GENERAL REQUIREMENTS
and
TECHNICAL SPECIFICATIONS

for the

MYRTLE STREET/ZION CIRCLE PERMEABLE PAVER INSTALLATION

Project No. 147924

March 2016

Prepared for:

ROSWELL
GEORGIA
SINCE 1854

Prepared by:

Brown AND Caldwell

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02490	Trees, Shrubs, Perennials and Ground Cover
02550	Permeable Interlocking Precast Concrete Paving

SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

A. The Myrtle Street/Zion Circle Permeable Paver Installation is located on Myrtle Street and Zion Circle in the City of Roswell. The project will be constructed within city right-of-ways owned by the City of Roswell. Construction easements necessary to complete the project have been obtained by the City of Roswell. The project Owner is the City of Roswell.

B. The goal of this project is to treat stormwater runoff and improve water quality, flood protection, and overall condition and health of city receiving waters. The Myrtle Street/Zion Circle Permeable Paver Installation includes the construction of a permeable paver section on 255 linear feet on Myrtle Street and up to 370 linear feet on Zion Circle.

The project elements include: installation of safety fence and silt fence; clearing and grubbing; removal of existing asphalt pavement and base; removal of curb; soil excavation and disposal; installation of permeable pavers and gravel reservoir; installation of underdrain; installation of new curb; and plantings and revegetation. The project also includes: survey; maintenance of traffic; sediment and erosion controls; and geotechncial testing as required for project construction.

C. The project elements were designed by Brown and Caldwell. Any utility work required will be performed by a licensed utility contractor in the State of Georgia.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01040

COORDINATION OF WORK

PART 1 GENERAL

1.1 CONSTRUCTION ACCESS AND STAGING

A. Construction access to the project site is shown on the Drawings. Access from other areas is prohibited.

B. The Contractor is responsible for maintaining public safety on the project site and adjacent roadways and property for the duration of the project. The Contractor shall mobilize and coordinate movement of construction vehicles and equipment into, through and out of the project site in a safe manner. Traffic control during construction is the responsibility of the Contractor. Flagmen will be required at all site construction access points at all times when construction vehicles are traveling within public right-of-ways or crossing pedestrian travel paths.

C. The Contractor shall provide safe vehicle access for residents and visitors through the work area to all adjacent homes and businesses at all times unless coordinated in advance with the city and the resident and/or business owner.

D. Staging and parking areas are limited on the site. Construction limits are provided on the Drawings. The Contractor is not permitted to use work areas or right-of-ways beyond what is designated on the Drawings without prior approval by the Owner. All disturbed areas will be restored as shown on the drawings to the satisfaction of the Owner.

1.2 WORKING LIMITS

A. Working limits are designated on the Drawings. The working limits shall be secured by the Contractor as specified in Section 01500.

B. Orange barrier fence shall be installed prior to beginning work in the designated area. Fencing shall be maintained for the duration of work activity, and removed only when construction is complete and accepted by the Owner.

1.3 CONSTRUCTION PHOTOGRAPHS

A. The Contractor shall photographically document all phases of the project including preconstruction, construction progress, and post-construction.

B. Photographs shall be taken using a digital camera with no less than 6 megapixels.

C. Engineer shall have the right to select the subject matter and vantage point from which photographs are to be taken.

D. Pre-construction and Post-construction:

1. After the effective date of the Agreement and before Work at the site is started, and again upon issuance of Substantial Completion, take a minimum of 20 photographs covering all areas of the construction site.

E. Construction Progress Photos:

1. Photographically demonstrate progress of construction, showing every aspect of site and adjacent properties.
2. Weekly: Take 20 photographs.
3. Provide photographs to Owner in digital (.jpg) format on a CD or via electronic delivery.

1.4 REFERENCE POINTS AND SURVEY CONTROL

A. Vertical and Horizontal Control Points have been established onsite. Control point locations and elevations are shown on the Drawings.

B. Contractor's Responsibilities:
1. Provide additional survey and staking required to lay out the Work and additional interim survey to document successful completion of the work for pay applications (see Section 02105).
2. In event of discrepancy in data provided by Owner, request clarification before proceeding with Work.
3. Provide competent employee(s), tools, stakes, and other equipment and materials as Engineer may require to: Check layout, survey, and measure Work performed by others.

1.5 UTILITY COORDINATION

A. The Contractor shall notify applicable utilities and locate all above and below ground utilities prior to commencing Work. The Contractor shall notify the Owner of any potential conflicts between existing utilities and the proposed work. The Contractor will be responsible for repairing any damage to existing utilities to the satisfaction of the Owner and for all damages resulting from damaging the utilities.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01080

APPLICABLE CODES AND STANDARDS

PART 1 GENERAL

1.1 GENERAL

A. All materials, equipment, fabrication, and installation practices shall comply with the following applicable Codes and standards, except in those cases where the Contractor's quality standards establish more stringent quality requirements, as determined by the Engineer.

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

2. Aluminum
   AA (Aluminum Association)
   AAMA (Architectural Aluminum Manufacturers Association)

3. Steel
   AISC (American Institute of Steel Construction)

4. Concrete
   ACI (American Concrete Institute)

5. Welding
   ASME (American Society of Mechanical Engineers)
   AWS (American Welding Society)

6. Safety
   OSHA (Occupational Safety and Health Act).

7. Permeable Pavement System
   ICPI (Interlocking Concrete Pavement Institute)

In addition, all work shall comply with the applicable requirements of City of Roswell, utilities, other authorities having jurisdiction and all permit requirements.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01092

ABBREVIATIONS, SYMBOLS, TRADE NAMES AND MATERIALS

PART 1 GENERAL

1.1 GENERAL

A. Whenever reference is made to the furnishing of materials or testing thereof to conform to the standards of any technical society, organization, or body, it shall be construed to mean the latest standard, code, specification or tentative specification adopted and published at the time of advertisement for bids. Such standards are made a part hereof to the extent which is indicated or intended.

B. Where so specified, products or workmanship shall also meet or exceed the additional prescriptive or performance requirements included within the Contract Documents to establish a higher or more stringent standard of quality than that required by the referenced standard.

1.2 ABBREVIATIONS

A. The following list includes construction industry organizations and governmental agencies to which references may be made in the Contract Documents, with abbreviations used:

AA	–	Aluminum Association
AAMA	–	Architectural Aluminum Manufacturer's Association
AASHTO	–	American Association of State Highway and Transportation Officials
ACI	–	American Concrete Institute
ACPA	–	American Concrete Pipe Association
AGA	–	American Gas Association
AI	–	Asphalt Institute
AIA	–	American Institute of Architects
AIEE	–	American Institute of Electrical Engineers
AISC	–	American Institute of Steel Construction
AISI	–	American Iron and Steel Institute
AITC	–	American Institute of Timber Construction
ANSI	–	American National Standards Institute
APA	–	American Plywood Association
APHA	–	American Public Health Association
API	–	American Petroleum Institute
APWA	–	American Public Works Association
ASA	–	American Standards Association
ASCE	–	American Society of Civil Engineers
ASME	–	American Society of Mechanical Engineers
ASTM	–	American Society for Testing and Materials
AWS	–	American Welding Society

AWWA	–	American Water Works Association
CFR	–	Code of Federal Regulations
CRSI	–	Concrete Reinforcing Steel Institute
CSI	–	Construction Specifications Institute
EDA	–	Economic Development Administration
EIA	–	Electronic Industries Association
EPA	–	Environmental Protection Agency
FmHA	–	Farmers Home Administration
FS	–	Federal Specifications
HI	–	Hydraulic Institute
ICPI	--	Interlocking Concrete Pavement Institute
IEEE	–	Institute of Electronic and Electrical Engineers
IES	–	Illuminating Engineering Society
NAAMM	–	National Association of Architectural Metal Manufacturers
NACE	–	National Association of Corrosion Engineers
NBS	–	National Bureau of Standards
NCPI	–	National Clay Pipe Institute
NEC	–	National Electric Code
NEMA	–	National Electrical Manufacturers Association
NFPA	–	National Fire Protection Association
NRMA	–	National Ready-Mix Association
OSHA	–	Occupational Safety and Health Administration
PCA	–	Portland Cement Association
PCI	–	Prestressed Concrete Institute
SBC	–	Southern Building Code
SSPC	–	Steel Structures Painting Council
TEMA	–	Tubular Exchangers Manufacturers Association
UBC	–	Uniform Building Code
UL	–	Underwriters Laboratories
USDC	–	United States Department of Commerce
WEF	–	Water Environment Federation.

1.3 TRADE NAMES AND MATERIALS

A. Where materials or equipment are specified by a trade or brand name, it is not the intention of the Owner to discriminate against an equal product of another manufacturer, but rather to set a definite standard of quality of performance, and to establish an equal basis for the evaluation of bids. Where the words “equivalent,” “proper,” or “equal to”, are used, they shall be understood to mean that the item referred to shall be proper, the equivalent of, or equal to the item specified by a trade or brand name, in the opinion or judgment of the Engineer. Unless otherwise specified, all materials shall be the best of their respective kinds and shall be equal to approved samples. Notwithstanding that the words “or equal to”, or other such expressions, may be used in the Specifications in connection with a material, manufactured article or process; the material, article, or process specifically designated shall be used, unless a substitute is approved in writing by the Engineer.

1.4 SYMBOLS

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

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01150

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 BID FORM

A. The Bid Form lists each item of work for which payment will be made. No payment will be made for any items other than those listed in the Bid Form.

B. Required items of work and incidentals necessary for the satisfactory completion of the Work which are not specifically listed in the bid, and which are not specified in this section to be measured or to be included in one of the items listed in the Bid Form, shall be considered as incidental to the Work. All costs thereof, including Contractor's overhead cost and profit, shall be considered as included in the lump sum or unit prices bid for the various Bid Items. The Contractor shall prepare his Bid Form accordingly.

C. Work includes furnishing all labor, equipment, tools and materials, and performing all operations required to complete the work satisfactorily, in place, as specified and as indicated on the Drawings.

1.2 MEASUREMENT AND PAYMENT

A. Measurement of an item of work will be by the unit indicated in the Bid Form.

B. Measurement will include all necessary and incidental related work not specified to be included in any other item of work listed in the Bid Form.

C. Unless otherwise stated in individual sections of the Specifications or in the Bid Form, no separate payment will be made for any item of Work, materials, parts, equipment, supplies or related items required to perform and complete the Work. The costs for all such items required shall be included in the Contract price bid item of which it is a part.

D. Payment will be made at the Contract price per unit indicated in the Bid Form with total price of the Contract being equal to the Total Bid, as specified and as modified, by extending unit prices multiplied by quantities as appropriate to reflect actual Work. Such price and payment shall constitute full compensation to the Contractor for furnishing all labor, equipment, tools and materials, and for performing all operations required to furnish to the Owner the entire Project, complete in place, as specified and as indicated on the Drawings.

E. All lump sum items will not be measured and payment shall constitute full compensation to the Contractor for the completed item inclusive of any and all work components including all labor, equipment, tools, materials and permit and inspection fees.

F. The Owner has completed a topographic survey of the project site as shown on the construction drawings. This survey was used to develop the project earthwork excavation and fill quantities listed in the Bid Schedule and serves as the basis for the pre-construction condition.

G. Payment will be made to the Contractor when the item or measurable portion of the item has been completed to the satisfaction of the Owner and the Engineer. With each monthly pay application the Contractor will be required to provide trucking records and receipts to verify the pay quantities for unit price items.

H. This project is being partially funded by a USEPA Section 319(h) grant and will follow federal procurement rules and procedure. The City of Roswell encourages Disadvantaged Business Enterprises (DBE) to submit a bid for the work described herein, to subcontract to other firms, or to offer materials and services in support of the project. The goal of the federal program is to procure 13.7% Minority Business Enterprise (MBE) and 7% Women Business Enterprises (WBE) for contracts, subcontracts, construction, equipment or services.

1.3 CASH ALLOWANCE WORK

A. The Bid Form contains one (1) Cash Allowance item, Item 14. **This item is for work beyond the items included and shown in the Construction Documents**. Additional work may or may not be needed and is not guaranteed. Final payment for these items will be based on the actual quantities completed to the satisfaction of the Owner. The work associated with these items will be directed by the Owner/Engineer in the field during construction. The Cash Allowance Work shall only be performed if specifically requested by the Owner in writing. No Cash Allowance work shall be performed by the Contractor without Owner pre-approval. Receipts shall be provided by the Contractor for all materials verifying the quantity furnished and installed prior to payment.

Measurement and Payment

1. Item 14, $10,000 Allowance for Additional Items. This pay item is specifically for materials and/or labor not included in the Construction Documents (lump sum work and unit price items 1 to 13 in the Bid Form). All items, quantities, unit prices, and total costs will be negotiated by Owner and Contractor at time of need prior to beginning the work. Measurement will be based on the actual quantity of work completed to the satisfaction of the Owner. Full payment will be for all labor, materials, equipment, supplies and incidentals to complete the agreed upon work in accordance with Owner direction and the Contract Documents.

Unit prices will be entered into Owner financial system and payment will not exceed line item total cost. Any item exceeding estimated quantities will be paid from cash allowance if needed.

Item	Description	Cash Allowance
14	Additional Items	$10,000.00

1.4 SCHEDULE OF VALUES

A. The Contractor shall submit a schedule of values detailing the project elements including the lump sum and unit price Bid Form items. The Schedule of Values shall be submitted in a spreadsheet format compatible with the latest version of Excel.

B. The summation of the Schedule of Values shall represent all lump sum and unit price work and shall equal the total bid amount included in the bid.

C. An unbalanced or front-end loaded schedule will not be acceptable.

1.5 REJECTED, EXCESS, AND WASTED MATERIAL

A. The following quantities will not be included for payment:

1. Quantities of material wasted or disposed of in a manner not called for under the Contract or as a consequence of the construction method used to perform the work.

2. Rejected loads of material, including material rejected after it has been placed by reasons of the failure of the Contractor to comply with the provisions of the Contract.

3. Material not unloaded from the transporting vehicle.

4. Material placed outside the lines indicated on the Drawings or established by the Engineer.

5. Material not incorporated into the final Work.

6. Material remaining on hand after completion of the Work.

7. No payment will be made for loading, hauling, and disposing of rejected material.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01200

PROJECT MEETINGS

PART 1 GENERAL

1.1 PRECONSTRUCTION CONFERENCE

A. After award of Bid and prior to beginning construction, a conference will be held with representatives of the Contractor, Owner, Engineer and the affected utility companies to discuss schedules and utility conflicts in the Project. This conference is intended to establish lines of communication between the parties involved. Time and place of preconstruction conference will be determined at time of bid award.

B. The Contractor shall be prepared to discuss the following:
   1. Required schedules
   2. Status of Bonds and insurance
   3. Sequencing of critical path work items
   4. Progress payment procedures
   5. Project changes and clarification procedures
   6. Use of site, access, office and storage areas, security and temporary facilities
   7. Required submittals
   8. Major product delivery and priorities
   9. Contractor's safety plan and representative
   10. Tree Preservation.

C. Attendees will include the following:
   1. Owner's representatives
   2. Contractor's office representative
   3. Contractor's resident superintendent
   4. Contractor's quality control representative
   5. Subcontractors' representatives whom Contractor may desire or Engineer may request to attend
   6. Engineer's representatives
   7. Others as appropriate.

D. The Contractor shall provide a detailed construction schedule to all meeting participants. This schedule will be maintained and updated as/if project sequencing and schedules change. The Engineer and Owner shall be made aware of any construction scheduling changes as soon as they are known.

1.2 PROGRESS MEETINGS

A. The Owner may request meetings with the Contractor at any time on matters pertaining to the progress of Work being carried out under this Contract. It will be the responsibility of the Contractor to supply whatever information is requested by the Owner concerning the project

throughout its duration. Monthly reviews of progress shall be held between the Owner and Engineer. The Contractor shall attend if requested by the Owner.

B. The Engineer will schedule weekly progress meetings at the site, conducted to review the Work progress, progress schedule, shop drawing and sample submissions schedule, application for payment, contract modifications, and other matters needing discussion and resolution.

C. Attendees will include the Owner's representatives, Contractor, Subcontractors, and Suppliers (as appropriate), Engineer's representatives, and others as appropriate.

D. Other meetings may become necessary and will be scheduled as appropriate and related to specific construction activities. These meetings will be planned and scheduled during the regularly schedule progress meetings, to the extent possible. It is the Contractor's responsibility to arrange for such meetings prior to any construction activity for which either the Owner or Engineer have requested a meeting.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01250

SUBSTITUTIONS AND OPTIONS

PART 1 GENERAL

1.1 SCOPE

A. This section outlines the restrictions and requirements for substitutions, product and manufacturer options, and construction method options.

1.2 DEFINITIONS

A. For the purposes of these Contract Documents, a "substitute item" shall be defined as one of the following:

1. A product or manufacturer offered as a replacement to a specified product or manufacturer.
2. A product or manufacturer offered in addition to a specified product or manufacturer.

