SECTION 01 25 00 -SUBSTITUTION PROCEDURES

PART 1 -GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.

2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Contractor to use included form.

2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.

b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.

c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities

may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.

e. Samples, where applicable or requested.

f. Certificates and qualification data, where applicable or requested.

g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.

h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.

i. Research reports evidencing compliance with building code in effect for Project.

j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.

k. Cost information, including a proposal of change, if any, in the Contract Sum.

l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.

m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

   a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.

   b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 –

PRODUCTS SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

   a. Requested substitution is consistent with the Contract Documents and will produce indicated results.

   b. Substitution request is fully documented and properly submitted.

   c. Requested substitution will not adversely affect Contractor's construction schedule.

   d. Requested substitution has received necessary approvals of authorities having jurisdiction.

   e. Requested substitution is compatible with other portions of the Work.

   f. Requested substitution has been coordinated with other portions of the Work.

   g. Requested substitution provides specified warranty.

   h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Architect will consider requests for substitution.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

   a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume.

   b. Requested substitution does not require extensive revisions to the Contract Documents.

   c. Requested substitution is consistent with the Contract Documents and will produce indicated results.

d. Substitution request is fully documented and properly submitted.

e. Requested substitution will not adversely affect Contractor's construction schedule.

f. Requested substitution has received necessary approvals of authorities having jurisdiction.

g. Requested substitution is compatible with other portions of the Work.

h. Requested substitution has been coordinated with other portions of the Work.

i. Requested substitution provides specified warranty.

j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 -EXECUTION (Not Used)

END OF SECTION 01 25 00

SECTION 01 33 00 -SUBMITTAL PROCEDURES

PART 1 -GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.

2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.

3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.

    a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

4. Format: Arrange the following information in a tabular format:

    a. Scheduled date for first submittal.

    b. Specification Section number and title.

    c. Submittal category: Action; informational.

    d. Name of subcontractor.

    e. Description of the Work covered.

    f. Scheduled date for Architect's final release or approval.

    g. Scheduled date of fabrication.

    h. Scheduled dates for purchasing.

    i. Scheduled dates for installation.

    j. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic copies of CAD Drawings of the Contract Drawings may be provided by Architect for Contractor's use in preparing submittals, subject to the requirements of Division 01Section “Electronic Data Transfer Agreement.”

1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project Record Drawings.

    a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.

    b. Digital Drawing Software Program: The Contract Drawings are available in “.dwg” format.

    c. The electronic PDF files will by furnished one time for each appropriate discipline.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.

3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.

4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

5. Incomplete Submittals and Excessive Errors: Shop drawings, product data, samples, and administrative submittals that contain excessive errors or that are incomplete will be returned unchecked and any delay caused thereby will be the responsibility of the Contractor.

6. Arrange for preparation of required submittals in sufficient detail to permit analysis and review by Contractor and Architect, sufficiently early to allow for review, and accommodate the rate of construction progress required under the Contract. Delete or mark out extraneous material not relevant to the Project.

7. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.

8. Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

9. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

C. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow ten (10) consecutive working days for the review of any shop drawing and other submittals requiring review by the Architect. The Architect will advise the Contractor of additional time required. Allow additional time if processing must be delayed to permit coordination with subsequent submittals or concurrent review as specified. Architect will advise Contractor when a submittal being processed must be delayed for coordination or concurrent review.

2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.

3. Resubmittal Review: Allow ten (10) consecutive working days for review of each resubmittal.

4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow fifteen (15) consecutive working days for initial review of each submittal.

5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow fifteen (15) consecutive working days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.

6. Direct Transmittal to Consultant: Where the Contract Documents indicate that submittals may be transmitted directly to Architect's consultants, provide one (1) duplicate copy of transmittal and submittal to Architect. Reviewed and Stamped Submittals will be returned from Consultant to Architect before being returned to Contractor.

D. Paper Submittals: Not used. Electronic submittal procedure shall be implemented. Retain "Electronic Submittals" Paragraph below if requiring electronic submittals instead of paper submittals.

E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.

2. Name file with submittal number or other unique identifier, including revision identifier.

a. File name shall use project identifier and six digit specification number, hyphen – sequential submittal number, hyphen -number of times submitted.

1) EXAMPLE: TAYLOR BRAWNER PARK 23 80 00 – 003 -01

2) Requirement in first subparagraph below can be performed using PDF publishing software.

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.

