Φ = Effective Soil Friction Angle, Degrees

σ_N = Effective Normal Stress (psf) at range from 500 to 1000 psf

F = Maximum shear resistance from direct shear test (lb/ft), per GRI:GS-6

L = Geosynthetic Embedment Length in Test (ft)

7. Soil/Geosynthetic Interaction Coefficient, Ci value shall be obtained from pullout tests per GRI:GG-5. The maximum pullout force used to determine Ci shall be limited to the lesser of Ta or the force that yields 1.5 inches displacement. The

minimum Ci value in silty-sand shall be 0.8 where the Ci value is determined as follows:

$$Ci = \frac{F}{2Le\sigma_N \tan\Phi}$$ Where

σ_N = Effective Normal Stress (psf) at range from 500 to 1000 psf

F = Pullout force (lb/ft), per GRI:GG-5

Le = Geosynthetic Embedment Length in the Anchorage Zone in Test (ft)

Φ = Effective Soil Friction Angle, Degrees

8. Geogrid shall have minimum junction strength of 40 pounds per foot per GRI:GG2. If this minimum value is not met then the geogrid shall have a minimum mass of 8 oz/sy and meet the strength requirements of AASHTO M-288-96 Class 1 geotextile.
9. All reinforcement shall have a minimum stiffness (flexural rigidity) of 30,000 mg-cm per ASTM D1388.
10. Polymer reinforcement shall be coated with a suitable coating providing impregnation into the bundles.
11. PET geosynthetics shall posses a Molecular Weight greater than or equal to 25,000 grams/mole as per GRI:GG8 and a carboxyl end group number less than or equal to 30 as per GRI:GG7. Otherwise a minimum value of RFd=2.0 shall be used.
12. HDPE geogrids shall possess a melt flow index value greater than or equal to 0.88. Otherwise HDPE geogrids shall use a minimum RFd=2.0 value.

C. Leveling Pad Base
   1. Aggregate Base: Crushed stone or granular fill meeting the following gradation as determined in accordance with ASTM D448:

Sieve Size	Percent Passing
1 inch	100
No. 4	35 to 100
No. 40	0 to 50
No. 200	0 to 10

      a. Base Thickness: 6 inches (minimum compacted thickness).
   2. Concrete Base: Nonreinforced lean concrete base.
      a. Base Thickness: At least 2 inches

D. Drainage Aggregate/Unit Fill: Clean crushed stone or granular fill meeting the following gradation as determined in accordance with ASTM D448:

Sieve Size	Percent Passing
1 inch	100
3/4 inch	75 to 100
No. 4	0 to 60
No. 40	0 to 50
No. 200	0 to 5

Unit fill must extend a minimum distance of 12 inches behind the segmental block unit for drainage as well as compaction aid.

E. Reinforced Backfill: Suitable reinforced backfill soils shall be free of organics and debris and consisting of either GP, GW, SP, SW, or SM type, classified in accordance with ASTM D2487 and the USCS classification system. Soils classified as ML, SC and CL are considered suitable soils for segmental retaining walls with a total height of less than 10 feet.
   1. The Plasticity Index (PI) of the reinforced backfill soils shall not be greater than 20 as measured in accordance with ASTM D4318.
   2. Unsuitable soils are organic soils and those soils classified as CH, OH, MH, OL, or PT.
   3. The pH of the reinforced backfill shall be between 3 and 10 and be tested in accordance with ASTM G51.
   4. Backfill gradation shall meet the following:

Sieve Size	Percent Passing
¾ inch	75-100
No.4	20-100
No. 40	0-60
No. 200	0-35
No. 200	0-50 (Walls under 10 feet only)

   5. Fill containing brush, sod, peat, roots, or other organic, perishable, or deleterious matter including, but not limited to snow, ice, or frozen soils, shall be considered unsuitable material and shall be removed. Less than 0.5% organic material.
   6. Materials passing the No. 40 sieve should have a liquid limit less than 35 and a plasticity index less than 10 as per ASTM D4318.
   7. An effective internal angle of friction greater than or equal to 30 degrees per ASTM D2166 or D3080 at the compaction standard. The 30 degrees shall be verified by appropriate testing submitted to and approved by the Owners engineer prior to construction.

F. Drainage Pipe: Perforated or slotted PVC or corrugated HDPE pipe manufactured in accordance with D3034 and/or ASTM F405. The pipe must be encapsulated with free draining #57 stone with the free draining stone encased with a geotextile filter to prevent fines migration into the stone from surrounding backfill.

G. Geotextile Filter: The geotextile filter shall be in accordance with AASHTO M288 guidelines.

H. Impervious Material: Clay soil and/or low permeability soil (ML, CL, or CH) geosynthetic shall be placed above the drainage/unit fill stone with a 6” minimum thickness to prevent surface runoff from entering the segmental block unit fill and 12 inch zone of stone.