B. For the purposes of these Contract Documents, a "substitute construction method" shall be defined as one of the following:

1. A mean, method, technique, sequence or procedure of construction offered as a replacement for a specified mean, method, technique, sequence or procedure of construction.
2. A mean, method, technique, sequence or procedure of construction offered in addition to a specified mean, method, technique, sequence or procedure of construction.

1.3 GENERAL

A. An item or construction method, which is offered where no specific product, manufacturer, mean, method, technique, sequence or procedure of construction is specified or shown on the Drawings, shall not be considered a substitute and shall be at the option of the Contractor, subject to the provisions of the Contract Documents for that item or construction method.

B. For products specified only by a referenced standard, the Contractor may select any product by any manufacturer, which meets the requirements of the specifications, unless indicated otherwise in the Contract Documents.

C. If the manufacturer is named on the Drawings or in the Specifications as an acceptable manufacturer, products of that manufacturer meeting all requirements of the Specifications and Drawings are acceptable.

D. Whenever the Engineer's design is based on a specific product of a particular manufacturer, that manufacturer will be shown on the Drawings and/or listed first in the list of approved manufacturers in the Specifications. Any Bidder intending to furnish products of other than the first listed manufacturer, or furnish substitute items, shall:

1. Verify that the item being furnished will fit in the space allowed, perform the same functions and have the same capabilities as the item specified

2. Include in its Bid the cost of all accessory items which may be required by the other listed substitute product
3. Include the cost of any other project modifications required
4. Include the cost of required additional work by the Engineer, if any, to accommodate the item.

E. Whenever a product specification includes minimum experience requirements which the manufacturer selected by the Contractor cannot meet, the manufacturer shall furnish the Owner with a cash deposit, or bond acceptable to the Owner in an amount equal to the cost of the product, which shall remain in effect until the experience requirement has been met.

1.4 APPROVALS

A. Approval, of a substitution as an acceptable manufacturer, by the Owner and Engineer is dependent on determination that the product offered:
1. Is essentially equal in function, performance, quality of manufacture, ease of maintenance, reliability, service life and other criteria to that on which the design is based
2. Will require no modifications to existing infrastructure or the proposed project elements.

1.5 SUBSTITUTIONS AND OPTIONS

A. No substitutions will be considered for the manufacturers listed in the Bid.

B. After Notice to Proceed:
1. Substitute items will be considered only if the term “equal to” precedes the names of acceptable manufacturers in the Specification.
2. Where items are specified by referenced standard or specified as indicated above in Article 1.03, Paragraph A, such items shall be submitted to the Engineer for review.
3. The Contractor shall submit shop drawings on the substitute item for the Engineer’s review in accordance with Section 01300.
4. The Engineer may require the submittal of additional information by the Contractor prior to approval.

C. Prior to Opening of Bids:
1. No consideration or approvals will be made for products specified by a referenced standard, or specified as indicated in Article 1.03, Paragraph A, above. Such consideration may occur only after the Notice to Proceed.
2. No consideration or approvals will be made for products being offered where the term “equal to” precedes the name of an approved product. Such substitution consideration may occur only after the Notice to Proceed.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.1 SHOP DRAWINGS AND PRODUCT DATA

A. The Contractor shall submit to the Engineer for review and approval complete drawings and data for all materials and products to be incorporated into the work. Shop drawings and engineering data shall be provided and the Engineer's review will be conducted in accordance with requirements of the General and Supplemental General Conditions. The review of the drawings by the Engineer shall not be construed as a complete check but only for conformance with the contract documents. Review of such submittals will not relieve the contractor of the responsibility for any errors which may exist as the Contractor shall be responsible for the dimension and design of adequate connections, details, and satisfactory construction of all work. Shop drawings and/or engineering data, as appropriate, shall be submitted for the following items:

1. Geotextiles specifications
2. Concrete mix specifications
3. Concrete color submittal and specifications
4. Gravel and stone specifications and gradation
5. Permeable pavers (specifications and full size sample and color choice chart)
   Note: The Owner will select paver colors during the submittal process.
6. All seed mix, plant materials and Bill of Sale for all plants
7. Soil testing results in preparation for planting
8. Water diversion equipment and materials
9. All temporary and permanent erosion and sediment control materials.

B. The term "submittals" shall mean shop drawings, manufacturer's drawings, catalog sheets, brochures, descriptive literature, diagrams, schedules, calculations, material lists, performance charts, test reports, samples, and items of similar nature which are normally submitted for the Engineer's review for conformance with the design concept and compliance with the contract documents.

C. Each shop drawing and each item of data shall bear the contractor's approved stamp indicating that the Contractor has reviewed the drawing or data for conformance with the Contract Documents.

D. No material shall be shipped unless the applicable drawings or submittals have been reviewed and approved by the Engineer and returned to the Contractor.

1.2 MISCELLANEOUS SUBMITTALS

A. The Contractor shall submit to the Engineer miscellaneous information, procedures, test data, samples, etc., in the manner and at the time specified in these Specifications and Contract Documents. Miscellaneous submittals shall include, but not be limited to, the following:

1. Construction Schedule
2. Pre-Construction, During Construction and Post-Construction Photographs
3. Maintenance of Traffic Plan
4. Tree Preservation Plan
5. Water Management Plan (see Erosion, Sediment and Pollution Control Plans)
6. Sediment and Erosion Control Plan including plan for daily site stabilization and turbidity controls for water leaving the site
7. Project record documents including As-Built Survey
8. Warranty.

1.3 GENERAL SUBMITTAL REQUIREMENTS

A. Preparation of Submittals

1. Provide permanent marking on each submittal to identify project, date, Contractor, subcontractor, submittal name and similar information to distinguish it from other submittals. Show Contractor's executed review and approval marking and provide space for the Engineer's "Action" marking. Package each submittal appropriately for transmittal and handling. Submittals which are received from sources other than through the Contractor's office will be returned "without action".

B. Transmittal Identification

1. Number transmittals in sequence for each Division of the Specifications. The number after the dash indicates the Section of the Specifications, and the number before the dash is the sequence number of the transmittal (1-15140 would be the first transmittal applicable to Section 15140 of the Specifications; 2-15140 would be the second transmittal for Section 15140, etc.).
2. Identify resubmittals with a letter of the alphabet following the original number, using A for the first resubmittal, B for the second resubmittal, etc. A resubmittal affecting transmittal 1-15140 would then be numbered 1A-15140. The number 1-15140 would then be entered in the space "Previous Transmittal Number", which is left blank except on resubmittals.

1.4 SPECIFIC CATEGORY REQUIREMENTS

A. General

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

1) The date of submittal and the dates of any previous submittals
2) The project title: Myrtle Street/Zion Circle Permeable Paver Installation
3) Contract No.
4) The names of the:
   a) Contractor
   b) Supplier
   c) Manufacturer
5) Identification of the product, with the Specification Section number and equipment tag numbers
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 Engineer in writing, at time of submittal, of any deviations on the submittals from requirements of the Contract Documents
10) Identification of revisions on resubmittals
11) An 8 inch x 3 inch blank space for Contractor and Engineer 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.

1.5 ROUTING OF SUBMITTALS

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

1. Supplier to Contractor (through representative if applicable) for preliminary check
2. Contractor to Engineer for general review or comment
3. Engineer to Contractor (with copy to Owner)
4. Contractor to Supplier.

1.6 ADDRESS FOR COMMUNICATIONS

Engineer:
Brown and Caldwell
990 Hammond Drive, Suite 400
Atlanta, GA 30328
(770) 673-3679
Attention: Michael Mullen

Owner:
City of Roswell
38 Hill Street, Suite 235
Roswell, GA
(770) 594-6417
Attention: Danelle Murray

1.7 SUBMITTAL COPIES REQUIRED

A. Shop Drawings, Product Data, and Miscellaneous Submittals

1. All submittals marked "A" or "B" will be distributed as follows:

For Brown and Caldwell	1 copy
For Contractor	3 copies
For Owner	1 copy
Total	5 copies

B. To the above number may be added additional copies as required by the Contractor.

C. The Engineer will mark all copies of each shop drawing. One will be retained in the Engineer's office, one will be retained for the Owner and the remaining copies sent to the Contractor for his records and distribution.

1.8 REVIEW OF SUBMITTALS

A. Review Time

1. Allow a minimum of 10 working days for the Engineer's initial processing of each submittal requiring review and response, except allow longer periods where processing must be delayed for coordination with subsequent submittals. The Engineer will advise the Contractor promptly when it is determined that a submittal being processed must be delayed for coordination. Allow 10 working days for reprocessing each submittal.

☐ NO EXCEPTIONS TAKEN	☐ MAKE CORRECTIONS NOTED. DO NOT RESUBMIT
☒ MAKE CORRECTIONS NOTED AND RESUBMIT	☐ REJECTED. RESUBMIT IN ACCORDANCE WITH CONTRACT DOCUMENTS

B. Engineer's Action

1. Final Unrestricted Release
   Work may proceed, provided it complies with contract documents, when submittal is returned with the following:

   Marking: No Exceptions Taken.

2. Final-But-Restricted Release
   Work may proceed, provided it complies with notations and corrections on submittal and with contract documents, when submittal is returned with the following:

   Marking: Make Corrections Noted. Do Not Resubmit.

3. Returned for Resubmittal
   Do not proceed with Work. Revise submittal in accordance with notations thereon, and resubmit without delay to obtain a different action marking. Do not allow submittals with the

following marking (or unmarked submittals where a marking is required) to be used in connection with performance of the work.

Marking: Make Corrections Noted and Resubmit.
Rejected. Resubmit in Accordance with Contract Documents.

Only two copies of these items will be reviewed and marked. One copy will be retained and the other copy with all remaining unmarked copies will be returned to the contractor for resubmittal.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01310

CONSTRUCTION SCHEDULING

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. The Contractor shall submit to the Engineer for approval construction planning, scheduling, and cost value documentation pertaining to the project as detailed herein and shall update same throughout the project as required.

1.2 SUBMITTALS

A. Within 5 working days of Notice to Proceed, the Contractor shall submit to the Engineer for approval the products required by this section of the Specifications.

B. Within 5 working days following receipt of same, the Engineer shall provide any comments to the Contractor.

C. Within 5 working days following the Engineer's review the Contractor shall resubmit a corrected copy of those documents requiring revision.

D. Within 5 working days following his receipt of the adequately revised documents, the Engineer will approve same for use on the project.

E. Once approved, the Contractor shall submit four copies of the construction scheduling documents to the Engineer for use on the project.

F. The Contractor shall update the work schedules at least weekly and indicate those activities whose completion dates are in jeopardy because of activities behind schedule.

G. The updated schedule shall be submitted with the Contractor's monthly invoice.

H. The Owner may require the Contractor to modify any portions of the work schedule that become infeasible because of "activities behind schedule" or for any other valid reason. Any such modification will be at the Contractor's expense unless the modification is required to accommodate schedule revisions required by the Owner.

I. An activity that cannot be completed by its original latest completion date shall be deemed to be behind schedule.

1.3 CONSTRUCTION PROGRESS SCHEDULE

A. The Construction Progress Schedule shall be submitted in a form satisfactory to the Owner showing:

1. Activity Number
2. Activity Description
3. Estimated Activity Duration (Work Days)
4. Activity Start Date (Calendar Date)
5. Activity Finish Date (Calendar Date)
6. Activity Cost.

B. The anticipated amount of each monthly payment that will become due the Contractor in accordance with the progress schedule shall be included thereon.

C. The activity durations shall be depicted in the form of a bar chart and shall be overlaid with graph of the cumulative anticipated monthly payments due the Contractor.

1.4 ESTIMATES

A. The Detailed Estimates shall give a complete and satisfactory breakdown of the contract amount.

B. Periodic Itemized Estimates shall detail work done for the purpose of tabulating partial payments thereon.

1.5 PROJECT INFORMATION

A. Each tabulation shall be prefaced with the following summary data:

1. Project Name
2. Contractor
3. Type of Tabulation (Initial or Updated with revision number)
4. Project Duration
5. Project Scheduled Completion Date
6. Effective or Starting Date of the Schedule
7. If an updated (revised) schedule, the new project completion date and project status.

1.6 SCHEDULE MONITORING

A. When specifically requested by the Engineer (in addition to the updated schedule submitted with the monthly invoice), the Contractor shall submit to the Engineer a revised schedule for those activities that remain to occur.

B. The revised schedule shall be submitted in the form, sequence, and of the number of copies requested for the initial schedule.

1.7 COST VALUE FOR ACTIVITIES

A. The Contractor shall establish and submit a cost value for each activity in his progress schedule and estimates so that monthly Progress Payments to the Contractor can be calculated on the basis of work in place.

B. Subject to the provisions for "Progress Payments" in the General Conditions of the Contract all cost value reports for net work activities shall be based upon the close of books as of the 20th day of each month, and the submittal of such costs value for activities shall be submitted to the Engineer for review and approval not later than the 25th day of each month.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. This section covers the following aspects of the work:

1. Mobilization/Demobilization
2. Protection of work and property
3. Project construction sign
4. Project document box
5. Soil erosion and sediment control
6. Construction fencing
7. Construction access (temporary)
8. Cleaning during construction.

1.2 MOBILIZATION/DEMOBILIZATION

A. Mobilization shall include, but not be limited to, these principal items:

1. Obtaining required permits, including land clearing permit.
2. Moving Contractor's equipment required for first month operations onto site.
3. Providing on-site sanitary facilities as specified and as required by laws and regulations and governing agencies.
4. Posting OSHA-required notices and establishing safety programs and procedures.
5. Having contractor's superintendent at site full time.

B. Demobilization shall include removal of Contractor's equipment, decommissioning of temporary power and lighting, removal of storage facilities and supplies, and removal of any other tools, equipment, supplies, or materials brought to the project site by the Contractor.

1.3 PROTECTION OF WORK AND PROPERTY

A. The Contractor shall be responsible for providing all necessary means to protect the work, property, and all equipment, materials, and supplies brought to the project site.

1.4 PROJECT CONSTRUCTION SIGN

A. The Contractor shall provide, install and maintain one, 48-inch-high by 72-inch-wide sign constructed of 4-mil Coroplast on two 4-inch x 4-inch PT posts. Placement of the sign will be as directed by the Owner. The sign shall bear name of project, Owner, Owner logo, contractor, engineer, and other participating agencies. Lettering shall be blue applied on a white background by an experienced sign painter. Graphics layout, fonts, colors, etc. shall be

similar to sign samples provided by Owner. Information to be included will be provided by Owner.

1.5 PROJECT DOCUMENT BOX

A. The Contractor shall provide a weatherproof project document box at the construction site at a location selected by the Owner. The Contractor shall be responsible for maintaining up to date project documents in the box including: construction drawings with any field changes; construction specifications; copies of all permits including the NPDES Construction General Permit NOI, and all monitoring information and inspection reports required by the permit.

1.6 TEMPORARY UTILITIES

A. The Contractor shall provide and maintain sanitary and personnel facilities for contractor's employees, subcontractors, and all other on-site personnel.

1.7 SOIL EROSION AND SEDIMENT CONTROL

A. Qualifications of Contractor's on-site certified personnel for sediment and erosion control:

1. "Certified Personnel" means any person who has attended the Georgia Soil and Water Conservation Commission's (GSWCC) "Fundamentals Seminar" (Level 1A) and holds a certificate of successful completion of the training requirements stated in 600-8-1-.04 (2)(a) from the Conservation Commission in the area of inspection of best management practices (BMPs) on construction sites. BMPs are vegetative and structural measures to control and prevent erosion.
2. Copy of proof of GSWCC certification.
3. Name and telephone number(s) for the responsible person(s) that can be reached 24 hours a day, 7 days a week for erosion and sedimentation control, and other emergencies.
4. Additional soil erosion and sediment control requirements are set forth on the construction drawings.
5. The Contractor is responsible for ensuring that the site is stable for up to a 10-year storm event and that it will not erode or allow sediment or turbidity to leave the site. The Contractor can accomplish this by bypassing stream flows and stormwater discharges around the disturbed area, placing material over the disturbed area for stabilization, and using filter bags and flocculants for turbidity and sediment removal from water.

1.8 CONSTRUCTION FENCING

A. Construction fencing shall be orange barrier fencing (4 feet high), and shall be placed along all sides of the working limits and around areas of tree protection. Construction fencing shall be erected by the contractor and maintained for the duration of the construction contract.

B. Construction fencing shall be removed from the project work areas following construction completion, and following the Engineer's approval to remove such fencing.

1.9 CONSTRUCTION STAGING AND STORAGE AREAS

The Contractor shall utilize areas within the project working limits for construction staging and storage of equipment and materials. The Contractor is not permitted use of properties beyond what is designated on the Drawings without prior approval by the Owner.

1.10 CLEANING DURING CONSTRUCTION

A. In accordance with General Conditions, as may be specified in specification sections, and as required herein.

B. Wet down exterior surfaces prior to sweeping to prevent blowing of dust and debris. At least weekly, and as directed, pick up all debris and dispose.