4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner**,** containing the following information:

a. Project name.

b. Date.

c. Name and address of Architect.

d. Name of Construction Manager.

e. Name of Contractor.

f. Name of firm or entity that prepared submittal.

g. Names of subcontractor, manufacturer, and supplier.

h. Category and type of submittal.

i. Submittal purpose and description.

j. Specification Section number and title.

k. Specification paragraph number or drawing designation and generic name for each of multiple items.

l. Drawing number and detail references, as appropriate.

m. Location(s) where product is to be installed, as appropriate.

n. Related physical samples submitted directly.

o. Indication of full or partial submittal.

p. Transmittal number, numbered consecutively.

q. Submittal and transmittal distribution record.

r. Other necessary identification.

s. Remarks.

5. Metadata: Include the following information as keywords in the electronic submittal file metadata:

a. Project name.

b. Number and title of appropriate Specification Section.

c. Manufacturer name.

d. Product name.

F. Options: Identify options requiring selection by Architect.

G. Resubmittals: Make resubmittals in same form as initial submittal.

1. Note date and content of previous submittal.

2. Note date and content of revision in label or title block and clearly indicate extent of revision.

3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

H. Reproduction and Distribution of Submittals: Unless otherwise required by the Contract Documents, provide and transmit shop drawings, product data and brochures, one (1) sample of standard manufactured items, and three (3) sets of samples for items with natural characteristics where samples are required to show range of such characteristics to the office of the Architect. After Architect's/Engineer's review, distribution of copies of reviewed submittals to Owner, Contractor's field office and main office, to subcontractors, and additional copies for other concerned parties. Show distribution on transmittal form.

I. Use for Construction: Use only final submittals with mark indicating "APPROVED" or "APPROVED AS NOTED" notation from Architect's action stamp. Perform no portion of the Work requiring submittal and review of shop drawings, product data, samples, or similar submittals until Architect has approved the respective submittal. Perform such Work in accordance with approved submittals.

PART 2 -PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Post electronic submittals as PDF electronic files directly to Project Web site specifically established for Project.

    a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2. Submit electronic submittals via email as PDF electronic files.

    a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

3. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

    a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.

    b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

4. Before the submittal process begins, immediately following the award of the Contract, the Contractor shall prepare the following:

4.1. A preliminary Submittal Item Register in the Contractor's project management software containing all items that need approval, including but not limited to:

4.1.1 Shop Drawings/Design Coordination Drawings
4.1.2. Samples
4.1.3. Manufacture's literature
4.1.4. Test certificates
4.1.5. Mock-ups
4.1.6. Warranty/Guarantee
4.1.7. Certificates of Compliance
4.1.8 . Close out material

4.2. Complete the Submittal Item Register in Excel format with the following completed: specification section, item description, and lead time.

B. Submittal Protocol:

1. Contractor:

1.1 The Contractor shall prepare all submittals in accordance with the requirements of the technical specifications. Each submittal package shall include a transmittal identifying the specification section and subsection.

1.2 The Contractor shall prepare a single electronic pdf file containing the submittal package transmittal together with all submittal items contained in the submittal package. Note that it may be necessary to manage the size of submittal packages to facilitate file transfer. If a complete submittal for a specification section cannot be prepared timely or would be very large, it will be necessary to consult with the Architect and obtain agreement for the packaging of submittal information.

1.3 Contractor shall not use **GREEN** or **RED** color fonts for notations on submittal documents. **GREEN** is reserved for the Contractor and **RED** for the Architect. **BLUE** is reserved for Subcontractor notations.

1.4 Contractor will manage notification and transmittal to its sub-contractors when the Architect has returned a submittal package and it is ready to be distributed.

2. Architect:

2.1 The Architect shall meet with the Contractor prior to the start of the submittal process to coordinate the submittal procedure and systems required to manage the submittal process.

2.2 The Architect shall designate a representative or representatives assigned to receive email notification of the availability of submittal packages for review. An alternate shall be identified to during periodic absence of the designated representative.

2.3 Transmittal of submittal packages to the responsible design consultant shall be the responsibility of the Architect.

2.4 Comments made on the submittal documents by the Architect and or Consultants shall be made in **RED** in order to make them distinct from comments by the Contractor in **GREEN,** and the Subcontractor's notations in **BLUE** is reserved for Subcontractor notations.

C. Filing and Distribution:

1. The Contractor will manage all submittal requirements in the Contractor's project management electronic web-based application.