I. Construction Adhesive: Exterior grade concrete adhesive as recommended by the retaining wall unit manufacturer.

J. Subsurface Drain: Located to the bottom rear of the reinforced zone. Subsurface drain to consist of perforated or slatted PVC or corrugated HDPE pipe manufactured in accordance with D304 and/or ASTM F405 surrounded with 3 foot wide and 1 foot high (in cross section) washed #67 or #57 drain stone covered on top side only with 3.5oz minimum needle-punched non-woven geotextile filter fabric.

Part 3 - Execution

3.01 Examination

A. The Project Geotechnical Engineer shall examine the areas and conditions under which the retaining wall system is to be erected, and notify the Owner and Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.
B. Promptly notify the wall design engineer of site conditions that may affect wall performance, soil conditions observed other than those assumed, or other conditions that may require a reevaluation of the wall design.
C. Verify the location of existing structures and utilities prior to excavation.

3.02 Preparation

A. Ensure surrounding structures are protected from the effects of wall excavation.
B. Excavation support, if required, is the responsibility of the Contractor, including the stability of the excavation and its influence on adjacent properties and structures.

3.03 Excavation

A. Excavate to the lines and grades shown on the Drawings. The General Contactor shall replace any unsuitable soils discovered during excavation. Use care in excavating to prevent disturbance of the base beyond the lines shown.

3.04 Foundation Preparation

A. Excavate foundation soil as required for footing or base dimension shown on the Drawings, or as directed by the Project geotechnical engineer.
B. The Project geotechnical engineer will examine foundation soil to ensure that the actual foundation soil strength meets or exceeds that indicated on the Drawings. Remove soil not meeting the required strength. Oversize resulting space sufficiently from the front of the block to the back of the reinforcement, and backfill with suitable compacted backfill soils.
C. The Project geotechnical engineer will determine if the foundation soils will require special treatment or correction to control total and differential settlement.
D. Fill over-excavated areas with suitable compacted backfill, as recommended by the Project geotechnical engineer.
E. Comply with all state and local requirements for execution of the work, including local building codes and current OSHA excavation regulations. The General Contractor is responsible for stability of the area during excavation and wall construction. Any excavation support required to maintain/protect existing structures, utilities, landscape features or property shall be the responsibility of the General Contractor.
F. Prior to undertaking any grading or excavation of the site, confirm the location of the retaining walls and all underground features, including utility locations within the area of construction. Ensure surrounding structures are protected from effects of wall excavation.
G. Control surface water drainage and prevent inundation of the MSE wall area during construction.
H. Coordinate installation of underground utilities with wall installation.
I. Foundation bearing capacity shall be inspected by project geotechnical engineer. The engineer shall confirm with a field inspection that the foundation has been properly prepared and the bearing capacity requirements are appropriate before placement of the geosynthetic reinforced zone.

J. Contractor shall have an approved set of plans and specifications on site at all times during construction of the wall.

3.05 Base Course Preparation

A. Place base materials to the depths and widths shown on the Drawings, upon undisturbed soils, or foundation soils prepared in accordance with Article 3.04.
   1. Extend the leveling pad laterally at least 6 inches in front and behind the lowermost concrete retaining wall unit.
   2. Provide aggregate base compacted to 6 inches thick (minimum) meeting 95% Standard Proctor density per ASTM D698.
   3. The Contractor may at their option, provide a concrete leveling pad as specified in Subparagraph 2.01.C.2, in lieu of the aggregate base.
   4. Where a reinforced footing is required by local code official, place footing below frost depth.

B. Compact aggregate base material to provide a level, hard surface on which to place the first course of units.

C. Prepare base materials to ensure complete contact with retaining wall units.

3.06 Erection

A. General: Erect units in accordance with manufacturer's instructions and recommendations, and as specified herein. All wall units shall be installed in the proper location and orientation as shown on the final signed and sealed civil engineered drawings for the project.

B. Place first course of concrete wall units on the prepared base material. Check units for level and alignment. Maintain the same elevation at the top of each unit within each section of the base course.

C. Ensure that foundation units are in full contact with leveling pad.

D. Place concrete wall units side-by-side for full length of wall alignment. Do not leave gaps between adjacent units. Alignment may be accomplished by using a string line measuring from the back of the block.

E. Place 12 inches (minimum) of drainage aggregate directly behind the concrete wall units. Fill voids in and between retaining wall units with drainage aggregate. Provide a drainage zone behind the wall units to within 12 inches of the final grade. Cap the backfill and drainage aggregate zone with 6 inches of impervious material.

F. Install drainage pipe at the lowest elevation possible, to maintain gravity flow of water to outside of the reinforced zone. Slope the main collection drainage pipe, located just behind the concrete retaining wall units, 2 percent (minimum) to provide gravity flow to the daylighted areas. Daylight the main collection drainage pipe to an appropriate location away from the wall system at each low point or at 50-foot (maximum) intervals along the wall length.

G. Remove excess fill from top of units and install next course. Ensure drainage aggregate and backfill are compacted before installation of next course. Where segmental block units have a continuous vertical core of uniformed dimension, a maximum of three courses or two feet may be backfilled with infill drain stone at one time.

H. Check each course for level and alignment. Adjust units as necessary to maintain level and alignment prior to proceeding with each additional course. Install alignment devices (pins) if required.