C. Provide approved containers for collection and disposal of waste materials, debris, and rubbish. At least at weekly intervals, and as directed, dispose of such waste materials, debris, and rubbish off site.

D. At least weekly, and as directed, brush sweep the entry drive and roadways, and all other streets and walkways affected by work and where adjacent to work.

PART 2 PRODUCTS

2.1 TURBIDITY CONTROLS

A. The Contractor may be required to use sediment and turbidity control products to comply with the project requirements. All products shall be safe for use in the environment without damage to wildlife or aquatic species.

PART 3 EXECUTION

3.1 PROTECTION OF WORK AND PROPERTY

A. General

1. Protect, shore, brace and support existing trees and other vegetation to remain which could be disturbed by excavation and other adjacent work activities.
2. Protect, shore, brace, support, and maintain underground pipes, conduits, drains, and other underground utility construction uncovered or otherwise affected by construction operations.
3. Keep fire hydrants and water control valves free from obstruction and available for use at all times.
4. Do not impair operation of existing water or sewer systems. Prevent construction material, pavement, concrete, earth, wastes, and other debris from entering storm sewers and sanitary sewers.

5. Maintain original site drainage or provide means for bypass to undisturbed downstream drainage systems.

6. Provide, install, and maintain all temporary barriers, fences, and signs to prohibit public access to work area.

B. Site Security: Provide and maintain additional temporary security fences as necessary to protect the work and Contractor-furnished products not yet installed.

C. Finished Construction: Protect finished work, private property, and existing facilities.

D. Waterways: Keep ditches, culverts, and natural drainages continuously free of construction materials and debris.

3.2 TEMPORARY CONTROLS

A. Air Pollution Control

1. Minimize air pollution from construction operations.

2. Burning of waste materials, rubbish, or other debris will not be permitted on or adjacent to site.

B. Noise Control: Provide acoustical barriers or other measures as required so that noise emanating from tools or equipment will not exceed legal noise levels and in no event shall exceed 75 dB at a distance of 50 feet from the noise source.

C. Water Pollution Control

1. Erosion and sediment control shall be the Contractor's responsibility for compliance, installation, maintenance, and removal as required by the State of Georgia "Manual for Erosion and Sediment Control in Georgia," latest version as published by the Georgia Soil and Water Conservation Commission. The Contractor shall become familiar with these specifications prior to any construction activities. The installation of the required erosion and sediment control measures shall be installed as a first step in construction. Contractor must have GSWCC certified personnel on site to supervise the installation and maintenance of all sediment and erosion control measures.

2. The Contractor will be required to control the discharge of turbidity and total suspended solids in all water including stormwater which leaves the site, including water which flows over the dam or is pumped. Special provisions shall be provided to control the discharge of water containing sediment and turbidity in the event of up to a 10-year, 24-hour or greater storm event.

3. Do not dispose of volatile wastes such as mineral spirits, petroleum products, oil, chemicals, or paint thinner in any system that conveys stormwater runoff, sewage, or potable water. These systems include, but are not limited to, storm drains, surface drains, manholes, ditches, swales, etc. Disposal of wastes into streams or waterways is prohibited. Provide acceptable containers for collection and disposal of waste materials, debris, and rubbish.

4. Volatile wastes such as mineral spirits, petroleum products, oil, chemicals, or paint thinner must be stored in a double-walled containment system.

5. Comply with all requirements of the NPDES Stormwater Construction Permit and all other state, federal and local permits.

D. Erosion, Sediment, and Flood Control: Provide, maintain, and operate temporary facilities to control erosion and sediment releases, and to protect upstream areas, work areas and existing facilities from flooding during construction period. The Contractor is responsible for ensuring that the site is stable for up to a 10-year storm event and that it will not erode or allow sediment or turbidity to leave the site. The Contractor may be required to use sediment and turbidity control products to comply with the project requirements.

E. Traffic Control: Contractor to provide necessary signage, traffic controls, and flagmen to satisfy City of Roswell requirements and to allow residents and visitors safe access to homes and businesses adjacent to the work area.

END OF SECTION

SECTION 01535

TEMPORARY DEWATERING

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. The work covered under this section includes all methods associated with maintaining dry working conditions throughout the construction project. These efforts include isolating portions of the work during construction during excavation. The work also includes controlling the release of sediment and turbidity in all water which discharges from the site.

B. It is the responsibility of the contractor to maintain dry, workable conditions in areas where work is being performed. This may require the use of dewatering systems including, but not limited to: wellpoint systems, trenching, pumps, hoses, connectors, portable sediment tanks, portable sediment dewatering equipment, silt bags, geotextiles, and outfalls adequate to discharge clean treated water into the existing downstream conveyance system while maintaining adequate water quality.

C. Stormwater flows shall be maintained at all times by the contractor during construction. It is the responsibility of the contractor to select, furnish, operate and maintain all necessary equipment, materials and labor to intercept flow, transfer it around and past any non-stabilized work areas, and return the flow to the existing downstream conveyance system while maintaining adequate water quality.

D. The contractor shall plan for and control unexpected surface water discharges from areas holding more than 12 inches of water above current ground level. Grading will be completed to ensure that if surface water unexpectedly and suddenly discharges from an isolated area (i.e., behind a cofferdam), the water will remain on City property and will not cause erosion, property damage or water quality violations.

E. The contractor shall prepare and sufficiently stabilize the construction site at the end of each days work to ensure the site can accept and convey runoff from up to 10-year storm event flows while maintaining adequate water quality.

1.2 SUBMITTALS

A. The Contractor shall provide to the engineer a temporary dewatering plan, including staging of various phases of work and corresponding measures to manage water entering and leaving work areas, as necessary to facilitate construction. This plan should consist of:

1. A legible sketch graphic showing all dewatering and diversion elements by phase.
2. A narrative component describing the phasing of work and description of specific elements to manage water entering and leaving the work areas during each phase.
3. The plan shall also provide detailed information and elements for the control of sediment and turbidity in all water which leaves the site.

B. The Contractor's temporary dewatering and diversion plan must be approved by the Engineer prior to initiating dewatering or stream diversion facilities.

1.3 SCHEDULING AND SEQUENCING

A. The Contractor shall plan work activities and provide temporary diversion and connections as necessary in appropriate sequences to perform the work and provide for the maintenance of the normal base flow and storm events.

B. Sequence Constraints: Erosion control provisions, either permanent or approved temporary, must be in place prior to any construction activities in an area served by the erosion control provisions.

1.4 MAINTENANCE

A. Dewatering and Diversion Systems:

1. Dewatering and diversion systems shall be maintained daily during operations.
2. The Contractor shall pay particular attention to potential erosion which may be created during dewatering operations. Erosion potential shall be identified and corrected at the earliest possible time.
3. Maintenance Service: Ensure that the temporary system is properly maintained and a responsible operator shall be on hand at all times when pumps or other equipment are operating.
4. Extra Materials: Spare parts for pumps, piping and other key components of the dewatering and diversion systems shall be kept on site as necessary to ensure continuous operation of the dewatering and diversion systems at all times.
5. Adequate hoisting equipment for key components shall be maintained on the site.
6. Materials to stabilize and protect disturbed areas from erosion and sediment transport during storm events up to the 10-year event.
7. Materials to control turbidity and sediment in all water which leaves the site.

PART 2 PRODUCTS

A. The equipment and materials used for dewatering and diversion shall be of suitable strength to withstand the weather and field conditions for the duration of the operations.

B. The equipment and materials used to control the release of turbidity and suspended solids shall be designed for this application and shall be capable of reducing the values to the specified values.

C. Where gas/diesel-powered generators are used, the Contractor must demonstrate measures to minimize public nuisance of noise. This may include, but is not limited to the following: 1) strategic placement of equipment, 2) properly operating/functioning equipment and components, and 3) application of volume suppressing measures.

D. In the event the Contractor fails to comply with maximum permissible noise level decibels in the operation of temporary dewatering and diversion systems, the Owner or Engineer may order the

Contractor to stop operation until such time as specified noise levels are achieved. The termination shall not be the basis for any extension of contract time nor for any claim for additional compensation.

PART 3 EXECUTION

A. Provide all wellpoint systems, pumps, piping an ancillary equipment to maintain dry working conditions. Barriers shall not be placed in a manner which will cause water to rise onto property not owned by the City or cause property damage. The dewatering system may be required to be operated 24 hours per day, 7 days per week, including holidays, during construction operations. Pumping systems and other dewatering operations shall not create flow rates and velocities which will cause erosion or water quality violations in the downstream drainage system or streams.

B. Provide all pumps and piping of adequate size to handle normal flows, and temporary discharge piping to ensure that the flow can be safely diverted around the channel section under construction. Bypass pumping system may be required to be operated 24 hours per day, 7 days per week, including holidays, during bypass pumping operations. Bypass pumping systems shall not create flow rates and velocities which will cause erosion or water quality violations in the downstream drainage system or streams.

C. To prevent flooding during storm events and on weekends, the Contractor shall provide a system capable of conveying flow while the site is left unattended for up to a 10-year storm event.

D. Operator shall inspect dewatering system in the morning and evening and bypass pumping system hourly, or on a schedule accepted by Engineer.

E. Disturbed Areas: Upon completion of the dewatering and/or bypass pumping operation, all areas disturbed by these operations must be restored to a condition at least equal to that which existed prior to the start of the work or as shown on drawings.

F. The Contractor shall monitor and control the release of sediment and turbidity in water which leaves the site.

END OF SECTION

SECTION 01545

TREE PRESERVATION

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. This work shall consist of protecting existing trees as specified on the construction drawings and in the Contract Documents or as directed by the Owner or Engineer.

B. The Contractor shall notify the Owner in writing, immediately, and before said work occurs, if any proposed work is likely to affect the survival of existing trees at the site. The Owner may elect to alter proposed work to protect existing trees. Alteration of proposed work will not be a cause for additional Contractor costs.

C. The Contractor will be responsible for the survival of all existing trees, except trees negotiated with Owner per item B above, within and adjacent to the project work area for a period of one year from the date of Final Completion and acceptance by the Owner.

PART 2 PRODUCTS

2.1 MATERIAL

A. Orange barrier fence, as specified in Specification Section 01500, securely fastened to wood posts. The wood posts shall be of adequate length and strength to remain in place throughout the construction period.

PART 3 EXECUTION

3.1 REQUIREMENTS

A. Prior to performing any tree preservation activities either described herein or otherwise, the contractor must perform the required construction staking as specified in Section 02105.

B. Tree Expert. The Contractor shall engage an ISA-certified (International Society of Arboriculture) tree expert to perform the following work:

1. Submit for the approval of the Owner, in writing and accompanied by red lined construction plans, the description and location of any additional trees to be removed greater than 6 inches in diameter that are not marked for removal on the construction plans. This submittal must be approved by Owner prior to commencing any clearing, grubbing, or grading activities.
2. Recommend procedures to compensate for loss of roots (if any) and perform initial pruning of branches and stimulation of root growth where removed. These

recommendations shall be provided to the Owner for approval prior to commencing any clearing, grubbing, or grading activities.

3. As construction progresses, inspect damaged trees, assess survivability, and make determination of whether or not to remove damaged trees. Potential risk to life, limb, or property that could result from damaged, dead, or dying trees should be considered when making this determination.

4. Inspect all trees at the completion of construction and perform follow-up care for any damage incurred.

5. Submit a written Tree Protection Certification that trees have been protected during the course of construction in conformance with recognized standards of the industry. Certify that damaged trees were promptly and properly treated. Indicate any damaged trees that are incapable of reaching maturity and those recommended for removal and replacement.

C. The Contractor and Owner shall meet on the site to discuss all aspects of tree protection and maintenance prior to the commencement of clearing, grubbing, and grading activities. Prior to this meeting the Contractor will flag all trees to be saved with red flagging.

D. Protective Fencing. Orange barrier fence shall be installed to clearly define the protected area as indicated on the Contract Documents. Prior to commencing with clearing and grubbing or erosion and sediment control, install temporary orange barrier fence around areas to be left undisturbed. Temporary orange barrier fence shall encompass any significant trees to be protected within and along the area designated as Tree Protection Area. The location of the protective fencing shall be approved on site by the tree expert, the Owner's Representative, and the Engineer, prior to commencing any construction activities.

E. Construction equipment access is limited as described on the Construction Drawings. Construction equipment access within the drip line of trees to remain is prohibited unless authorized at specific locations by the Owner/Engineer. If construction equipment access within the drip line of trees to remain is allowed, the Contractor shall place 8-12 inches of mulch over access areas prior to any vehicle passage.

F. Wash-Out Area. Any "wash-out" area for trucks shall be located away from Tree Protection Area, as approved by the Engineer. Drainage from wash-out areas shall be away from Tree Protection Area.

G. Traffic. The Contractor is prohibited from parking any construction equipment, or from storing building supplies or material within the Tree Protection Area. Vehicular traffic and excessive foot traffic are prohibited within the Tree Protection Area. The Contractor shall take all reasonable actions, in accordance with the Tree Expert's written recommendations, to protect those trees shown on the Plans for protection, which are outside the Tree Protection Area.

H. Tree Removal and Damaged Trees. The Contractor shall not remove any tree that is designated for preservation. Any tree damaged or destroyed within or adjacent to the Limits of Work shall be the responsibility of the Contractor. The Contractor shall avoid the following:

1. Placing backfill in protected areas
2. Felling trees into protected areas
3. Driving construction equipment into or through protected areas
4. Burning in or in close proximity to protected areas
5. Stacking or storing supplies in protected areas
6. Changing site grades which cause drainage to flow into, or to collect in protected areas
7. Conducting unauthorized trenching operations in the vicinity of trees
8. Grading in the vicinity of trees to be protected as indicated on the Contract Documents.

I. Work within the Tree Protection Area, and in the vicinity of other trees marked for protection.

1. Replacing Damaged Trees. Existing trees that have been designated to remain but are damaged beyond repair due to construction operations, as determined by the Owner, Engineer, or Contractors ISA-certified tree expert shall be removed, upon Owner approval, and replaced at no additional cost to the Owner. Replacement trees shall be the same genus, species, variety, and size as the removed tree, except those trees having caliper greater than 6 inches may have smaller trees furnished and installed if equal to total caliper diameter removed as approved by Owner. The replacement trees shall be a caliper and quantity acceptable to the Engineer. The minimum caliper shall be 2 to 3 inches. Planting of replacement trees shall be in conformance with Section 02490 and the planting plan and include a 1-year warranty period.

2. Repairing Tree Limbs, Branches, and Trunks. The Contractor shall repair limbs and branches that have been damaged by construction operations as determined by the Owner, Engineer, or Contractors ISA-certified tree expert. Repairing shall be accomplished by cutting damaged limbs and branches to healthy wood in conformance with this Specification at no additional cost to the Owner.

3. Pruning Trees. All pruning shall be in conformance with the current edition of the National Arborist Association Standard for Pruning Shade Trees and this Specification. All pruning tools and methods employed shall be in conformance with accepted arboricultural practices performed by competent personnel under the direct supervision of the tree expert. The Contractor shall notify the Engineer 10 days prior to the beginning of any work. Safety ropes shall be used to climb trees to be pruned. Existing injuries to bark, trunks, and limbs as designated by the Engineer, shall be repaired by properly cutting, smoothing the wood if necessary, tracing the bark to the proper shape to ensure rapid healing, and using only approved tools, materials and methods. All pruned material shall be removed and disposed of by means acceptable to the Engineer. The Contractor shall be responsible for all damage or injury to property of any character during the execution of the work resulting from any act, omission, neglect or misconduct, in the manner or method of executing this work satisfactorily.

J. Construction Activities within the Tree Protection Area

1. When construction activities become necessary within the Tree Protection Area, the Contractor shall obtain written permission from the Owner or Engineer prior to working in the area.

3.2 REMOVAL AND CLEAN-UP

A. Removal. After construction has been completed, orange barrier fencing and all surplus construction materials shall be removed from the site in a manner that will not cause damage within the Tree Protection Area.

B. Clean-up

1. The Contractor shall clean up all work areas.
2. Grades shall be restored, stabilized, and blended into the adjacent areas.
3. The Contractor shall haul away all debris, excess dirt and construction materials and dispose of off-site.
4. The Contractor shall seed all disturbed areas within 24 hours.

END OF SECTION

SECTION 01710

CLEANUP

PART 1 GENERAL

1.1 DESCRIPTION

A. This section covers 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.

B. All areas disturbed as a result of construction activities and adjacent paths and roadways shall be restored to pre-construction conditions or better.

C. Sediment and soil on hauling route streets and roads shall be cleaned at least once each week during hauling operations and at the end of construction, and as directed by Owner.

D. All construction-related materials and/or debris shall be removed and properly disposed of by the contractor on at least a weekly basis, and as directed by Owner.

E. All pipes, stormwater structures, best management practices, sidewalks, and roads shall be left clean and void of debris or sedimentation.