2. Approved shop drawings, typically structural steel erection, curtain wall, concrete reinforcement, MEP coordination, etc. shall be printed and placed on stick files by the Contractor in the Project Site Office document control center.

C. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.

2. Mark each copy of each submittal to show which products and options are applicable.

3. .Include the following information, as applicable:

a. Manufacturer's catalog cuts.

b. Manufacturer's product specifications.

c. Standard color charts.

d. Statement of compliance with specified referenced standards.

e. Testing by recognized testing agency.

f. Application of testing agency labels and seals.

g. Notation of coordination requirements.

h. . Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

a. Wiring diagrams showing factory-installed wiring.

b. Printed performance curves.

c. Operational range diagrams.

d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.

6. Submit Product Data in the following format:

a. PDF electronic file.

D. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Identification of products.

b. Schedules.

c. Compliance with specified standards.

d. Notation of coordination requirements.

e. Notation of dimensions established by field measurement.

f. Relationship and attachment to adjoining construction clearly indicated.

g. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 24 x 36 inches

3. Submit Shop Drawings in the following format:

a. PDF electronic file.

E. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.

2. Identification: Attach label on unexposed side of Samples that includes the following:

    a. Generic description of Sample.

    b. Product name and name of manufacturer.

    c. Sample source.

    d. Number and title of applicable Specification Section.

    e. Specification paragraph number and generic name of each item.

3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.

4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.

    b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

F. Coordination Drawing Submittals: Comply with requirements specified in Division 01 Section "Project Management and Coordination."

G. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."

H. Application for Payment and Schedule of Values: refer to A201-2007 General Conditions of the Contract for Construction for requirements"

I. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

    1. Post copies of list in project meeting room, in temporary field office, on Project Web site, and by each temporary telephone. Keep list current at all times.

J. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Division 01 Section "Quality Requirements."

K. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section "Closeout Procedures."

L. Maintenance Data: Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."

M. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

N. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

O. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

P. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

Q. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

R. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

S. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

T. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

U. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

    1. Name of evaluation organization.

    2. Date of evaluation.

    3. Time period when report is in effect.

    4. Product and manufacturers' names.

    5. Description of product.

    6. Test procedures and results.

    7. Limitations of use.

V. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

W. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

X. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

Y. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents (Fire Suppression, Low Voltage, etc.), provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

C. BIM File Incorporation: Incorporate delegated-design drawing and data files into Building Information Model established for Project.

PART 3 -EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Project Closeout and Maintenance Material Submittals: See requirements in Division 01 Section "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:

1. APPROVED: Submittal has been reviewed for the limited purpose of checking for conformance with information given and design concept expressed in the Contract Documents and no exceptions are taken; Contractor may proceed with work represented in submittal. Architect's review is not conducted for the purpose of determining the accuracy or completeness of other details, such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment and systems, all of which remain the responsibility of the Contractor.

2. APPROVED AS NOTED: Submittal has been reviewed as stated in Subparagraph 1 above and certain exceptions are noted. Contractor may proceed with work represented in submittal, only when contractor agrees to incorporate exceptions noted by Architect.

3. REVISED AS NOTED AND RESUBMIT: Submittal has been reviewed as stated in Subparagraph 1. above and certain exceptions are noted. Contractor may not proceed with work represented in submittal. Revise submittal incorporating exceptions noted and resubmit submittal to Architect until "APROVED or APPROVED AS NOTED" status is given.

4. REJECTED; RESUBMIT AS SPECIFIED: Submittal has been reviewed as stated in Subparagraph 1. above; Contractor may not proceed with work represented and submittal is not acceptable for one or more of the following reasons:

    a. Submittal has been reviewed as stated in Subparagraph 1 above. Work represented in submittal has not been accepted; submit specified item. Submittal has not been made in accordance with procedures specified in Division 01 Sections "Submittal Procedures" and "Product Requirements."

    b. Not enough information is provided to make a determination.

    c. Submittal contains too many errors or omissions to make a determination.

    d. Information provided does not conform to information given in the Contract Documents.

    e. Submittal contains too much extraneous material to make a determination.

B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may be returned by the Architect without action.

3.3 SCHEDULE OF SUBMITTALS

A. Contractor to review each individual specification section for submittal requirements and include a list of required submittals as part of their Submittal Schedule requirements.

END OF SECTION 01 33 00

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SECTION 01 56 39
TREE PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the protection and trimming of trees that interfere with, or are affected by, execution of the Work, whether temporary or new construction.

B. Related Sections include the following:
   1. Division 2 Section "Site Preparation".
   2. Division 2 Section "Earthwork".