I. Install each succeeding course. Backfill as each course is completed. Pull the units forward until the locating surface of the unit contacts the locating surface/device of the units in the preceding course. Interlock wall segments that meet at corners by overlapping successive courses.

J. Install geosynthetic reinforcement in accordance with geosynthetic manufacturer's recommendations and the shop drawings.
   1. Orient geosynthetic reinforcement with the highest strength axis perpendicular to the wall face.
   2. Prior to geosynthetic reinforcement placement, place the backfill and compact to the elevation of the top of the wall units at the elevation of the geosynthetic reinforcement.
   3. Place geosynthetic reinforcement at the elevations and to the lengths shown on the Drawings.
   4. Lay geosynthetic reinforcement horizontally on top of the concrete retaining wall units and the compacted backfill soils. Place the geosynthetic reinforcement out to the face of the concrete retaining wall units. Place the next course of concrete retaining wall units on top of the geosynthetic reinforcement.
   5. The geosynthetic reinforcement shall be in tension and free from wrinkles prior to placement of the backfill soils. Pull geosynthetic reinforcement hand-taut and secure in place with staples, stakes, or by hand tensioning until the geosynthetic reinforcement is covered by 6 inches of loose fill.
   6. The geosynthetic reinforcements shall be continuous throughout their embedment lengths. Splices in the geosynthetic reinforcement strength direction are not allowed.
   7. Do not operate tracked construction equipment directly on the geosynthetic reinforcement. At least 6 inches of compacted backfill soil is required prior to operation of tracked vehicles over the geosynthetic reinforcement. Keep turning of tracked construction equipment to a minimum.
   8. Rubber-tired equipment may pass over the geosynthetic reinforcement at speeds of less than 5 miles per hour. Turning of rubber-tired equipment is not allowed on the geosynthetic reinforcement.
   9. Reinforcement embedment length is measured from the front face of the segmental block wall unless noted otherwise on the construction drawings.

3.07 Backfill Placement

A. Place reinforced backfill, spread and compact in a manner that will minimize slack in the reinforcement.

B. Place fill within the reinforced zone and compact in lifts not exceeding 8 to 10 inches (loose thickness).
   1. Only lightweight hand-operated compaction equipment is allowed within 3 feet of the back of the retaining wall units unless demonstrated large compaction equipment will not disrupt block and wall alignment. The moisture content of the backfill material prior to and during compaction shall be uniformly distributed throughout each layer and shall be within a range of 3% below to 3% above optimum moisture content. If the specified compaction cannot be achieved within 3 feet of the back of the retaining wall units, replace the reinforced soil in this zone with drainage aggregate material.

C. Compaction testing shall be done in accordance with ASTM D1556 or ASTM D2922. Refer to Article 3.10 for compaction testing.

D. Minimum Compaction Requirements for Fill Placed in the Reinforced Zone
   1. The minimum compaction requirement shall be determined by the project geotechnical engineer testing the compaction. At no time shall the soil compaction requirements be less than 95 percent of the soil's standard Proctor maximum dry density (ASTM D698) [or 92% of modified Proctor maximum dry density (ASTM D1557)] for the entire wall height
   2. Utility Trench Backfill: Compact utility trench backfill in or below the reinforced soil zone to 95 percent of the soil's standard Proctor maximum dry density (ASTM D698) [or 92% of modified Proctor maximum dry density (ASTM D1557)], or as recommended by the Project geotechnical engineer.
      a. Utilities must be properly designed (by others) to withstand all forces from the retaining wall units, reinforced soil mass, and surcharge loads, if any.
   3. Moisture Content: Within 3 percentage points of the optimum moisture content for all wall heights.

E. At the end of each day's operation, the wall installer shall slope the last level of compacted backfill away from the interior (concealed) face of the wall to direct surface water runoff away from the wall face.
   1. The General Contractor is responsible for ensuring that the finished site drainage is directed away from the retaining wall system.
   2. In addition, the General Contractor is responsible for ensuring that surface water runoff from adjacent construction areas is not allowed to enter the retaining wall area of the construction site both during and following earth structure completion until permanent site grading and storm drainage including pavement, gutters and vegetation are established.

3.08 Cap Unit Installation

A. Apply adhesive to the top surface of the unit below and place the cap unit into desired position conforming to ASTM 2339.
B. Cut cap units as necessary to obtain the proper fit.
C. Backfill and compact to top of cap unit.

3.09 Site Construction Tolerances

A. Site Construction Tolerances
   1. Vertical Alignment: Plus or minus 1-1/2 inches over any 10-foot distance, with a maximum differential of 3 inches over the length of the wall.
   2. Horizontal Location Control From Grading Plan
      a. Straight Lines: Plus or minus 1-1/2 inches over any 10-foot distance.
      b. Corner and Radius Locations: Plus or minus 12 inches.
      c. Curves and Serpentine Radii: Plus or minus 2 feet.
   3. Immediate Post Construction Wall Batter: Within 2 degrees of the design batter of the concrete retaining wall units.
   4. Bulging: Plus or minus 1-1/4 inches over any 10-foot distance.
   5. Maximum horizontal gap between erected units shall be 1/8 inch.