1.2 WASTE CONTROL

A. The Contractor shall store in a container or remove construction waste materials from premises daily.

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

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

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

1.3 DISPOSAL OF SURPLUS MATERIALS

A. Unless otherwise shown on the Drawings, specified or directed, the Contractor shall dispose of all surplus excavated materials and other materials, legally off the site, and shall provide his own suitable, off-site spoil area.

1.4 FINAL CLEANING

A. At completion of Work or of a part thereof and immediately prior to Contractor's request for certificate of Substantial Completion; or if no certificate is issued, immediately prior to

Contractor's notice of completion, clean entire site or parts thereof, as applicable. The Contractor shall:

1. Employ experienced workmen for final cleaning.
2. Leave the Work and adjacent areas affected in a cleaned condition satisfactory to the Owner.
3. Leave water courses and ditches open and clean.
4. Repair, patch, and touch up marred surfaces to specified finish, or to match adjacent surfaces to equal or better than pre-construction condition.
5. Broom clean paved surfaces; rake clean other surfaces of grounds.
6. Upon completion of the work, Contractor shall remove from the site all materials, tools and equipment belonging to him, and leave the site with an appearance acceptable to the Owner.
7. Repair of Damaged Property
    a. Any property scarred or damaged by the Contractor's equipment or operations shall be restored or replaced in a manner such that the finished product is equal to or better than pre-construction conditions. All work shall be performed to the satisfaction of the Owner and the Engineer. This will be completed at no cost to the Owner.
8. Restoration of Landscape Damage
    a. Any landscape feature scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition at the Contractor's expense. The Owner will decide what method of restoration shall be used. Any dead plant materials shall be removed and replaced with new plant materials at no cost to the Owner.
9. Post-Construction Cleanup
    a. The Contractor shall completely remove all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, or any other vestiges of construction.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01740

WARRANTIES AND BONDS

PART 1 GENERAL

1.1 PROJECT MAINTENANCE AND WARRANTY

A. Separate from and prior to the start of the 2-year warranty period, the Contractor is responsible for all maintenance and operations required to furnish to the Owner the entire Project, complete in place, as specified and as indicated in the Contract Documents.

B. Maintain and keep in good repair the improvements covered by these drawings and specifications during the life of the contract.

C. Indemnify the Owner against any repairs which may become necessary to any part of the work performed, arising from defective workmanship or materials used therein, for a period of 2 year after acceptance from the final date of final resolution of the Owner accepting work.

D. For a period of two (2) years following construction completion and Owner's Final Acceptance of the Work, the Contractor shall be responsible for complete maintenance of all pavers, curb, and other proposed improvements related to this Contract. If any work, for example plantings, is scheduled for completion after general construction completion, then the 2-year warranty begins when the plantings (or other work) are successfully completed and accepted by the Owner. The Contractor's responsibilities during this 2-year warranty and maintenance period includes:

1. Replacing any pavers and/or stone which have been damaged or have shifted in orientation, location, or elevation.
2. Replacing any concrete curb which has been damaged or have shifted in orientation, location, or elevation.
3. Replacing any geotextile which has been damaged or have shifted in orientation, location, or elevation.
4. Replacement of any plants and/or groundcover that does not survive (see note below).

   Note: An acceptable survival rate for all planted materials is 90 percent survival. If less than 90 percent survival occurs (in the judgment of the Owner) then replacement plants or groundcover shall be installed by the Contractor within 1 month of notification by Owner (or at Owner's request a longer period) that the minimum survival rate is not being achieved.
5. Replacement of any existing (pre-project) trees within or adjacent to the project work area which are dead or damaged. Replacement shall be in accordance with Specification Sections 01545 and 02490. All replaced trees shall have a 1-year warranty beginning when accepted by the Owner.

6. Two year warranty for plants, trees and groundcover begins after successful planting and acceptance by the Owner.

E. For a period of 2 years following construction completion and Owner's Final Acceptance of the Work, the Contractor shall, at his own expense, furnish all labor, materials, tools and equipment required and shall make such repairs and removals (including replacement of vegetation).

F. Except as noted on the Drawings or as specified, all existing features to remain shall be returned to their original condition prior to the completion of the contract. Any and all damage to any facility not designated for removal, resulting from the Contractor's operations, shall be promptly repaired by the Contractor at no cost to the Owner.

G. In the event the Contractor fails to proceed to remedy the defects of which he has been notified within 15 days of the date of such notice, the Owner reserves the right to cause the required materials to be procured and the work to be done, as described in the drawings and specifications, and to hold the Contractor and the sureties on his bond liable for the cost and expense thereof. Notice to Contractor for repairs and reconstruction will be made in the form of a registered letter addressed to the Contractor at his home office.

H. Neither the foregoing paragraphs nor any provision in the Contract Documents, nor any special guarantee time limit implies any limitation of the Contractor's liability with the law of the place of construction.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 ONE AND TWO -YEAR INSPECTIONS

A. One and two years following the date of final completion and acceptance of the project, the Contractor shall attend an inspection with the Owner and Engineer.

B. Any items from above which require Contractor attention will be identified and a plan of action will be agreed upon by the Contractor, Owner, and Engineer.

C. The Contractor will provide a schedule and complete all required actions to the satisfaction of the Owner and Engineer within 30 calendar days.

END OF SECTION

SECTION 01780

CONTRACT CLOSEOUT (PROJECT RECORD DOCUMENTS)

PART 1 GENERAL

1.1 DESCRIPTION

A. Project Record Documents are to be maintained by the Contractor during construction (updated on a regular basis) and submitted to the Owner upon project completion. Project Record Documents shall consist of the following:

1. Drawings
2. Specifications
3. Addenda
4. Construction Aerial Photographs
5. Final As-Built survey
6. Change Orders and other Modifications to the Contract
7. Engineer Field Orders or Written Instructions
8. Approved Shop Drawings, Product Data and Samples
9. Field Test Records and Results
10. Special Bonds, Special Warranties, and Service Agreements
11. Consent of Surety to Final Payment: As required in the General Conditions
12. Releases or Waivers of Liens and Claims: As required in the General Conditions
13. Releases from Agreements
14. Final Application for Payment: Submit in accordance with procedures and requirements stated in Section 01150, Measurement and Payment.

1.2 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.

B. Make documents and samples available at all times for inspection by the Engineer and Owner.

C. Furnish qualified and experienced person, whose duty and responsibility shall be to maintain record documents.

D. Accuracy of Records:

1. Coordinate changes within record documents, making legible and accurate entries on each sheet of Drawings and other documents where such entry is required to show change.

2. Purpose of Project record documents is to document factual information regarding aspects of Work, both concealed and visible, to enable future modification of Work to proceed without lengthy and expensive site measurement, investigation, and examination.

E. Prior to submitting each request for progress payment, request Engineer's review and approval of current status of record documents. Failure to properly maintain, update, and submit record documents may result in a deferral by Engineer to recommend the whole or any part of the Contractor's Application for Payment, either partial or final.

F. Promptly following commencement of Contract Times, secure from Engineer at no cost to Contractor, one complete set of Contract Documents. Drawings will be full size.

G. Label or stamp each record document with title, "Record Documents", in neat large printed letters.

H. Record information concurrently with construction progress and within 24 hours after receipt of information that change has occurred. Do not cover or conceal Work until required information is recorded.

1.3 RECORDING CHANGES ON PROJECT RECORD DOCUMENTS

A. Drawings

1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe change by graphic line and note as required.
   a. Color Coding: 1) Green when showing information deleted from Drawings. 2) Red when showing information added to Drawings. 3) Blue and circled in blue to show notes.
2. Date entries.
3. Call attention to entry by "cloud" drawn around area or areas affected.
4. Legibly Mark to Record Actual Changes Made During Construction, as described in Section 01150, Measurement and Payment, and including, but not limited to:
   a. Vertical elevations of the channels (top of bank, bankfull and toe of bank) at 25 feet, on center as shown in profile views.
   b. Horizontal and vertical locations of new structures and appurtenances, and other underground structures, equipment, or work.
   c. Changes made by Addenda and Field Orders, Work Change Directive, Change Order, Written Amendment, and Engineer's written interpretation and clarification using consistent symbols for each and showing appropriate document tracking number.
5. Dimensions on Schematic Layouts: Show on record drawings, by dimension, the centerline of each run of items as described in the subparagraph above:
   a. Clearly identify the item by accurate note such as "ductile iron sanitary sewer pipe," "storm sewer drain," and the like.
   b. Show, by symbol or note, vertical location of item ("grade control structure," "fieldstone weir crossing," "Drop inlet," and the like).
   c. Make identification so descriptive that it may be related reliably to Specifications.

B. Specifications and Addenda

1. Legibly mark each section to record:
   a. Changes made by Field Order or by Change Order.

1.4 SUBMITTALS

A. At Contract close-out deliver Project Record Documents to the Engineer for the Owner. Project Record Documents shall include:

1. Drawings
2. Specifications
3. Addenda
4. Final As-built survey
5. Photographs in digital format
6. Change Orders and other Modifications to the Contract
7. Engineer Field Orders or Written Instructions
8. Approved Shop Drawings, Product Data and Samples
9. Field Test Records
10. Special Bonds, Special Warranties, and Service Agreements
11. Consent of Surety to Final Payment: As required in the General Conditions
12. Releases or Waivers of Liens and Claims: As required in the General Conditions
13. Releases from Agreements
14. Final Application for Payment: Submit in accordance with procedures and requirements stated in Section 01150, Measurement and Payment.

B. Accompany submittals with transmittal letters in duplicate, containing:

1. Date
2. Project title and number
3. Contractor's name and address
4. Title and number of each Record Document
5. Signature of Contractor or his authorized representative.

1.5 SUBSTANTIAL COMPLETION

Substantial Completion is defined as follows: The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents to provide the following: (i) the Owner full time, uninterrupted, continuous operation of the work; and (ii) all required functional, performance, and testing has been successfully completed to the satisfaction of the Engineer in accordance with the requirements of the Specifications; and (iii) all required inspections and other work necessary for the Engineer to certify "substantially complete" have been completed. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 02105

CONSTRUCTION SURVEY AND STAKEOUT

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. The Contractor is responsible for all construction surveying and stakeout required to initiate and maintain complete horizontal and vertical control of all construction activities.

B. Survey control anticipated for the work includes, but is not limited to, the following:

1. Setting benchmarks for construction.
2. Establishing working limits.
3. Construction staking for excavations, grading, pavers, and curb. Both horizontal and vertical control required.
4. Interim As-Built surveys.
5. Final As-Built survey.

C. Construction staking shall include all surveying work required to layout the work and control the location of the finished construction.

D. A topographic survey is included in the drawings. The topographic information shown is believed to be reasonably correct. However, it shall be the Contractor's responsibility to determine any major differences which would affect the project.

E. For areas designated for either excavation or fill, the Contractor shall be responsible for arranging and paying for surveys following earth moving activities.

1.2 SCHEDULING AND SEQUENCING

A. The contractor is responsible for scheduling and coordination of all surveying activities.

B. Prior to any clearing the Contractor shall locate the limits of pavers and curb. The Owner and Engineer will review these points with the Contractor in the field and may make adjustments to the layout. The Contractor will make these changes and obtain Owner and Engineer approval before proceeding with clearing activities.

C. Following completion of the flagging and staking and approval of the Owner and Engineer, the Contractor may begin clearing and shall complete the detailed layout of the proposed improvements.

D. The Owner and Engineer will review the detailed layout points with the Contractor in the field and may make adjustments to the detailed layout. The Contractor will restake these changes and obtain Owner and Engineer approval before proceeding with grading and installation activities.

E. All new concrete curb shall be completed and the location and top elevation surveyed and accepted by the Owner and Engineer before beginning work on the paver section. The permeable paver system will be completed in sections. Each layer of gravel and paver bedding will be reviewed by the Owner and Engineer before proceeding to the next layer. An interim as-built survey of the paver system compacted subgrade elevation will be provided to the Owner and Engineer and approved before installation of the paver system. Elevations will be provided at the two edges and in the center of the street section throughout the entire paver area. If the elevations are not within the defined tolerances, the Contractor will regrade areas and re-survey until the areas are accepted by the Owner/Engineer.

F. Once the Contractor has completed a layer of the paver system an interim as-built survey of the project element will be completed by the Contractor and provided to the Owner/Engineer for review prior to placement of the next layer. Elevations will be provided at the two edges and in the center of the street section throughout the entire paver area. If the elevations are not within the defined tolerances, the Contractor will regrade areas and re-survey until the areas are accepted by the Owner/Engineer. An interim as-built survey shall be provided by the Contractor with the monthly pay application for any work submitted for payment.

1.3 FINAL AS-BUILT SURVEY

A. The Contractor is responsible for providing the Engineer with an as-built survey of final construction conditions. The as-built survey should indicate any significant deviations from the original construction plans, including feature location and elevation differences, limits of excavations, final reprographic survey data, and other pertinent as-built conditions. The as-built survey will include: spot elevations at the edge and center of the street at 10 feet spacing; one foot contours; and the location and elevations of the top of curb. The Contractor shall provide a plan view at 20 scale with corresponding photographs of all curb and pavers.

1.4 SUBMITTALS

A. The Contractor shall provide the Engineer with the name of the survey company to be used for the work described herein.

1.5 QUALITY ASSURANCE

A. All survey shall be performed by a Georgia Licensed Professional Land Surveyor.

B. The Contractor shall furnish documentation prepared by a licensed surveyor confirming that staking is being done to the lines and grades shown in the Contract Documents. This requires the Contractor to hire a licensed surveyor who is acceptable to the Owner to provide ongoing confirmation of construction staking.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 02110

CLEARING AND GRUBBING

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. Clearing and grubbing includes, but is not limited to felling and salvage/removal from the project site all pavement and subgrade, curb, trees, stumps, roots, brush, structures, abandoned utilities, trash, debris, and all other materials found on or near the surface of the ground within the clearing limits not to be stored and reused on the site. All cleared and grubbed material not to be used on-site will become the property of the Contractor and must be removed from the site and properly disposed of off-site by the Contractor.

1.2 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. All required permits shall be obtained for construction operations by the Contractor.

B. Burning or burying of waste materials, rubbish, or other debris will not be permitted on or adjacent to site.

1.3 LOCATION OF WORK

A. All areas within the limits of disturbance shown in the drawings shall be cleared and grubbed. Areas bounded within orange barrier fencing shall not be cleared or grubbed.

PART 2 PRODUCTS

2.1 EQUIPMENT

A. The Contractor shall furnish acceptable equipment (including, but not limited to small tractors, small excavators, and trucks) operators, and all other materials required to perform clearing and grubbing operations. All equipment must be sized and selected to serve intended function within the limits of disturbance.

PART 3 EXECUTION

3.1 CLEARING AND GRUBBING

A. Before commencing any work required by this section, the Contractor shall ascertain the location of all utilities, both below and above ground, subsurface drainage, and underground construction so that proper precautions may be taken not to disturb or damage any subsurface improvements. The Contractor will be held responsible for making, at his own expense, all repairs to damaged utilities and structures resulting from the work.

B. Materials to be cleared, grubbed and removed from the construction area include, but are not limited to the following: pavement and subgrade, curb, trees, stumps, roots, brush, structures, abandoned utilities, trash, debris, miscellaneous structures, storm drain pipe, and all other materials found on or near the surface of the ground within the clearing limits not to be reused on the site.

C. Clearing shall not begin until all erosion and sediment control measures are in place and approved by the Engineer.

D. Clearing and grubbing shall not extend beyond the limits indicated on the Drawings without prior approval of the Engineer. Orange barrier fencing shall be installed prior to clearing so that vegetation intended to remain is not damaged.

E. Grubbing shall consist of completely removing roots, stumps, trash, and other debris from all graded areas so that the soil to a depth of 36-inches below proposed grade is free of roots and debris. Topsoil is to be left sufficiently clean so that further picking and raking will not be required.

F. Salvaging, or reuse, of any cleared or grubbed material must first be approved by the Engineer.

G. The Contractor shall exercise special precautions for the protection and preservation of trees, cultivated shrubs, sod, fences, etc. situated within the limits of the construction area but not directly within excavation limits. The Contractor shall be held liable for any damage his operations inflict on such property.

3.2 DISPOSAL OF CLEARED AND GRUBBED MATERIALS

A. Contractor may dispose of the cleared and grubbed materials by hauling to an approved waste site only, unless otherwise approved by the Engineer. Off-site disposal of clearing and grubbing debris shall be limited to locations that are approved by federal, state, and local authorities, and that will not be visible from the project site.

B. Burning or burying of cleared and grubbed materials will not be permitted on or adjacent to site.

C. The Contractor may not pile materials in or adjacent to proposed paver areas, inlets, or channels where it might be washed onto these areas by stormwater runoff. The material shall be immediately loaded into trucks and removed from the site in conjunction with clearing and grubbing activities.