3.10 Field Quality Control

A. Installer is responsible for quality control of installation of system components. The installer must employ or retain the design engineer of the retaining wall to provide construction verification on a predefined basis by the Owner's Geotechnical Engineer.
B. The General Contractor, at their expense, shall also retain a qualified independent testing agency to act as construction verification engineer to perform quality assurance checks, evaluation of foundation soils, and compaction testing of the installer's work. Correct reinforcement type, elevation, length, orientation, reinforcement tensioning procedures, placement of drainage materials and outlets.
C. Installer shall correct work that does not meet these specifications or the requirements shown on the drawings at the installer's expense.
D. The independent testing agency (Construction Verification Engineer), at the general contractor's expense, shall be contracted to perform compaction testing of the reinforced backfill placement and compaction in the reinforced backfill zone. The construction verification engineer shall also verify all aspects of construction regarding the MSE wall and certify that the construction meets the design documents and will supply a letter to the Owner's Engineer stating that all design parameters have been met and that the wall is in compliance with all requirements set forth by City of Sandy Springs Planning and Development Department for final acceptance by that department.
    1. Minimum Testing Frequency
        a. One test for every 2 feet (vertical) of fill placed and compacted, for every 100 lineal feet of retaining wall.
        b. Vary compaction test locations to cover the entire area of the reinforced soil zone, including the area compacted by the hand-operated compaction equipment.
        c. Triaxial Test (if required by construction verification engineer) on every appreciable different soil type based on index testing. Run Consolidated-Undrained Triaxial Shear Test and report the stress strain test results as well as the Mohr-Coulomb failure diagram for peak and residual stress levels, as required by ASTM.
        d. Verify foundation bearing capacity by probe rod and static cone penetrometer testing every ten feet of wall length for entire reinforced soil zone. Also, use hand auger borings to a depth of 12 feet or the reinforced length, whichever is shorter, every 50 feet along the wall length at third points of the reinforcement length.
        e. For walls in excess of 20 feet tall, power auger holes with cone, SPT, or other suitable investigative methods of testing to depth equal to twice the wall height is required, every 100 feet of wall length or as required by the geotechnical engineer to establish appropriate allowable bearing capacity, unless already performed in pre-wall design geotechnical investigation. If there is soft soil, it should be done to the bottom of the soft soil layer.

3.11 Adjusting and Cleaning

A. Replace damaged units with new units as the work progresses.
B. Remove debris caused by wall construction and leave adjacent paved areas broom clean.
C. No changes to the masonry block or geosynthetic reinforcement layout, including but not limited to, length, geosynthetic type, or elevation shall be made without the expressed prior written consent of the wall design engineer.

3.12 Site Drainage

A. Care shall be taken not to contaminate the filter fabric, unit fill, and/or the drainage composite with clay or other poor drainage material.
B. The engineering, design, analysis, detailing and mitigation of both surface drainage and seepage of groundwater shall be the responsibility of the owner or owner's representative.
C. Drainage aggregate shall extend one foot (or as indicated on the detail drawings) behind the back of the masonry block units to alleviate the build up of possible hydrostatic pressure behind the masonry block units.
D. Backfill shall be graded a minimum of 2% away from the wall face and rolled at the end of each work day to prevent ponding of water on the surface of the reinforced soil mass. A berm at the crest of the wall shall be constructed at the end of each work day to prevent rain water from overtopping the wall. The Contractor shall not allow surface runoff from adjacent areas to enter the wall construction site.

3.13 General Notes

A. A copy of the design report and the wall drawings should be provided to future owners of the developed property to provide them with a record of the location of the reinforced zone and recommendations of permissible construction activities.
B. All liquid carrying utilities located within the reinforced backfill are to be encased in a drainage aggregate and geotextile filter. All liquid carrying utilities located outside of, but within 100 feet of the reinforced backfill shall be water tight to prevent migration of water into the surrounding soils.
C. Wall elevation views and locations and geometry of existing structures must be verified by project civil site designer prior to construction.
D. General or grading contractor is responsible for location and protection of underground utilities in the vicinity of the wall and for maintaining safe excavation and working conditions.
E. Backfill and compact in front of wall prior to exceeding 5.0 feet of wall height.
F. All utilities located within the reinforced zone are to be installed concurrently with the reinforced backfill placement.

END OF SECTION

Section 32 9000
Landscape Materials

Part 1 General

1.01 Scope

A. Work is to include seeding with grass all disturbed areas upon completion of work.

1.02 Qualifications and Materials

A. The Contractor shall have minimum five years of successful experience in the field and shall furnish all materials and perform all work in accordance with these Specifications, Drawings, and instructions provided by the Owner's Representative. The work shall include everything shown on the Drawings and required by the Specifications and everything to which in the judgment of the Owner's Representative is incidental to what is shown on the Drawings or required by the Specifications. Workmanship and materials shall be of the best quality and shall be in strict accordance with the intention of the Drawings, Specifications and samples. The Contractor shall cooperate with the Owner's Representative so that no error or discrepancy in the Drawings or Specifications shall cause defective or inappropriate materials to be used or poor workmanship to be allowed and so that the work may proceed in the most efficient and effective manner.