END OF SECTION

SECTION 02115

SOIL EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. This section covers the work necessary for the installation of structures and measures for the prevention and control of erosion and sediment transport. The Contractor is responsible for implementing best management practices to prevent and minimize erosion and resultant sedimentation in all disturbed areas before, during and after construction. The Contractor is responsible for inspecting and properly maintaining the erosion and sediment control devices installed. The Contractor shall furnish all material and labor necessary for the proper installation, maintenance, documentation, and removal (where applicable) of erosion prevention and control measures under this section.

B. Erosion control shall be employed during the construction period and shall include all necessary temporary measures required to prevent soil erosion onto the proposed paver areas and from the site until permanent erosion control and finished surfaces are installed.

C. The Contractor shall comply with applicable codes, rules, ordinances, regulations, and laws of local, municipal, state or federal authorities having jurisdiction over the project.

D. Erosion control measures for construction shall conform to Project Drawings, these Specifications, and the current edition of the "Manual for Erosion and Sediment Control of Georgia".

E. While temporary dewatering and diversions may aid in erosion and sediment control, those specific items of work are described in Section 1535, Temporary Dewatering.

F. See Specification Section 01535 for additional requirements.

1.2 GENERAL

A. The following soil erosion and sediment control features are covered under this Section 02115:

1. Silt fence – Type NS
2. Mulch and temporary seeding
3. Dust control

All items listed above are required as part of the project.

Note that permanent sodding is also required for this project, but is covered under a separate section. Temporary dewatering and diversion of stormwater is also covered under a separate section.

B. The requirements specified herein and shown in the Contract Documents are the minimum requirements for preventing or minimizing soil erosion and sediment transport. Additional details and requirements are shown on the plans.

1. Contractor
   a. For purposes of this section, the term Contractor is synonymous with discharger, operator, and permittee (permit holder) as used in permits, laws, rules, regulations, ordinances and other soil erosion and sediment control references.
2. Regulatory Compliance
   a. Contractor shall comply with requirements specified in the Contract Documents or by the Engineer. Contractor shall also comply with all other laws, rules, regulations, ordinances and requirements concerning soil erosion and sediment control established by the United States, the State of Georgia, the County, and the City where the work is being performed.
      1) NPDES Permit
         a) The Georgia National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction Activity, GAR 100001, governs land disturbance or construction activities of 1 acre or more. The Contractor is responsible for complying with the terms and conditions of this permit, including preparing and submitting the notice of intent, the construction monitoring program (CMP), the Storm Water Pollution Prevention Plan (SWP3), the notice of termination, and performing daily inspections.
      2) When a construction monitoring program (CMP) is provided in the contract documents or required under the NPDES General Permit, the Contractor shall prepare the CMP and follow the practices and requirements described in the CMP.
      3) SWP3
         a) When a Storm Water Pollution Prevention Plan (SWP3) is provided in the Contract Documents or required under the NPDES General Permit, Contractor shall prepare the SWPPP and follow the practices described in the SWP3.
      4) Manual for Erosion and Sediment Control in Georgia
         a) Contractor shall follow practices and standards of the Georgia Soil and Water Conservation Commission *Manual for Erosion and Sediment Control in Georgia.*
      5) Permitting
         a) Land disturbance activities, including clearing and grubbing, are not authorized to begin until after all required erosion and sediment control permits are obtained from the United States, the State of Georgia, and/or City of Roswell.

1.3 REFERENCE TO OTHER ITEMS

A. All requirements established in other sections of these specifications that may apply to actions taken pursuant to this section are hereby made a part of these specifications for Soil Erosion and Sediment Control.

1.4 SUBMITTALS

A. Contractor shall submit to the Engineer the proposed schedule for installation, maintenance and removal of all temporary and permanent erosion and sediment control measures. The schedule shall reflect the requirements of Section 3.1 below (Sequence of Construction of Temporary Sediment Control Structures) and must show the anticipated starting and completion date for all land development activities including:

1. Installation of temporary and permanent sediment control structures
2. Stormwater management facilities
3. Timber salvage operations
4. Clearing operations
5. Grubbing operations
6. Mass excavation and/or fill operations
7. Rough and finished grading
8. Installation of curb and paver system
9. Landscaping, including all seeding and sodding
10. Removal of temporary sediment control structures.

PART 2 PRODUCTS

2.1 RAIN GAUGE

A. A rain gauge shall be a standard pre-manufactured container with dimensions at least 1½ inches in diameter, 5 inches tall, with straight sides and graduations clearly marked to indicate rainfall measured in a minimum of 1/8-inch amounts. The rain gauge will include a funnel-type opening with the area of the container equal to 0.1 times the area of the funnel. The contractor may provide an automatic rainfall gauge at no additional cost to the Owner.

2.2 FILTER FABRIC MATERIAL SPECIFICATIONS

A. Filter fabric materials must meet the requirements set forth in these specifications and in accordance with the Drawings. Contractor shall submit to Engineer copies of delivery invoices, certifications or other documentation that the filter fabric complies with these specifications if requested by Engineer.

B. Silt Fences

1. Temporary silt fences (Type NS) shall be located at all points where surface water can leave the construction area if the source area is subject to soil erosion.
2. Silt fences shall be constructed to remove sediments from flowing water through filtration and sedimentation. Silt fences shall be constructed in accordance with the details shown on the drawings.
3. Silt fences shall be arranged to create ponding behind them. Provision shall be made for removing accumulated sediments and maintaining ponding capacity.
4. Silt fences shall be removed and the area restored once disturbed areas have been permanently stabilized.

2.3 GRADING OPERATIONS

A. Grading operations shall be scheduled so that the ground surface will be disturbed for the shortest possible time before permanent construction is complete and the paver system, curb, and vegetative stabilization installed. Large areas shall be maintained as flat as possible to minimize soil transport through surface flow.

B. Wherever steeper slopes or abrupt changes in grade are required, a diversion or berm shall be constructed at the top of the slope to cause the surface water to flow along the diversion to a control point to be transported downslope in a slope drain. In no case shall surface water be allowed to flow uncontrolled down slopes.

2.4 GEOTEXTILE UNDER-LINER

A. A geotextile under-liner, conforming to Section 881.2.05 - Plastic Filter Fabric, State of Georgia DOT Standard Specifications, Construction of Roads and Bridges, shall be used in all instances to stabilize and support the construction exit pad aggregate.

2.5 DUST CONTROL

A. The movement of dust on the construction site must be controlled at all times utilizing acceptable methods as defined in the current edition of the Manual for Erosion and Sediment Control in Georgia.

2.6 TEMPORARY SOIL STABILIZATION

A. Seed, wood waste, or erosion control matting such as coir, excelsior, etc. are appropriate for temporary soil stabilization.
   1. Seed shall be clean, delivered in original unopened packages and bearing an analysis of the contents. Guaranteed 95 percent pure with minimum germination rate of 85 percent.
      a. Summer seed mix shall be 40 percent by weight Fawn Fescue, 30 percent by weight Perennial Ryegrass, 15 percent by weight Orchard Grass, and 15 percent by weight Dutch White Clover.
      b. Winter seed mix shall be 35 percent by weight Fawn Fescue, 30 percent by weight Perennial Ryegrass, 30 percent by weight Hairy Vetch, and 5 percent by weight Dutch White Clover. Fertilizer shall be used if directed by Engineer.
   2. Fertilizer shall be commercial, chemical type, uniform in composition, free-flowing, conforming to state and federal laws, and suitable for application with equipment designed for that purpose. Fertilizer shall have a minimum percentage of plant food by weight for the following:
      a. Summer mix shall be 10 percent nitrogen, 10 percent phosphoric acid, and 6 percent potash.
      b. Winter mix shall be 16 percent nitrogen, 8 percent phosphoric acid, and zero percent potash.
   3. Straw mulch shall be threshed straw of oats, wheat, or rye, free from obnoxious weed seeds or obnoxious weeds, or shall be clean hay. Average stalk length shall be 6 inches.

PART 3 EXECUTION

3.1 SEQUENCE OF CONSTRUCTION OF TEMPORARY SEDIMENT CONTROL MEASURES

A. Install all erosion and sediment control structures specified herein and shown in the Contract Documents, or as directed by the Engineer, as the first item of work within a given drainage area. Construction and installation of all sediment control structures shall begin downgradient of the area to be disturbed and proceed upgradient. Contractor shall at all times maintain all soil erosion and sediment control structures and practices throughout construction and until all disturbed areas are permanently stabilized.

3.2 SPECIFIC REQUIREMENTS

A. Contractor shall install and maintain soil erosion and sediment control measures in accordance with the plans and the following criteria.
   1. Temporary Interceptor, Diversion, and Perimeter Dikes
      a. Install interceptor, diversion and perimeter dikes to intercept and prevent stormwater runoff from entering proposed paver areas from any upgradient area regardless of whether area is on-site or off-site. Dikes must divert runoff to a drainage ditch, sediment basin or temporary or permanent channel. Dikes shall remain in place until the disturbed area is permanently stabilized. Construct dikes of earth fill free from all perishable matter and refuse, such as scraps of forms, wire, brush, rocks larger than 6 inches or any foreign materials. Ashes, large stones, muck or other soft materials shall not be used. Compact all dikes using construction equipment. Dikes shall be stabilized immediately after construction with temporary seeding in accordance with Section 3.2.A.9 to prevent sediment transport to downstream areas.
   2. Temporary Sediment Barriers (Silt Fence)
      a. Install silt fence where shown on the Drawings or as directed by the Engineer.
         1) Installation
            a) In general, silt fencing shall be installed on the downgradient side of all areas to be disturbed as well as the perimeter of the project site (Engineer may authorize an exception for a perimeter which is upgradient from all land disturbing activity). All posts used to install silt fence shall comply with the specifications in the *Manual for Erosion and Sediment Control in Georgia*. Posts must be placed at least 18 inches in the ground and cannot be more than 4 feet apart from one another. Fence fabric must be inserted below ground as shown on drawing details and fence fabric must be fastened to posts according to the specifications in the Manual. Silt fence must over lap by 18 inches between roles or where one role of material ends and another begins.
      b. Maintenance
         1) In accordance with Section 3.3 below, all silt fencing shall be inspected at least once every 7 calendar days and within 24 hours of a rainfall event that has precipitation of 0.5 inches or greater. Maintenance of the silt fence shall be performed, if needed, within 24 hours of inspection.

2) The silt fence shall be maintained such that it minimizes sediment transport as designed. At the earlier of (1) every 14 calendar days, or (2) when sediment reaches a depth of one half the installed fence height, all soil, silt, sediment and other material captured by the silt fence should be removed and returned upgradient on the construction site. All silt fencing materials, including fabric, posts and fasteners must be replaced six months after installation.

3. Temporary Soil Erosion Stabilization (Vegetative)
   a. This section covers work necessary for temporary stabilization of soil to prevent erosion following clearing, grubbing, grading or other construction activities in the areas identified in the Contract Documents or as directed by the Engineer, except wetlands. The Owner reserves the right to modify the use, location, and quantities of the areas requiring stabilization as the Engineer considers being in the best interest of the Owner. During construction, the Engineer will designate the extent of stabilization used in each location throughout the project. Temporary stabilization within a buffer zone of a Water of the United States shall meet the requirements of this section.
      1) General Criteria
         a) The stabilization measures specified herein shall be initiated on all disturbed areas including dikes, ditches, and stockpiles within 24 hours of completion to minimize erosion and soil transport.
      2) Submittal and Scheduling
         a) Contractor shall submit to Engineer certificates of inspection of seed by state or federal authorities and copies of delivery invoices or other documentation of quantities of mulch and fertilizer.
         b) The Contractor shall give at least 3 days notice to the Engineer of the time and place of starting the following operations:
            1. Delivery of materials
            2. Planting of grass
         c) The Contractor shall keep the Engineer advised of his schedule of operations.
      3) Application

         Planting and seeding shall be performed in accordance with the following schedule:
         a) Summer Seeding – No earlier than April 1 and no later than October 15.
         b) Winter Seeding – October 16 until weather conditions prohibit further construction operations as determined by the Engineer.
         c) Soil Preparation – Prior to seeding operations, and after surface has been shaped, graded, and compacted, scarify surface to a minimum depth of 1 inch.
         d) Seeding – All seedbeds shall be a minimum depth of 1 inch. Seedbeds shall be reviewed by the Engineer prior to seeding. For designated wetlands, reference seeding specifications. After soil has been scarified, apply required seed mix, as specified in this section, uniformly with a cyclone seeder, drill, cultipacker seeder, or hydroseeder. When hydroseeding is the selected method of seeding, prepare and apply slurry at the rate and proportion specified below:

Seed Mix	100 lbs/acre
Fertilizer	650 lbs/acre
Water	As necessary

e) The required fertilizer mix shall be uniformly applied at the time of seeding. Fertilizer shall not be applied to a land area within a buffer zone of a Water of the United States as identified in this section.

f) Upon completion of the seeding operations, apply straw mulch to a reasonably uniform thickness of 1-1/2 inches to 2-1/2 inches in depth. Mulch shall be loose enough to permit penetration of sunlight and air circulation, but dense enough to shade ground, reduce evaporation rate, and prevent or materially reduce erosion of underlying soil. Retain straw in place by applying asphaltic emulsion at a rate of 100 gallons per acre or mechanically tack the mulch into the soil to approximately 3 inches. Equipment used for tacking shall be specially designed for this use.

g) Dry Straw or Hay – Spread at a rate of 2 ½ tons per acre. Apply to a depth of 6 to 10 inches. Apply uniformly and anchor as necessary.

h) Wood Waste – Spread at a rate of 6 to 9 tons per acre. Apply to a depth of 2 to 3 inches. Apply wood waste only on slopes that are 3:1 or flatter. Anchoring is not necessary.

i) Erosion Control Matting – Apply in accordance with manufacturers recommendations.

4) Maintenance

a) In accordance with Section 3.3, stabilized areas shall be inspected and maintenance performed, if needed, within 24 hours of inspection at least once every 7 calendar days and within 24 hours of a rainfall event that has precipitation of 0.5 inch or greater. Apply additional stabilization materials as needed.

3.3 INSPECTIONS AND MAINTENANCE

A. Contractor shall designate certified personnel to perform inspections required by this Section 3.3. ”Certified Personnel” means any person who has attended the Georgia Soil and Water Conservation Commission’s (GSWCC) “Fundamentals Seminar” (Level 1A) and holds a certificate of successful completion of the training requirements stated in 600-8-1-.04 (2)(a) from the Conservation Commission in the area of inspection of best management practices (BMPs) on construction sites. BMPs are vegetative and structural measures to control and prevent erosion. The following areas are to be inspected at least once every 7 calendar days and within 24 hours of a rainfall event that has precipitation of 0.5 inch or greater. Maintenance shall be performed, if needed, within 24 hours of inspection:

1. Disturbed areas of the construction site that have not undergone permanent stabilization.
2. Erosion and sediment control structures.
3. All locations where vehicles enter or exit the site.
4. Material storage and construction laydown areas that are exposed to precipitation and have not been finally stabilized.

B. In areas that have been permanently stabilized, inspections and, if necessary, maintenance by Contractor will occur at least once per month for duration of contract or project, whichever is longer.

C. During inspections, the following will be observed and appropriate maintenance procedures taken:
   1. Conformance with these specifications, conformance with the current version of the *Manual for Erosion and Sediment Control in Georgia,* and current condition of all erosion and sediment control structures.
   2. The effectiveness and operational success of all erosion and sediment control measures.
   3. The presence of sediments or other pollutants in stormwater runoff at all runoff discharge points.
   4. If reasonably accessible, the presence of sediments or other pollutants in receiving waters.

D. Evidence of off-site sediment tracking at all locations where vehicles enter or exit the site.

E. Evidence of sediment laden stormwater runoff entering proposed paver areas.

F. Contractor will provide an inspection checklist. This checklist must be completed during each inspection, dated and signed by the Contractor's qualified person conducting the inspection. Completed inspection checklists shall be kept on-site with the Contract Documents. The Contractor will repair deficiencies within 24 hours of inspection. The contractor acknowledges that failure to inspect, document, and maintain the erosion and sedimentation control measures will constitute a violation of the Georgia NPDES Stormwater Permit for Construction Activities, GAR 100001.

3.4 RAINFALL

A. Installation
   1. The contractor shall install the rain gauge in an area that has at least 20-foot diameter open area where buildings and/or foliage will not interfere with the rainfall collection. The rain gauge will be maintained in a working condition to accurately measure the rainfall for the duration of the contract until the Notice of Termination is processed.

B. Recording Rainfall
   1. The contractor shall examine the rainfall and record the rain gauge amount on a daily basis using the inspection checklist. The checklist shall be kept on site and made available for review by the Owner, the Engineer, and government agencies that request the information.

3.5 REMOVAL OF TEMPORARY SEDIMENT CONTROL STRUCTURES

A. At such time that temporary erosion and sediment control structures are no longer required under this Section, the Contractor shall notify the Engineer of its intent and schedule for the removal of the temporary structures. Contractor shall remove as approved the temporary structures and all sediments accumulated at the removed structure shall be returned

upgradient. In areas where temporary control structures are removed, the site shall be left in a condition that will restore original drainage. Such areas shall be evenly graded and seeded as specified in the section entitled "Seeding," of these specifications.

B. The Contractor is required to complete the final stabilization of the work area. Final stabilization means that all soil disturbing activities at the site have been completed, and that for unpaved areas and areas not covered by permanent structures, at least 80 percent of the soil surface is uniformly covered in permanent vegetation or equivalent permanent stabilization measures (such as the use of field stone, river stone, matting, permanent mulches or geotextiles) have been employed. Permanent vegetation shall consist of: planted trees, shrubs, perennial vines; a crop of perennial vegetation appropriate for the time of year and region; or a crop of annual vegetation and a seeding of target crop perennials appropriate for the region, such that within the growing season 80 percent coverage by perennial vegetation shall be achieved. Final stabilization applies to each phase of construction.

END OF SECTION

SECTION 02368

BMP CONSTRUCTION – GRADING COMPLETE

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. This section applies to the earthwork associated with the stormwater BMPs (paver system cut and fill, excavation, rough grading, final grading, and disposal of excess material).

B. All excavation and grading shall be completed in the dry by isolating and dewatering the areas and providing diversion of stormwater flows around the work area.

1.2 DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials

1. Provide in accordance with manufacturer's recommendation and as specified.
2. Store and safeguard equipment and material.
3. Inspect and inventory items upon delivery to site.

B. Storage

1. Area available for the storage of materials on-site is limited.

1.3 QUALITY ASSURANCE

A. As work is performed, Contractor shall have personnel qualified to survey and record station and elevations at all critical design points. Engineer shall approve all data as collected on a daily basis.

1.4 SCHEDULING AND SEQUENCING

The following outlines a sequence of work to be performed by the Contractor:

A. Establish construction limits; install orange barrier fence.

B. Following mobilization perform minor clearing and grubbing to the extent necessary to establish Initial Phase erosion and sediment controls.

C. Install Initial Phase erosion and sediment controls as shown on the construction drawings.

D. Install the dewatering system and diversion system to create a dry working environment.

E. Perform clearing and grubbing as described in Section 02110.

F. Complete the detailed layout of the proposed improvements.

G. Owner and Engineer will review the detailed layout with the Contractor in the field and may make adjustments to the detailed horizontal and/or vertical layout. The Contractor will restake these changes and obtain Owner and Engineer approval before proceeding with grading activities.

H. Only perform rough grading for the length of construction through which successful final grading and structure installation can be performed by the end of a single work day. It is recommended that one operator perform rough grading, while a second operator follows with final grading and structure placement.

I. Approval of Engineer is required following structure installation and final grading activities, prior to continuing downstream grading operations.

J. Following completion of grading and temporary stabilization, the Contractor must complete an as-built survey of project elevations to verify they agree with design elevations prior to placement of additional materials.

K. Permanent features should be installed as quickly as possible after the land is disturbed.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 INITIAL SITE PREPARATION

A. Prior to beginning construction operations, the Contractor shall remove from the project area all debris, and any other objectionable matter, including fences, buildings, and other structures shown on the Drawings in the construction areas which are designated for removal or which, if left in place, would interfere with the proper performance or completion of the contemplated work, would impair its subsequent use, or would form obstructions therein.

B. Stumps and roots shall be grubbed and removed to a depth not less than 3 feet below grade. All holes or cavities which extend below the subgrade elevation of the proposed work shall be filled with compacted layers of crushed rock or earth backfill conforming to the requirements specified herein for backfill. Organic material from clearing operations shall not be incorporated in excavation backfill or embankment material.

C. The Contractor shall exercise special precautions for the protection and preservation of trees, cultivated shrubs, sod, fences, buildings, and other structures which are located in the construction area but not within designated clearing limits as shown on the Drawings or within the limits of embankments, excavations, or proposed structures. The Contractor shall be responsible for the repair and/or replacement of any of the aforementioned items damaged by his operation or construction activities.

D. The Contractor shall remove and dispose of all excess material resulting from clearing or site preparation operations. The Contractor shall dispose of such materials in a lawful manner and at a location where such materials can be lawfully disposed.

3.2 DEWATERING

A. All construction activities shall be conducted in the dry by pumping all water around the construction area and/or the use of dewatering equipment. Diversion shall be maintained around the area/reach being constructed. During anticipated larger storm events, exposed surfaces shall be stabilized to control erosion and sediment transport. Diversion shall continue until construction is completed in the area/reach under construction. Unless specifically authorized by the Engineer, no concrete or mortar shall be placed in water nor shall water be allowed to rise over newly placed concrete or mortar for at least 24 hours after placement. No concrete structure shall be exposed to unequal hydrostatic forces until the concrete has reached its specified 28-day strength. Excavations shall be protected from the entrance of surface water to the extent possible by the use of dikes and/or covers.

B. The Contractor shall use preventative measures to stop the entrance of soil from surface runoff into the proposed paver areas, storm drains, or receiving waters.

C. Water shall be disposed of in such a manner as not to be a menace to the public health and in accordance with applicable Environmental Protection Agency, Corps of Engineers, and State Environmental Protection Division standards and permits.

D. See Specification Section 01535 and Erosion, Sediment, and Pollution Control Drawings for additional requirements.

3.3 EXCAVATION AND GRADING

A. General

1. Excavate to lines, grades, and dimensions shown and as necessary to accomplish the Work. Excavate to within tolerance of plus or minus 0.1 foot, except where dimensions or grades are shown or specified as maximum or minimum. Allow for forms, working space, granular base, topsoil, and similar items, wherever applicable. Trim to neat lines where concrete is to be deposited against earth.
2. Remove or protect obstructions as shown and as specified in Section 01500, Construction Facilities and Temporary Controls.
3. Use of explosives shall not be permitted.
4. Shape, trim, and finish cut slopes to conform to lines, grades, and cross-sections shown, with proper allowance for topsoil or slope protection, where shown.
5. Remove stones and rock that exceed 3-inch diameter and that are loose and may roll down slope. Trim all exposed roots flush with cut slopes.
6. Round tops of cut slopes in soil to not less than a 6-foot radius, provided such rounding does not extend offsite or outside easements and rights-of-way, or adversely impacts existing vegetation, utilities, facilities, adjacent property, private property, or completed Work.

B. Unclassified Excavation

1. Complete all unclassified excavation regardless of the type, nature, or condition of the material encountered, including rock.

C. Disposal of Spoil

1. Do not stockpile on-site and immediately dispose of excavated materials offsite.
2. Dispose of debris resulting from removal of organic matter, trash, refuse, and junk as specified in Section 02110, Clearing and Grubbing.

3.4 SUBGRADE COMPACTION

A. Compact the subgrade beneath the paver system to 95 percent of maximum dry density as determined by Standard Proctor Analysis with moisture content ranging between 1 percent below to 3 percent above optimum moisture content as determined by ASTM D1557, free from all wood, vegetable matter, debris, and other objectionable material, and having scattered clods, stones, or broken concrete and pavement less than 6 inches in maximum dimension.

B. Material that is too dry for adequate compaction shall receive a prior admixture of sufficient water to secure optimum moisture content. Material having excessive water content shall not be placed at any time.

C. Contractor shall coordinate with Owner's geotechnical engineer or Owner to allow subgrade to be tested as directed by owner.

3.5 DISPOSAL OF WASTE AND UNSUITABLE MATERIALS

A. All materials removed by excavation shall be considered as waste materials and the disposal thereof shall be made by the Contractor in a lawful manner and at a location where such materials can be lawfully disposed.

B. No unsuitable or waste material shall be dumped on private property unless written permission is furnished by the owner of the property and unless a dumping permit is issued from the local jurisdiction.

3.6 PLANTING PREPARATION

A. After the completion of final grading and within 5 days of seeding or planting, the Contractor shall loosen the subgrade of all areas to be planted, by plowing or ripping, to a minimum depth of 6 inches. Preparation areas are to be moistened prior to seeding when soil is dry but care shall be taken not to create muddy conditions. Prepared areas are to be restored if eroded or otherwise disturbed after fine grading and before planting. Avoid disturbance to existing trees and other vegetation.

3.7 SETTLEMENT

A. The Contractor shall be responsible for all settlement 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.

3.8 ADDITIONAL REQUIREMENTS

A. The contractor shall install, operate, and maintain the dewatering and diversion system to provide a continuous dry working environment.

B. The Contractor must at all times control the release of suspended solids and turbidity in water which leaves the site as specified in other specification sections and the construction drawings.

END OF SECTION

SECTION 02490

TREES, SHRUBS, PERENNIALS AND GROUND COVER

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. The work covered under this section applies to furnishing all equipment, materials, and labor necessary for soil preparation; planting of trees, shrubs, herbaceous perennials, ground cover, bare root plants, procurement and proper installation of brush mattresses/live stakes, as applicable; protection, maintenance, guarantee, and replacement of plants; and all related items as shown on the drawings and specified herein.

B. It is not contemplated that planting shall occur where the depth of soil over underground construction or obstructions is insufficient to accommodate the roots or where impervious soil will require drainage. Where such conditions are encountered in excavation of planting areas, other locations for underground construction or for the planting may be designated by the Engineer.

1. Removal of underground obstructions, relocation of underground construction and provision of drainage for planting areas shall be done only as directed by the Engineer.

2. If changes in the location of the work or if removal of obstructions involve additional work, the Contractor shall proceed in accordance with the "General Conditions" of the Contract for construction.

C. All planting shall be performed by personnel with experience with these planting procedures and under the supervision of a qualified planting foreman capable of executing the requirements of this specification.

D. The Contractor shall take all necessary precautions to avoid damage to existing sidewalks, fencing, paving, curbs, lighting, and other site improvements and Contractor shall replace any existing site improvements damaged by his operations at his own expense to match the pre-damaged condition and to a manner acceptable to the Engineer.

1.2 QUALITY ASSURANCE

A. Size, quality, root ball preparation, and grading standards shall conform to the American Association of Nurserymen, Inc., as published in the "American Standard for Nursery Stock," ANSI Z60.1, latest approved revision.

B. The Contractor shall obtain representative samples of topsoil to be used in planting operations and shall furnish soil analysis certificates to the Engineer for approval. Native soil may be used if suitable for plant growth as determined by soil analysis. Tests shall be performed by the UGA Extension Service as described in Section 3.1 of this specification.

C. The Contractor shall be responsible for all certificates of inspection of plant materials that may be required by federal, state, or other authorities to accompany shipments of plants. All plants

must be inspected and approved by the Engineer before they are planted. Inspection and approval of plants upon delivery shall be for quality, size, and variety only and shall not in any way impair the right of rejection for failure to meet other requirements during progress of the work.

D. Fertilizer shall conform to the local, state, and federal laws applicable to its manufacture and labeling.

1.3 PLANT GUARANTEE AND REPLACEMENT

A. Guarantee

1. Plants shall be alive, healthy, and vigorous at the end of the guarantee period. The guarantee period shall be for a period of one year after installation and Owner acceptance of the plants.

B. Replacement

1. The Contractor shall inspect all planting monthly until the end of the guarantee period, and shall submit to the Engineer a written report describing plant replacements, if any. Any plant required under this contract that is dead or not in satisfactory growth, will be removed from the site; these and any plants missing due to the Contractor's negligence shall be replaced as soon as conditions permit. In case of any question regarding the condition and satisfactory establishment of a rejected plant, the Contractor shall notify the Engineer immediately in writing, and the Engineer shall determine acceptability. All replacement plants shall be guaranteed for the duration of one full year as described in Paragraph A above.

PART 2 PRODUCTS

2.1 TOPSOIL

A. The Contractor shall furnish topsoil for the planting of trees, shrubs, perennials, branch layers, seed, vines, and/or ground covers as shown on the Drawings and Details. All topsoil shall be natural soil classifiable as a loam, silt loam, or sandy loam as described in the U.S. Department of Agriculture triangular soil texture chart. The acidity range, between pH 5.5 and 7.0 s.u., shall contain not less than 5 percent or more than 20 percent organic matter. Topsoil shall be free from hard clods, stiff clay, hardpan, stones larger than 0.5 inch in diameter, noxious weeds and plants, sod, partially disintegrated debris, insects, or any other undesirable material that would be toxic or harmful to growth. Topsoil for planting may be conditioned by the use of approved additives until the requirements outlined in this paragraph are satisfied.

B. Topsoil excavated at the project site which meets these requirements should be stockpiles and used on-site. If sufficient topsoil is not available on-site, it shall be provided by the Contractor.

2.2 PEAT

A. Peat shall be commercial Sphagnum peat moss containing not more than 15 percent moisture and not less than 60 percent decomposed organic matter by weight calculated on an oven-dried basis. It shall be clean; free from stones, sticks, roots, and other foreign matter; and shall be shredded. It shall be delivered to site in unopened, partially compressed bales.

2.3 SAND

A. Sand for planting mix shall be clean, natural sand meeting the requirements of ASTM C 144. Subject to approval by the Engineer, sand may be prepared from stone, gravel, or other inert material having similar characteristics.

2.4 MANURE

A. Manure shall be aged, commercially composted horse or cow manure subject to approval by the Engineer.

2.5 LIMESTONE

A. Limestone, if necessary as a soil additive shall be a pulverized limestone having a calcium carbonate content of not less than 85 percent by weight. Agricultural limestone shall be crushed so that at least 85 percent of the material will pass a No. 10 mesh screen and 50 percent will pass a No. 40 mesh screen.

2.6 PLANTING SOIL MIX

A. All tree and shrub planting pits shall be backfilled with a planting mix consisting of the following proportions by volume:

1. 5 parts approved topsoil
   1 part peat
   1 part sand
   1 part manure.

B. The planting soil mix shall be thoroughly rotary mixed prior to installation. If so directed by the Engineer, ground limestone shall be added to the mix at a rate of 2½ pounds per cubic yard for each one full point rise in pH desired.

2.7 PLANTS

A. The names of plants required under this contract conform to those given in "Standardized Plant Names," latest edition, prepared by American Joint Committee on Horticultural Nomenclature. Each plant shall be tagged or labeled at the source with full botanical name on a waterproof tag.

B. Plant specimens shall conform to those indicated on the Drawings and two specimens of each plant shall be furnished for approval unless otherwise noted on the plant list.

C. Plants shall be nursery grown locally, unless otherwise noted, and have a habit of growth that is normal for the species. They shall be sound, healthy, vigorous, and free from insect pests, plant diseases, and injuries. All plants shall equal or exceed the measurements specified in the Plant List, which are minimum acceptable sizes. They shall be measured before pruning with branches in normal position. No pruning shall be done until the plants have been inspected by the Engineer and in no case shall the plants supplied under this contract be pruned back to such an extent that they no longer meet specifications. All trees and shrubs shall have been transplanted or root pruned at least once in the three years previous to contract date. Root bound container plants will not be accepted.

D. Substitutions of genus, species, or variety will be permitted only upon submission of proof, in writing, that the specified plant or its alternative is not obtainable in the continental United States. Written authorization for substitution must be obtained from the Engineer.

E. Live stakes and plants used for branch layering may be field collected in a legal manner.

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

G. Live stakes shall be hand planted along streambanks within the earth-filled voids of a rip-rap lined streambank from species of specified size, type and at density shown on Construction Drawings and Details.

H. Branch layering plants shall be branch cuttings from plant species of specified size, type, and density shown on Construction Drawings and Details on graded stream banks.

2.8 SOD

A. Sod shall be medium quality Bermuda grass grown in this ecoregion. Sod shall be green, healthy, and free of weeds and insects.

2.9 MISCELLANEOUS MATERIALS

A. Water shall be free from ingredients harmful to plant life. Hose and other watering equipment required for the work shall be furnished by the Contractor.

B. Mulch shall be tightly baled pine straw which is clean, fresh, dark reddish-brown, and free of branches, cones, foreign matter, insects and disease.

C. Fertilizer shall be as recommended by soil analysis and as specified within Section 3.3 G and 3.5A, within these specifications.

D. Materials for staking, guying, and wrapping:

1. Stakes for supporting trees shall be 36 inches minimum length, #2 rebar as shown on the Drawings or 2 inches x 2 inches x 36 inches minimum length wooden stakes. Wooden stakes shall be rot resistant wood, e.g., redwood, oak, western cedar, or pressure treated southern pine.
2. Wire for fastening trees to stakes or eye-bolts shall be No. 12 gauge pliable, galvanized steel.
3. Hose to encase guy wires or wires used for fastening shall be reinforced rubber garden hose (black or clear).
4. Turnbuckles, if applicable, shall have a 3-inch minimum lengthwise opening fitted with threaded ends and screw eyes. All parts shall be hot dipped galvanized steel or some other rust resistant material.
5. If required on Drawings, metal or plastic flags shall be minimum 3 inches x 5 inches x ⅛-inch thick attached by running guy wire through punched holes on both ends. Position at waist height each wire.