1.03 Weather

A. Plant only during weather conditions favorable to landscape construction and to the health and welfare of plants. Contractor to notify Owner's Representative immediately if directed to commence planting operations in conditions detrimental to plant health.

B. Planting shall not begin until planting area drainage has been approved by Owner's Representative.

1.04 Submittals

A. The Contractor is to submit certification tags from seed and sod verifying type and purity.

1.05 Quality of Plants

A. Plants shall be free of disease, insect pests, eggs or larvae.

1.06 Notification of Delivery

A. Unless otherwise authorized by the Owner's Representative, the Contractor shall notify the Owner's Representative at least 48 hours in advance of the anticipated delivery date of any plant materials.

1.07 Maintenance

A. All planting shall be protected and maintained by the Contractor until time of final acceptance as defined in the guarantee. Contractor's maintenance shall include but is not limited to watering, weeding, cultivating, removal of dead material, lawn mowing, fertilizing, and other necessary operations. A watering schedule which delivers 3" of water per plant every 10 days (if no measurable rain is received during that period), for a period not less than 90 days or until substantial completion, whichever is greater, after planting occurs is to be followed.

1.08 Plant Guarantee

A. All plants, grass shrubs and trees shall be guaranteed to be alive and healthy one year after the date of final acceptance. The Owner is responsible for notifying Contractor of any plant, including grass, or tree that is dead or not showing satisfactory growth. After not more than a 90-day period following notification, said plant shall be replaced, or conditions contributing to unsatisfactory growth shall be corrected by Contractor. All replacements shall be of the original quality and shall be of a size equal to that attained by adjacent plants or trees of the same species. Replacement plant material shall be guaranteed to be alive at the beginning of the following growing season or 1 year, whichever is greater. Plant material that can be shown to have died from inadequate or improper watering will be required to be replaced within the 90-day period following notification.

1.09 Final Grading and Cleanup

A. After all work has been completed and all soil settled and final finished grading completed, clean-up and adjustments shall be made to insure proper depth of topsoil, proper drainage, proper grades adjacent to walks and curbs, proper slope of plant beds, etc. Remove any soil, peat moss, mulch or plant materials from walks and paving, leaving the areas broom clean.

1.10 Damaged/Disturbed Areas

A. Plant or grassed areas damaged during the process of work by other contractors shall be called to the attention of the General Contractor and Owner's Representative in writing within one week of the occurrence, to settle disputes over party responsible for damages.

B. Damaged areas will be repaired within a timely period to Owner's Representative's satisfaction.

1.11 Final Approval

A. The Owner's Representative shall have the final approval for acceptance of all work.

B. The Contractor may request for areas of landscaping to be accepted by the Owner's Representative once all construction activities are completed in that area. If work resumes in a landscaped area that was previously accepted by the Owner's

Representative it is the Contractor's responsibility to again provide watering and maintenance for landscape in that area.

C. If landscaping is damaged or neglected in an area that has not been accepted by the Owner's Representative, it is the responsibility of the Contractor to replace the affected landscaping in kind with the same size and species.

D. If site construction is occurring in areas that have been landscaped, it is the Contractor's responsibility to provide protection, watering and maintenance for plantings in that area.

Part 2 Products

NOTE:

All references to vendors and "approved manufacturers" are included for description of quality and content of the designated equipment/materials. Equivalent items may be accepted if they meet all standards of quality and purpose for the intended use, as determined by City of Sandy Springs.

2.01 General

A. Water: All water necessary for planting and maintenance shall be of satisfactory quality to sustain the growth of plants and shall not contain harmful, natural or man-made elements detrimental to plants. Water meeting the above standard shall be furnished by the Contractor and all arrangements for securing water and any expenses of transporting to the site and dispersal on the site shall be the responsibility of the Contractor. A watering schedule which delivers 3" of water per plant every 10 days (if no measurable rain is received during that period), for a period not less than 90 days or until substantial completion, whichever is greater, after planting occurs is to be followed.

B. Lime: Shall be agricultural grade high calcium ground limestone and shall be of such fineness that 90% will pass through a No. 10 sieve and not less than 50% through a No. 50 sieve.

C. Soil Test: Revise fertilizer analysis, quantities of fertilizer and lime as dictated by soil tests made prior to planting.

D. Hardwood Mulch: Shall be aged for a minimum of three years and ground to a fine texture. Mulch shall be fresh, clean, free from sticks, cones, leaves and other debris.

E. Topsoil: Where required shall be a natural, fertile, friable soil, possessing characteristics of representative productive soils in the vicinity. It shall be obtained from naturally well-drained areas, free from substances harmful to plant growth, and free from clay lumps, stones, stumps, roots, or similar substances one inch or more in size in any direction. The source and material shall be approved by the Owner's Representative before placing on site. Topsoil shall be free from noxious grass and

weeds.

F. Fertilizer: For grass areas: See planting details for specific requirements.

G. Pre and Post Emergent Herbicide: Contractor to have a licensed herbicide applicator with a minimum three years experience performing all herbicide applications to lawns, trees and shrubs. Herbicides shall be utilized as necessary to control weeds in bed, tree plantings and turf areas unless applicable codes or ordinances stipulate otherwise. Contractor is responsible to be familiar with all applicable local, state and federal codes, ordinances and regulations.

H. Quantities necessary to complete the work shown on the drawings shall be furnished. Although quantity estimates have been carefully made, the Owner's Representative assumes no liability for omissions or errors. If discrepancies are found between the layout and plant list, the contractor is responsible for providing the quantities shown on the layout.

I. Sod: Sod species to be Tifway 419 Bermuda. All sod to be blue tag certified. Sod shall be a species recommended by an experienced local A.N.A.-certified nursery, grown in a nursery equipped for the production of such sod and capable of meeting the published State Standards for Certification. It shall have been mowed regularly, fertilized and fumigated and shall be free of diseases and harmful insects at the time of delivery. Sod shall be delivered in strips one foot wide and two feet or longer as soil and species permit or in rolls not over six feet long. Sod shall have a minimum of one inch thickness including roots and soil. Sod bearing holes or thinned root pad, i.e. less than 1/2 inch shall be rejected. Sod shall be free of weeds, nut grass, crab grass and other invasive plants and insects injurious to it's health.

J. Seed: All seed shall be certified stock and appropriately labeled. Contractor shall deliver empty seed bags to Owner's Representative on site.

Part 3 Execution

3.01 General

A. Planting operations shall be conducted under favorable weather conditions. Areas receiving irrigation can be planted throughout the year provided the planting zone has a functioning irrigation system that has been approved by the Owner's Representative before installation of plant material. Areas not receiving irrigation shall be planted during the months of November through February and the Contractor shall water as needed during the 1-year warranty period to insure survivability. The Contractor assumes full responsibility for planting in unseasonable conditions.

B. Planting of grass shall be accomplished during recommended season dependent on specified grass and planting method.

C. Protect roots or balls of plants at all times from sun and drying winds, water and freezing, as necessary until planting.

3.02 Protection

A. Before commencing work, all trees and shrubs which are to be saved must be protected from damage by the placement of fencing flagged for visibility or some other suitable protective procedure approved by the Owner. No work may begin until this requirement is fulfilled.

B. In order to avoid damage to roots, bark or lower branches, no truck or other equipment shall be driven or parked within the drip line of any tree, unless the tree overspreads a paved way.

C. The Contractor shall use any and all precautionary measures when performing work around trees, walks, pavements, utilities, and any other features either existing or previously installed under this Contract.

D. The Contractor shall adjust depth of earthwork and loaming when working immediately adjacent to any of the aforementioned features in order to prevent disturbing tree roots, undermining walks and pavements, and damage in general to any existing or newly incorporated item.

E. Plants transported to the project in open vehicles shall be covered with tarpaulins or other suitable covers securely fastened to the body of the vehicle to prevent injury to the plants. Closed vehicles shall be adequately ventilated to prevent overheating of the plants. Evidence of inadequate protection following digging, carelessness while in transit, or improper handling or storage shall be cause for rejection. All plants shall be kept moist, fresh, and protected. Such protection shall encompass the entire period during which the plants are in transit, being handled, or are in temporary storage.

3.03 Planting Procedure

A. Cleaning Up Before Commencing Work: The Contractor shall clean-up work and surrounding areas of all rubbish or objectionable matter. All mortar, cement and toxic material shall be removed from the surface of all plant beds. They must not be stirred with the soil. Extensive clean-up work will not be required under this contract. Should the Contractor find such conditions beneath the soil which shall in any way adversely affect the plant growth, he shall immediately call it to the attention of the Landscape Architect. Failure to do so before planting shall render the Landscape Contractor liable for subsequent problems arising from unacceptable subsoil conditions. Use approved herbicide to eliminate temporary plant material as directed.

B. Moving Plants: When trees and smaller plants are moved, the root ball should always be supported. Trees and shrubs should never by handled by the trunk.

C. Stake Out: Stake tree or plant locations and secure approval of them from the Owner's Representative before digging pits, and make adjustments as directed. Locate no tree closer than two feet from pavement or structures.

D. Planting Pit Size: For ball up to two feet in diameter shall be twice the diameter of the ball. Diameter of hole for ball two feet and greater shall be two feet larger in diameter than diameter of ball. Excavate pits with vertical sides.

E. Planting Soil Mixture: For trees shall consist of 1/3 topsoil and 2/3 thoroughly pulverized existing soil mixed with fertilizer and lime if specified in soil test results.

F. Large Plastic Containers: After approval of plant location and orientation by Owner or Owner's representative, cut off bottom of containers over 5 gallons, place plant and containers in planting hole, cut the container on two sides, removing the remaining part of the container. Examine roots to insure that roots have not begun to circle the container. If roots have begun to circle the plant, Contractor may realign the roots in the hole. If root circling is too severe, plant must be rejected and returned to supplier.