PART 3 EXECUTION

3.1 SOIL TESTING

A. Prior to planting, soil samples shall be taken within each planting zone (minimum of one per 5,000 square feet) and include a composite sample of each zone with a minimum of four subsamples per instructions from the UGA Extension Service and be analyzed for the appropriate parameters by the UGA Extension Service or State approved soil analytical laboratory. All soil sample results shall be submitted to the Owner for their records. The Contractor shall add the appropriate amount of the deficient elements to the soil prior to planting.

3.2 TIME OF PLANTING

A. When other sections of the work have progressed sufficiently to commence the work of planting, and the Owner and Engineer have accepted the preceding work, planting operations shall be conducted immediately under favorable weather conditions. These seasons shall be as follows:
   1. Planting Season: Plant all trees, shrubs, perennials, bare root plants and branch layer plants and ground covers between September 1 and May 1.
   2. At the option and on the full responsibility of the Contractor, planting operations may be conducted under unseasonable conditions without additional compensation.

3.3 PRODUCT HANDLING AND STORAGE

A. Live Cuttings: All live cuttings not installed on the same day as their delivery to the Project Site must be protected and stored as follows:
   1. Store in water or hold in moist soil for a maximum of 2 days without refrigeration.

2. Outside storage locations shall be continually shaded and protected from wind.
3. Product must be protected from drying at all times.
4. If harvested under ambient temperatures in excess of 50 degrees F, live cut branches shall be installed on the same day they are harvested or refrigerated less than 7 days.

B. Balled and burlapped plants shall be dug and prepared for shipment in a manner that will not damage roots or branches. The balls or roots of plants not planted immediately on delivery shall be covered with moist soil or mulch, or other protection from drying winds and sun. All plants shall be watered as necessary, until planted. Balled plants shall not be lifted by the trunk of the plant.

3.4 TOPSOIL

A. Topsoil shall be placed on select areas as directed by the Owner or Engineer. These select areas may include streambanks, bankfull benches, graded slopes, and other areas to be planted. The minimum depth of topsoil is 4-inches. The maximum depth of topsoil is 6-inches.

3.5 SOIL PREPARATION

A. After the completion of final grading and within 5 days of planned seeding or planting, the Contractor shall loosen the subgrade of all areas outside the bankfull channel to be planted, by plowing or ripping, to a minimum depth of 3 to 4 inches. These areas include areas compacted by equipment and/or vehicles such as haul roads and the staging/stockpile areas. The subgrade and topsoil are to be rough graded to promote surface water storage, with depressions and organic matter spread throughout. The Contractor is to limit subgrade and finish grade preparation to areas that will be planted immediately. Preparation areas are to be moistened prior to seeding when soil is dry but care shall be taken not to create muddy conditions. Prepared areas are to be restored if eroded or otherwise disturbed after fine grading and before planting. Avoid disturbance to existing trees and other vegetation.

B. Where topsoil is to be placed, scarify surface to depth of 3 to 4 inches.

C. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 6 inches.

D. Rake surface to remove debris, branches, rocks, and other materials.

E. Take and analyze soil sample to determine soil amendment requirements. Add fertilizer and amendments as directed by soil analysis or directed by Owner.

F. Place topsoil in areas where seeding and planting is indicated until all topsoil excavated from site is used. Dispose of excess topsoil on site in area designated by Engineer. If quantity of topsoil excavated from site is not adequate for seeded areas, no additional topsoil imported to site will be required.

G. Place topsoil during dry weather.

H. Remove roots, weeds, rocks, and foreign material while spreading.

I. Near plants spread topsoil manually to prevent damage.

J. Lightly compact placed topsoil with tracks or bucket of equipment as directed by Engineer.

3.6 PLANTING OF TREES, SHRUBS, AND GROUND COVER

A. Except as otherwise specified, the Contractor's work shall conform to accepted horticultural practices as used in the trade.

B. Plants and seed mixtures shall be planted during their individual dormant seasons, as directed in the planting schedule, or as advised by a commercial plant supplier. Plants shall be installed per the recommendations shown on the individual labels and as directed in the planting schedule, or as advised by a commercial plant supplier.

C. The Engineer shall verify the staked location of all trees and shrubs prior to installation with labeled stakes to be furnished for this purpose by the Contractor.

D. Planting pits shall be dug and soil for planting readied before plants are delivered. Pits shall be excavated according to the dimensions indicated on the Drawings. The Contractor shall get approval of the planting pit locations from the Engineer prior to plant installation.

E. All trees, shrubs, and ground cover shall be installed per the Drawings and Details.

F. Excess excavated soil from planting operations shall be removed from the site and properly disposed of by the Contractor.

G. All plants shall be set on prepared soil to such depth that the finished grade level at the plant after settlement will be the same as that at which the plant has grown. They shall be planted upright and plumb. No burlap shall be pulled out from under balls. Platforms, wire and burlap for top and sides of the ball as shown on the Details shall be removed. All broken or frayed roots shall be cut off cleanly. Topsoil or prepared soil shall be placed and compacted carefully to avoid injury to roots and to fill voids. When the hole is nearly filled, add water as necessary and allow it to soak away. Fill the hole to finish grade. After the ground settles additional soil shall be filled to the level of the finished grade.

H. All exterior plants shall be fertilized per soil test recommendations within 2 days of installation.

I. If applicable, staking and guying shall be accomplished as shown on Drawings. Supports shall be kept in place during entire guaranty period.

J. Unless shown otherwise on the Drawings, all plants shall be mulched with a 3-inch minimum layer of mulch within 2 days of planting. This mulch shall entirely cover the area of the planting pit, bed, or saucer around each plant.

3.7 PRUNING AND REPAIR

A. Upon completion of the work under the contract, all new trees and shrubs shall have been pruned and any injuries repaired. The amount of pruning shall be limited to the minimum

necessary to remove dead or injured twigs and branches and to compensate for the loss of roots as a result of transplanting operations. Pruning shall be done in such a manner as not to change the natural habit or shape of the plant. All cuts shall be made flush, leaving no stubs. On all bruises or scars on the bark and cuts over ¾ inch in diameter, the injured cambium shall be traced back to living tissue and removed; wounds shall be smoothed and shaped so as not to retain water; and the treated area shall be coated with a commercial tree wound dressing.

3.8 INSPECTION FOR ACCEPTANCE

A. Upon completion of all planting and after written notification, inspection of the landscape work to determine partial completion of the contract work, exclusive of maintenance and replacement of plants, will be made by the Engineer. Inspection of the work will be made again by the Engineer at the end of the guarantee period.

3.9 MAINTENANCE

A. Maintenance shall begin immediately after each plant is planted and shall continue until final acceptance is established by the engineer. Planting shall be protected and maintained as necessary by watering, fertilizing, and replanting as necessary for at least one full year after final acceptance.

END OF SECTION

SECTION 02550

PERMEABLE INTERLOCKING PRECAST CONCRETE PAVING

PART 1 GENERAL

1.01 DESCRIPTION

A. This specification covers the installation of a permeable interlocking concrete pavement system comprised of heavy duty concrete pavers with permeable joint material, a bedding course / base course / subbase course each consisting of open graded aggregates, and an edge restraint consisting of existing or cast-in-place concrete.

B. Work consists of furnishing and construction of a Permeable Interlocking Concrete Pavement System in accordance with these specifications and in reasonably close conformity with the lines, grades, design, and dimensions shown on the construction plans.

C. Installation work includes:
   1. Verifying Subgrade is to the lines, grades, infiltration rate, and density shown on the construction drawings.
   2. Furnishing and installing Geotextile and/or Membrane Liner (where required), Horizontal Drainage Piping (where required), Subbase Course, Base Course, Bedding Course, Edge Restraint, Concrete Pavers and Permeable Joint Material to the lines and grades shown on the construction drawings.

1.02 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO)
   1. GDPS-4-M Guide for Design of Pavement Structures

B. American Society of Civil Engineers (ASCE)
   1. ASCE 58-10 Structural Design of Interlocking Concrete Pavement for Municipal Streets and Roadways

C. American Society for Testing and Materials (ASTM)
   1. ASTM C-29 Bulk Density (“Unit Weight”) and Voids in Aggregate
   2. ASTM C-94 Standard Specification for Ready Mixed Concrete
   3. ASTM C-131 Resistance to Degradation of Small-Sized Course Aggregate by Abrasion and Impact in the Los Angeles Machine
   4. ASTM C-136 Sieve Analysis of Fine and Course Grained Aggregates
   5. ASTM C-140 Sampling and Testing Concrete Masonry Units and Related Units
   6. ASTM C-936 Solid Concrete Interlocking Paving Units
   7. ASTM C-979 Pigments for Integrally Colored Concrete
   8. ASTM C-1645 Freeze-thaw and De-icing Salt Durability of Solid Interlocking Paving Units
   9. ASTM D-448 Standard Classification for Sizes of Aggregates for Road and Bridge Construction
   10. ASTM D-698 Laboratory Compaction Characteristics of Soil Using Standard Effort

11. ASTM D-1557 Laboratory Compaction Characteristics of Soil Using Modified Effort
12. ASTM D-1883 CBR (California Bearing Ratio) of Laboratory Compacted Soils
13. ASTM D-2488 Description and Identification of Soils (Visual-Manual Procedure)
14. ASTM D-3034 Type PSM Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings
15. ASTM D-3350 Polyethylene Plastic Pipe and Fittings Materials
16. ASTM D-4873 Identification, Storage and Handling of Geosynthetic Rolls and Samples
17. ASTM D-6928 Resistance of Course Aggregates to Degradation by Abrasion in the Micro-Deval Apparatus

D. Interlocking Concrete Pavement Institute (ICPI)
   1. Permeable Interlocking Concrete Pavement manual (latest edition)
   2. Permeable Design Pro software for hydrologic and structural design
   3. Tech Spec Technical Bulletins.

1.03 SUBMITTALS

A. Contractor shall submit to the Owner for approval, and retain for the balance of the project, a minimum of four full size samples of each Concrete Paver type/size/thickness/color/finish specified; the samples shall represent the range of shape, texture and color permitted for the respective type. Concrete Color(s) will be selected by Engineer/Owner from Manufacturer's standard colors.

B. Prior to delivery of the associated material to the site, the Contractor shall submit the following product specific documentation for approval:
   1. Aggregates:
      a. Sieve analysis per ASTM C-136
      b. Durability of aggregates using Micro Deval Degradation using ASTM D-6928.
      c. Percentage of angular and sub-angular particles per ASTM D-2488.
      d. Minimum 3-lb sample of each material for independent testing.
      e. Source test results for void ratio and bulk density of the Base and Subbase aggregates per ASTM C-29.
   2. Concrete Pavers:
      a. Test results from an independent testing laboratory for compliance to ASTM C-936 or other applicable requirements.
      b. For machine installation projects, stitching details to be used during product placement as supplied by the manufacturer.
      c. Warranty documentation
      d. Close out Operations and Maintenance program
      e. Material Safety Data Sheets
   3. Geosynthetics:
      a. One 18-inch x 18-inch panel of each geosynthetic (Geotextile) for inspection and testing. The sample panels shall be uniformly rolled and shall be wrapped in plastic to protect the material from moisture and damage during shipment. Samples shall be externally tagged for easy identification. External identification shall include: name of manufacturer; product type; product grade; lot number; and physical dimensions.

b. Material Safety Data Sheets

4. Written Method Statement and Quality Control Plan that describes material staging and flow, paving direction and installation procedures, including representative reporting forms that ensure conformance to the project specifications.

1.04 QUALITY ASSURANCE

A. Contractor shall submit a list of five (5) previously constructed permeable paver projects of similar size in Georgia (preferably in the greater Atlanta metro area) with the bid to be qualified. Contractor shall be located in the state of Georgia. Contact names, emails, and telephone numbers shall be listed for each project with date of completion.

B. At a minimum, the Contractor's Site Foreman shall hold PICP Technician Certificate from the Interlocking Concrete Pavement Institute (ICPI) contractor certification program. The Site Foreman is expected to be onsite for the entire paver system installation.

C. Contractor shall conform to all local, state/provincial licensing and bonding requirements.

D. Contractor will hold a mandatory pre-construction meeting with Engineer, Owner, and affected sub-trades accessing PICP work area to review method statement and quality control plan and communicate to all parties a work flow that is most desirable to meet the construction schedule as set forth by the General Contractor. Additional details of Pre-Construction meeting are outlined in Section 3.01.

E. The Contractor shall verify with the bid they have the necessary equipment, and is sufficiently familiar with its operation, to properly conduct the work. The Contractor shall also provide a description of the anticipated growth in size of each cluster, and a plan for managing the growth, so as to not interfere with placement by the paving machines.

1.05 MOCK-UPS

A. Install a full street width by approximately 10-feet paver area following the installation practices described in Section 3.02 to 3.04. The concrete curb shall also be completed on both sides of the street.

B. This area will be used to verify: surcharge of the Bedding Course; joint sizes; lines; laying pattern(s); stitching details (for mechanical installation); color(s); and, texture of the job.

C. To provide a proper representation of color blend, a minimum of three (3) cubes for manual installation, and 6 cubes for mechanical installation, will be pulled from.

D. This area shall be the standard from which the work will be judged.

E. Upon approval by the Owner, the mock-up will be retained as part of the finished work. If the mock-up is not approved it shall be removed and replaced by the Contractor for Owner approval.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with Manufacturer's ordering instructions and lead time requirements to avoid construction delays.

B. Coordinate delivery and paving schedule to minimize interference with normal use of buildings adjacent to paving.

C. Contractor shall check all materials upon delivery to assure that the proper materials have been received and are in good condition before signing off on the manufacturer's packing slip.

D. Contractor shall protect all materials from damage or contamination due to jobsite conditions and in accordance with manufacturer's recommendations. Damaged or contaminated materials shall not be incorporated into the work.

E. Deliver Concrete Pavers to the site in steel banded, plastic banded, or plastic wrapped cubes capable of transfer by fork lift or clamp lift. Unload and store Concrete Pavers at job site in such a manner that no damage occurs to the product.

F. Handle and transport aggregates to avoid segregation, contamination and degradation. Keep different materials sufficiently separated as to prevent mixing. Do not dump or store one material on top of another unless it is part of the installation process. Cover material with waterproof covering to prevent exposure to rainfall or removal by wind – secure the covering in place.

G. Geosynthetics shall be delivered, stored and handled in accordance with ASTM D-4873.

1.07 ENVIRONMENTAL CONDITIONS

A. Do not install during heavy rain, freezing conditions or snowfall.

B. Do not install on frozen soil subgrade or aggregates.

C. Do not install frozen aggregates.

1.08 MAINTENANCE MATERIALS

A. Provide 100 square feet of additional paver material for use by Owner for maintenance and repair as attic stock.

B. Pavers to be from the same production run as installed materials.

C. Store paver materials in Owner designated location.

PART 2 PRODUCTS

2.01 DEFINITIONS

A. Base Course – within the context of this specification, a washed open graded free draining aggregate material (#57 Stone), 6-inch minimum thickness, that provides both structural support over the Subbase and water storage capacity (within the voids). It also serves as a choking material between the Bedding Course and Subbase.

B. Bedding Course – within the context of this specification, a 2-inch thick layer of washed open graded free draining aggregate material (#8 Stone) loosely screeded smooth for bedding of the Concrete Pavers.

C. Concrete Pavers – within the context of this specification, solid individual paving units manufacturing from concrete that are either specifically designed for use in permeable applications (include joints and voids) or are laid in a pattern that creates large enough openings to provide infiltration. Concrete Pavers are shipped in clusters called bundles or cubes, which consist of several layers of pavers strapped or wrapped together.

1. Voids – larger openings between the individual pavers that provide for infiltration.
2. Joints – smaller openings between the individual pavers that provide vertical and horizontal interlock between units.

D. Edge Restraint – within this specification, the existing concrete curb, sidewalk, or driveway, or cast in place concrete curb that prevents the lateral movement of the Bedding Course and Concrete Pavers so they do not spread and loose interlock.

E. Geotextile – Woven or non-woven fabrics made from plastic fibers used primarily for separation between the paver system and adjacent soils.

F. Laying Face – the working edge of the pavement where the laying of pavers is occurring.

G. Mechanical Installation – the use of specialized machines to lift whole layers of pavers from the bundles and place them on the prepared bedding course. These specialized machines are designed specifically for this application.

H. Permeable Joint Material – a washed open graded free draining natural aggregate material (typically #8, #89 or #9 Stone) used to fill the spaces (joints and voids) between Concrete Pavers to create interlock and still maintain infiltration.

I. Permeable Interlocking Concrete Pavement System – a system of paving consisting of Concrete Pavers placed in an interlocking pattern with the joints and voids filled with Permeable Joint Material. The minimum rate of infiltration of the Concrete Pavers and Permeable Jointing Material is 10 inches per hour. The Bedding Course, Base Course and Subbase Courses provide structural support over the Subgrade and store, exfiltrate (into the Subgrade) and/or drain the infiltrating water.