G. Wire Baskets: After placing in planting hole and obtaining approval of plant location and orientation by Owner or Owner's representative, remove all twine and rope used to secure wire basket and burlap. Push the wire to the bottom of the root ball. Fill planting pit to two thirds depth with approved planting soil then slit and remove all burlap from the top of the ball at least 1/3 of the way down sides or further as possible. Backfill and cover top of ball with mulch.

H. Trees and Shrubs: Trees shall be set straight and at such level that after settlement the plant crown shall be a minimum of 2 inches above grade. Trees with a ball size of 24" or larger shall be set 4" above grade to allow for settlement. Shrubs shall stand 1 inch – 2 inches above grade mounded. Each plant shall be set in the center of the pit. Backfill mixture shall be thoroughly tamped around the ball and shall be settled by water after tamping. A water holding saucer shall be formed with extra soil. Do not handle the tree by the trunk or use the trunk to straighten or adjust the location. (See Details)

I. Fill: Fill hole with soil mixture and fertilizer as required. Pack lightly with feet. Add more soil. Do not cover top of ball with soil, only with mulch. Make sure no burlap is exposed since exposed burlap acts as a wick causing excessive loss of water.

J. Water Basin: Build basin around all plants or trees which stand alone and are not in larger mulched beds. A water holding earth dam shall be built on the outside of the hole to form a basin to hold water; it shall be 4 – 6-inches high of soil firm enough to remain in place. If necessary, bring in soil. (See Details).

K. Watering In: A watering schedule which delivers 3" of water per plant every 10 days (if no measurable rain is received during that period), for a period not less than 90 days or until substantial completion, whichever is greater, after planting occurs is to be followed

L. Pruning: Each tree shall be pruned to preserve the natural character of the plant as directed by the Landscape Architect. All soft wood or sucker growth and all broken or badly damaged branches shall be removed with a clean cut.

M. Guying or Staking: Shall be done immediately after planting for trees over 4" caliper or 15 feet in height. Trees shall stand plumb after staking or guying in accordance with the drawings.

3.04 Finish Grading

A. Prior to applying mulch, plant beds shall be stirred 3-inches deep to loosen soil mixture. Fine grade areas until all bumps and depressions are removed and until the grade conforms to requirements of the grading plan. Eliminate any water pockets and verify surfaces drain away from all buildings. The minimum surface slope of plant beds shall be three percent. Minimum surface slope in lawn areas shall be two percent.

3.05 Mulching

A. On completion of planting, all trees, shrubs and ground cover areas shall be mulched with 4-inch layer of hardwood mulch.

3.06 Grassing

A. General: Includes soil preparation, applying fertilizer, planting and maintenance as required to produce an acceptable stand of grass on areas shown on planting plan.

1. Any damage to planting soil by erosion, construction equipment, construction operations, or other damage shall be repaired prior to application of fertilizer. Finished surface shall be smooth and even.

B. Soil Preparation: After the area to be grassed has been brought to finished grade, prepare the soil by thoroughly loosening the area by plowing, discing, harrowing, or scarifying until these areas are friable, well pulverized and acceptable to the Owner's Representative. Any irregularities in the surface resulting from the above operation or from other operations by the Contractor shall be smoothed out before any subsequent operations are begun. All roots and stones larger than 1" in any dimension, stumps and other foreign material detrimental to final grading, proper bonding, the rise of capillary moisture, or the proper growth of the desired plantings shall be removed.

1. The completed surface shall conform to the finished grades or subgrades shown and shall have a smooth pulverized surface at the time of planting. Any irregularities shall be corrected before the lime and fertilizer are placed.

2. Spread lime and fertilizer over the prepared surface before turning. Fertilizer and lime shall be sufficient to correct irregularities in the soil based on soil tests for the specified turf. Turn the soil one last time the day before planting or placing sod.

C. Sodding

1. Prepare planting bed as described for seeded areas except that fine graded soil shall be 1 inch below finished grade established by the grading plan.

2. Stored sod of the species required in the schedule shall be kept moist prior to laying. Any sod not laid within 24 hours of delivery will be rejected, removed from site, and replaced with fresh sod.

3. Wet all areas immediately prior to sodding.

4. Any sod not laid within 24 hours of delivery will be rejected and must be removed from the site and replaced with fresh sod at no additional expense to the Owner.

5. Unroll the sod on the prepared soil. Lay the strips parallel with the strip ends staggered as in bricklayers' running bond pattern. Press each successively laid strip snugly up against the one next to it. Fill cracks, holes, joints with clean, loose sand, free of all grass and plant seeds. Remove netting from back of sod prior to installation.

6. Watering, fertilizing and rolling shall be done by the Contractor as described under "Maintenance of Sodded Areas" below.

D. Maintenance of Sodded Areas: The Contractor shall be responsible for maintaining sodded areas by properly watering, weeding and mowing the grass until an acceptable stand has been produced, and been accepted by the Owner.

1. A stand shall be considered acceptable when 95% of the total sodded area has been covered with grass that has rooted into the soil and is in a healthy growing condition. There shall be no bare areas greater than one 6" square exist. All cracks, joints, dips, pits and other irregularities in the surface must have been corrected by top dressing with sand.