J. Subbase Course – within the context of this specification, an open graded free draining natural aggregate material (GA DOT #3 Washed Stone or equivalent) of a specified thickness that provides both structural support over the Subgrade and water storage capacity (within the voids).

K. Subgrade – the soil upon which the pavement structure and shoulders are constructed.

2.02 CONCRETE PAVERS

A. Commercial Concrete Permeable Pavers shall be three piece modular and 80 mm thickness. Belgard Eco Dublin or approved equal (Belgard GA supplier - Georgia Masonry Supply, 1443 Battle Creek Road, Jonesboro, GA 30236, 800-621-5222, 770-471-2128 Fax).

B. Color and finish to be selected by Owner during submittal review. Several different colors may be selected.

C. Concrete Pavers shall conform to the following requirements set forth in ASTM C-936:

1. Measured length or width of test specimens shall not differ by more than +/- 0.063 inch, while measured thickness shall not differ by more than +/- 0.125 inch.
2. Average compressive strength of 8,000 psi (55 MPa) with no individual unit under 7,200 psi (50 MPa) when tested in accordance with ASTM C-140.
3. Average absorption of 5% with no unit greater than 7% when tested in accordance with ASTM C-140.
4. Where freeze-thaw testing is required, the average mass loss of all specimens tested shall not be greater than (A) 225 g/m2 when subject to 28 freeze thaw cycles, or (b) 500 g/m2 when subject to 49 freeze thaw cycles. Testing shall be conducted using a 3% saline solution in according to ASTM C-1645.

D. Pigment in Concrete Pavers shall conform to ASTM C-979.

2.03 BEDDING COURSE

A. Clean, non-plastic aggregate, free from deleterious or foreign matter, manufactured from crushed rock.

B. Micro Deval Degradation of less than 8% as per ASTM D-6938.

C. Percent of angular and sub-angular particles greater than 90%. Do not use rounded river gravel.

D. LA Abrasion <40 as per ASTM C-131, minimum CBR of 80% as per ASTM D-1883.

E. Gradation to conform to Table 1 as tested in accordance to ASTM C-136. All aggregates shall have equal to or less than 2% passing the No. 200 (0.075 mm) sieve.

Table 1
Grading Requirements for Bedding Course (ASTM No. 8 Stone per ASTM D-448)

Sieve Size	Percent Passing
1/2 in. (12.5 mm)	100
3/8 in. (9.5 mm)	85 to 100
No. 4 (4.75 mm)	10 to 30
No. 8 (2.36 mm)	0 to 10
No. 16 (1.18 mm)	0 to 5

2.04 PERMEABLE JOINT MATERIAL

A. Where joints are greater than or equal to ¼ inch, use ASTM No. 8 Stone as specified for the Bedding Course.

B. Where joints are less than ¼ inch, use pre-bagged Permeable Joint Material as supplied by Belgard or approved equal.

2.05 BASE AND SUBBASE

A. Clean, non-plastic aggregate, free from deleterious or foreign matter, manufactured from crushed rock.

B. Micro Deval Degradation of less than 8% as per ASTM D-6938.

C. Percent of angular and sub-angular particles greater than 90%. Do not use rounded river gravel.

D. LA Abrasion <40 as per ASTM C-131, minimum CBR of 80% as per ASTM D-1883.

E. Gradation of Base Course to conform to Table 2 as tested in accordance to ASTM C-136. Gradation of Subbase Course to conform to Table 3 as tested in accordance to ASTM C-136. All aggregates shall have equal to or less than 2% passing the No. 200 (0.075 mm) sieve.

Table 2
Grading Requirements for Base Course (ASTM No. 57 Stone per ASTM D-448)

Sieve Size	Percent Passing
1-½ in. (37.5 mm)	100
1 in. (25 mm)	95 to 100
1/2 in. (12.5 mm)	25 to 60
3/8 in. (9.5 mm)	0 to 10
No. 4 (4.75 mm)	0 to 5

Table 3
Grading Requirements for Subbase Course (ASTM No. 3 Stone per ASTM D-448)

Sieve Size	Percent Passing
3 in. (75 mm)	100
2-½ in. (63 mm)	90 to 100
2 in. (50 mm)	35 to 70
1-½ in. (37.5 mm)	0 to 15
¾ in. (19 mm)	0 to 5

2.06 EDGE RESTRAINTS

A. Edge restraints shall be existing concrete curb, sidewalk, or driveway or cast in place concrete curbs constructed as shown on the construction drawings and details.

2.07 GEOSYNTHETICS

A. Geotextile for Sides of Paver System. Geotextile shall be a needled, non-woven, polypropylene geotextile with Grab Tensile Strength equal to or greater than 120 lbs. (ASTM D4632), with a Mullen Burst Strength equal to or greater than 225 lbs./sq. in. (ASTM D3786), with a Flow Rate greater than 125 gpm/sq. ft. (ASTM D4491), and an Apparent Opening Size (AOS) equivalent to a US # 70 or # 80 sieve (ASTM D4751). The geotextile AOS selection is based on the percent passing the No. 200 sieve in "A" Soil subgrade, using FHWA or AASHTO selection criteria.

B. Geotextile for Flow Barrier. Geotextile shall be a woven geotextile fabric made of 100 percent polypropylene slit film yarns. Fabric shall be resistant to ultraviolet and biological deterioration, and rotting within a pH range of 2 to 13 s.u. Fabric shall satisfy the

requirements outlined in AASHTO M-288-06 for Class 1 Stabilization & Separation applications. The woven geotextile shall have the following minimum properties:

PROPERTY	TEST METHOD	MINIMUM VALUE
Tensile Strength	ASTM D-4632	315 lbs.
Elongation @ Break	ASTM D-4632	15%
Mullen Burst*	ASTM D-3786*	600 psi
Puncture Strength*	ASTM D-4833*	120 lbs.
CBR Puncture	ASTM D-6241	1,000 lbs.
Trapezoidal Tear	ASTM D-4533	120 lbs.
Apparent Opening Size	ASTM D-4751	40 US Sieve
Permittivity	ASTM D-4491	0.05 Sec-1
Water Flow Rate	ASTM D-4491	4 g/min/sf
UV Resistance @ 500 Hours	ASTM D-4355	70%

2.08 HORIZONTAL UNDERDRAIN PIPE AND FITTINGS

A. The Horizontal Underdrain Pipe shall be a 6 inch diameter perforated Schedule 40 PVC pipe. Fittings will also be Schedule 40 PVC with no perforations. PVC shall be 1120 Type 1 Grade 1, with a cell class of 12454B, per ASTM D1784. The pipe shall be produced in strict compliance to ASTM D1785. Schedule 40 pipe shall be installed per ASTM D2855. The joints shall conform to ASTM D2672, the solvent cement to ASTM D2564 and the primer to ASTM F656. Pipe shall have two rows of holes, 120° apart, parallel to the axis of the pipe. Holes are ½-inch in diameter and are on 5-6 inches center

PART 3 EXECUTION

3.01 INSPECTION

A. Prior to commencement of any work, the Contractor shall conduct a pre-construction meeting with the Owner, Engineer and affected sub-trades. The pre-construction meeting should, at a minimum, verify:
   1. The location of the Mock Up area.
   2. The site layout conforms to the Site Plan. In particular, the location and elevation of discharge points (if any) of the Horizontal Drainage Pipes.
   3. The excavation work conforms to the specified lines and elevations. Subgrade shall be trimmed to within 0 and ½ in of the specified grades. The surface of the prepared

Subgrade shall not deviate by more than 3/8 in from the bottom edge of a 10-foot straight edge laid in any direction.

4. The condition of the subgrade, in particular that the surface infiltration (where desired) has not been adversely impacted by the excavation work. Where compaction is desired, that the compaction densities have been met.
5. Locations of curbs, grade beams, utility structures, light standards, tree wells or any other protrusions as applicable to the project.
6. The details of the site's 'Erosion and Sediment Control Plan'.
7. Panel Installation Drawings for the Geosynthetics, in particular the location of any protrusions through the Membrane Liner where boots are required.

B. Although the Owner may provide soil testing and quality assurance inspection during earthwork and subgrade preparation, the Owner's quality assurance program does not relieve the Contractor of responsibility for quality control and system performance. Contractor shall obtain any quality control testing or inspection not provided by the Owner that is necessary to satisfy the Contractor with the condition of the Subgrade prior to commencement of the work. This may include:

1. Proof rolling of the subgrade to determine presence of soft spots or localized pockets of objectionable materials.
2. Infiltration testing to verify the subgrade has not been adversely impacted.
3. Compaction testing.

C. Where deficiencies or inconsistencies are identified, the Contractor shall notify the Engineer in writing. The Contractor will not proceed with the work until the Engineer has verified that the deficiencies or inconsistencies have been addressed.

D. Beginning of Installation means acceptance of Subgrade.

3.02 USING EXISTING CURB FOR EDGE RESTRAINTS

A. In those areas using existing curb, sawcut curb, driveways, or sidewalk for edge restraints, the edge restraint shall be prepared by the Contractor.

B. Any cuts shall be completed in a continuous and straight line leaving a uniform vertical edge restraint surface adjacent to the paver system.

C. Material adjacent to the edge restraint shall be carefully removed by the Contractor so the existing edge restraint is not damaged. Once the existing material adjacent to the curb has been removed by the Contractor, and the paver system is ready to be installed, the Contractor shall request that the Owner and Engineer inspect the edge restraint. The paver system shall not be installed until the edge restraint is inspected and approved for use by the Owner and Engineer. The Contractor shall be responsible for repairing or replacing, to the satisfaction of the Owner, any edge restraint damaged by the Contractor during the cutting and material removal process.

3.03 INSTALLATION EDGE RESTRAINTS

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

B. All concrete edge restraints shall be constructed to dimensions and level specified and shall be supported on a compacted Base not less than 6 inches thick.

C. Concrete used for the construction of edge restraints shall be air-entrained and have a compressive strength as specified. All concrete shall be in accordance with ASTM C94 requirements.

D. Once the curb has been installed by the Contractor, and the paver system is ready to be installed, the Contractor shall request that the Owner and Engineer inspect the edge restraint. The paver system shall not be installed until the edge restraint is inspected and approved by the Owner and Engineer.

3.04 INSTALLATION BASE COURSE

A. Keep area where pavement is to be constructed free from sediment during the entire job. Any materials contaminated with sediment shall be removed and replaced with clean material.

B. Install Geotextiles as required in accordance with the specifications and drawings. The Geotextile is applied to the sides of the excavation with overlapping joints a minimum of 12 inches. Overlaps to follow down slope. Allow for enough geotextile to exceed the final elevation of the surface. After completion of the surface, the excess geotextile should be cut flush with the finished grade.

C. Install the Subbase Course and Base Course at the thicknesses, compaction rates, surface tolerances, and elevations outlined in the specifications and construction drawings.
   1. Place and spread the first layer of Subbase without displacing or damaging the Geosynthetics (if used). To prevent damage, tracked vehicles must not be used to spread the initial Subbase layer.
   2. The aggregate should be spread and compacted in uniform layers not exceeding 6-inch loose thickness. Compaction is performed using either a 10 T (10 ton) vibratory roller or a minimum 13,500 lbs. of centrifugal force reversible vibratory plate compactor. For each lift, make at least two passes in the vibratory mode and at least two passes in the static mode – continue compaction until there is visible movement in the materials.
   3. At the specified elevation(s), install the Horizontal Drain Pipes in accordance with the manufacturer's recommendations. Ensure the Pipes are properly sloped to provide proper drainage to the outlets Pipes shall be surrounded by a minimum of 4 inches of Base Course material to prevent damage from the Subbase material. Care must be taken not to damage Horizontal Drain Pipes during subsequent aggregate installation.
   4. Final surface tolerance should be plus or minus 1 inch over a 10-foot straight edge laid in any direction.
   5. Attention will be paid to providing proper compaction near curbs, grade beams, concrete collars around utility structures, lights standards, tree wells, building edges and other protrusions as applicable to the project. In areas not accessible to large compaction equipment, compact to specified density with mechanical tampers (jumping jacks).

D. Before commencing the placing of the Bedding Course, the base shall be inspected by the Owner and Engineer.

3.05 INSTALLATION BEDDING COURSE, CONCRETE PAVERS AND PERMEABLE JOINT MATERIAL

A. Spread the Bedding Course evenly over the Base Course and screed to a nominal 2-inch thickness. Do not use the bedding material to fill depressions in the Base Course surface.

B. The Contractor shall roll the Bedding Course using either an approved mechanical spreader (e.g., an asphalt paver) or by the use of screed rails and boards.

C. Moisten and lightly compact the Bedding Course using a Plate Compactor. Surface tolerances shall be 3/8 inch over a 10-foot straight edge.

D. Loose screed the bedding course.

E. Ensure that Concrete Pavers are free of foreign material before installation. Concrete Pavers shall be inspected for color distribution and all chipped, damaged or discolored Concrete Pavers shall be replaced. Initiation of Concrete Paver placement shall be deemed to represent acceptance of the pavers.

F. Lay the Concrete Pavers in the pattern(s) as shown on the drawings. Maintain straight pattern lines.

G. Paving units shall be installed from a minimum of three (3) bundles for hand installations, six (6) bundles for mechanical installations, simultaneously to ensure color blending.

H. Joints between the individual Concrete Pavers shall be maintained according to the spacer bars.

I. Fill gaps at the edges of the paved area with cut pavers or edge units. Do not install cut pavers smaller than one-third of a whole paver along edges subject to vehicular traffic – trim two pavers to fit.

J. Cut pavers using a masonry saw. Upon completion of cutting, the area must be swept clean of all debris to facilitate inspection and to ensure the Concrete Pavers are not damaged during compaction.

K. Using a low amplitude plate compactor capable of at least 5,000 lbs. (22 kN) compaction at a frequency of 75 Hz –100 Hz, compact and seat the Concrete Pavers into the Bedding Course.

L. The pavers shall be compacted to achieve consolidation of the Bedding Course and brought to level and profile by not less than three passes. Initial compaction should proceed as closely as possible following the installation of the paving units and prior to the acceptance of any traffic or application of Permeable Joint Material.

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

N. Apply a dressing of Permeable Joint Material to the surface and sweep into the joints and voids. Fill joints and voids, and then sweep off excess material before vibrating the material down into the joints using a plate compactor. This will require at least two or three passes with the compactor.

O. Do not compact within 6 feet of the unrestrained edges of the paving units.

P. All work to within 3 feet (1 m) of the laying face must be left fully compacted at the end of each day. Cover the laying face with plastic sheets overnight if not closed with cut and compacted pavers.

Q. Sweep off excess aggregate when the job is complete. Wash dust or particles from the paver surface.

3.06 QUALITY ASSURANCE/QUALITY CONTROL

A. Quality Assurance – The Owner may engage inspection and testing services, including independent laboratories, to provide quality assurance and testing services during construction. This does not relieve the Contractor from securing the necessary construction quality control testing.

B. Quality assurance should include as a minimum verification with the Engineer that the Contractor's quality control plan and testing are adequate. Quality assurance shall also include observation of construction for general compliance with design drawings and project specifications.

C. Quality Control – The Contractor shall engage inspection and testing services to perform the minimum quality control testing described in the design plans and specifications. Only qualified and experienced technicians and engineers shall perform testing and inspection services.

D. Quality control testing shall include backfill testing to verify soil types and compaction, and verification that the system is being constructed in accordance with the design plans and project specifications.

E. The Contractor shall perform infiltration testing of the paver system observed by the Owner and Engineer. The Contractor shall apply water to three areas selected by the Engineer at a rate of at least 12 inches per hour for a minimum of 2 hours.

3.07 AS-BUILT CONSTRUCTION TOLERANCES

A. Final inspection shall be conducted to verify conformance to the drawings after removal of excess aggregate. All pavements shall be finished to lines and levels to ensure positive drainage at all drainage outlets and channels.

B. The final surface elevations shall not deviate more than +/- 1/4 inch under a 10 foot-long straight edge.

C. Where the pavers are adjacent to the concrete edge restraint at the same level the elevation of the pavers shall not deviate more than +/- 1/8 inch.

D. Lippage shall be no greater than 1/8 inch difference in height between adjacent pavers.

E. Bond lines for the pavers shall be +/- ½ inch over a 50-foot string line.

F. The actual measured infiltration rate of the completed paver system shall be at least 10 inches per hour.

3.08 PROTECTION AND MAINTENANCE

A. At the completion of the work, the Contractor shall provide the Owner with a "PICP System Maintenance Checklist" and sample "Long Term Performance and Maintenance Agreement" from the manufacturer.

B. The Contractor shall return to the site after 12 months from the completion of the work and conduct an inspection of the PICP System with the Owner, Engineer, and Manufacturer in accordance with the "PICP System Maintenance Checklist". The Contractor shall provide the following remedial work, as required, as part of the original bid and with no additional compensation: fill paver joints with stones; replace broken or cracked pavers; re-level settled pavers to specified elevations; and, re-align pavers to straighten bond lines.

END OF SECTION