2. The Contractor shall be responsible for resodding all bare areas greater than one 6 inch square with the specified mixture and for repairing and resodding wash-outs and eroded areas to the original finished grade.

3. Sodded areas shall be mowed when the grass attains a height of 2 inches and as required thereafter until the acceptance of the stand. Reel type mowers, kept well sharpened, shall be used. Turf shall not be accepted until all sod has knitted together and tacked to the soil.

4. All lawn areas shall be given a top dressing of fertilizer to provide 100 pounds available nitrogen per acre when the grass has attained a satisfactory growth and the first mowing has been performed. Nitrogen shall be derived from Ammonium Nitrate or Nitrate of Soda.

3.07 Seeding

A. Area: All exterior ground within the limit of contract, except surfaces occupied by

buildings, structures, paving, and except areas indicated to be undisturbed or mulched, shall be seeded, sodded or planted as shown on Drawings.

1. Furnish topsoil

2. Finish grading

3. Prepare seed bed

4. Seed and maintain areas as indicated on the Drawings.

B. Seed Bed Preparation: Grade areas to finish grades, filling as needed or removing surplus dirt and floating areas to a smooth, uniform grade as indicated on grading plans. All lawn areas shall slope to drain. Where no grades are shown, areas shall have a smooth and continual grade between existing or fixed controls (such as walks, curbs, catch basin, elevational steps or building) and elevations shown on plans. Roll, scarify, rake and level as necessary to obtain true, even lawn surfaces. All finish grades shall meet approval of the Owner's Representative, before grass seed is sown. Loosen soil to a depth of six inches in lawn areas by approved method in the Specifications and grade to remove ridges and depressions. Remove stones or foreign matter over one inch in diameter from the top two inches of soil. Float lawn areas to approximately finish grades.

C. Seed beds should be permitted to settle or should be firmed by rolling before seeds are broadcast.

D. Seeding should not be performed in windy weather.

E. Seeding shall be done in two directions at right angles to each other.

F. Lawn areas shall be seeded by sowing evenly with an approved mechanical seeder at the rate of a minimum of three pounds per 1,000 square feet. Culti-packer or approved similar equipment may be used to cover the seed and to form the seed bed in one operation. In areas inaccessible to culti-packer, the seeded ground shall be lightly raked with flexible rakes and rolled with a water ballast roller. After rolling, seeded areas are to be lightly mulched with wheat straw.

G. If the Project completion date prohibits in-season planting, the Contractor shall prepare for out-of-season seeding or sodding so that all lawns shall be completed and ready for acceptance at time of Project completion, without additional cost to the Owner. Lawn maintenance shall be the same as for other planting.

H. Lawns shall be maintained by the Contractor for at least 30 days after sodding and 60 days after seeding, or as long as is necessary to establish a uniform stand of the specified grasses, or until substantial completion of the Project or until acceptance of lawns, whichever is later.

I. In the event that lawn operations are completed too late in the Fall for adequate germination and/or growth, maintenance shall continue into the following growing season or until a uniform stand of the specified grasses has been established.

J. Water seeded areas twice the first week to a minimum depth of six inches with a fine spray and once per week thereafter as necessary to supplement natural rain to the equivalent of one inch or to a six inch depth.

K. The surface layer of soil for seeded areas must be kept moist during the germination period. After first cutting, water as specified above.

L. Make weekly inspections to determine the moisture content of the soil and adjust the watering schedule to fit conditions.

M. After grass growth has started all areas or parts of areas which fail to show a uniform stand of grass for any reason whatsoever shall be reseeded in accordance with the plans and as specified herein. Such areas and parts of areas shall be reseeded repeatedly until all areas are covered with a satisfactory growth of grass at no additional cost to the Owner.

N. Watering shall be done in such a manner and as frequently as is deemed necessary by the Owner's Representative to assure continued growth of healthy grass. All areas of the site shall be watered in such a way as to prevent erosion due to excessive quantities applied over small areas and to avoid damage to the finished surface due to the watering equipment.

O. Water for the execution and maintenance of this work shall be provided by the Owner. The Contractor shall, however, furnish his own portable tanks, pumps, hose, pipe, connections, nozzles, and any other equipment required to transport the water from the available outlets and apply it to the seeded areas in an approved manner.

P. Mowing of the seeded areas shall be initiated when the grass has attained a height of one and one-half to two inches. Grass height shall be maintained between one and one-half inches at subsequent cuttings depending on the time of year. Not more than 1/3 of the grass leaf shall be removed at any cutting and cutting shall not occur more often than 10 days apart.

Q. When the amount of invading grass is heavy, it shall be removed to prevent destruction of the underlying turf. If weeds or other undesirable vegetation threaten to smother the planted species, such vegetation shall be mowed or, in the case of rank growths, shall be uprooted, raked and removed from the area by methods approved by the Owner's Representative.

R. Protect seeded areas against trespassing while the grass is germinating. Furnish and install fences, signs, barriers or any other necessary temporary protective devices. Damage resulting from trespass, erosion, washout, settlement or other causes shall be repaired by the Contractor at his expense.

END OF SECTION