1.3 SUBMITTALS

A. Certification: In the event a tree designated as being within a **tree save area** or **outside the limits of work** is damaged during construction the Contractor shall employ a qualified arborist to assess the health and likely survival of the tree or trees.

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

1.4 QUALITY ASSURANCE

A. Tree Service Qualifications: An experienced tree service firm that has successfully completed tree protection and trimming work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site on a full-time basis during execution of the Work.

B. Arborist Qualifications: An arborist certified by the International Society of Arboriculture or licensed in the jurisdiction where Project is located.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Polyethylene Fence: 4'-0" high, nontoxic, U. V. stabilized, high density polyethylene, high visibility bright orange colored safety fence with 3 ½" x 1 ½" oval mesh openings and with a minimum breakload of 740 lbs. per foot. Posts shall be 2" x 2" x 6' - 0" long wooden posts spaced at no more than 8 feet on center..

PART 3 - EXECUTION

3.1 PREPARATION

A. Temporary Fencing: Install temporary fencing located as indicated or outside the drip line of trees to protect remaining vegetation from construction damage.

1. Install chain link fence according to ASTM F 567 and manufacturer's written instructions, or polyethylene fence per drawings.

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

C. Do not store construction materials, debris, or excavated material within the drip line of remaining trees. Do not permit vehicles or foot traffic within the drip line; prevent soil compaction over root systems.

D. Do not allow fires under or adjacent to remaining trees or other plants.

3.2 EXCAVATION

A. Install shoring or other protective support systems to minimize sloping or benching of excavations within drip line on trees.

B. Do not excavate within drip line of trees, unless otherwise indicated.

C. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks and comb soil to expose roots.

D. Where utility trenches are required within drip line of trees, tunnel under or around roots by drilling, auger boring, pipe jacking, or digging by hand.

1. Root Pruning: Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots with sharp pruning instruments; do not break or chop.

3.3 REGRADING

A. Grade Lowering: Where new finish grade is indicated below existing grade around trees, slope grade beyond drip line of trees. Maintain existing grades within drip line of trees.

1. Root Pruning: Prune tree roots exposed during grade lowering. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots with sharp pruning instruments; do not break or chop.

B. Minor Fill: Where existing grade is 6 inches or less below elevation of finish grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations.

3.4 TREE REPAIR AND REPLACEMENT

A. Promptly repair trees damaged by construction operations within 24 hours. Treat damaged trunks, limbs, and roots according to written instructions of the qualified arborist.

B. Remove and replace dead and damaged trees that the qualified arborist determines to be incapable of restoring to a normal growth pattern.

1. Provide new trees of 6-inch caliper size and of a species selected by Landscape Architect when trees more than 6 inches in caliper size, measured 12 inches above grade, are required to be replaced.

3.5 DISPOSAL OF WASTE MATERIALS

A. Burning is not permitted on-site.

B. Disposal: Remove excess excavated material, displaced trees, and excess chips from Owner's property.

END OF SECTION 01 56 39

SECTION 04 22 00

CONCRETE UNIT MASONRY
(Non-Load-Bearing)

PART 1 - GENERAL

1.01 SUBMITTALS:

A. General: Submit in accordance with Section 01 33 23 - Submittals.

B. Product Data: Submit manufacturer's product data for each type of masonry unit and other manufacturer's products, including certifications that each type complies with specified requirements.

1.02 DELIVERY, STORAGE AND HANDLING:

A. Masonry Units:

1. Store materials above ground and under cover in a dry place and to prevent damage or intrusion of foreign matter.
2. Keep units dry. Allow air circulation around stacked units.
3. Remove concrete units which have become wet from site.
4. Protect units to be exposed in finish work from staining and physical damage of exposed faces.

1.03 PROJECT CONDITIONS:

A. Environmental Requirements:

1. Lay no masonry when temperature of surrounding air has dropped below 45° F., except with written permission from Architect.
2. When masonry work is authorized at temperatures below 40° F., but above freezing, provide mortar at temperature between 70° and 100° F. Maintain air temperature above 40° F.

on both sides of masonry for 72 hours after laying.

3. Protect masonry construction from direct exposure to wind and sun when erected in ambient air temperatures of 95° F. in the shade with relative humidity less than 50%.

B. Protection of Work:

1. Keep walls dry during erection by covering at end of each work period with a waterproof membrane. Similarly protect partially completed walls not being worked on. Covering shall overhang at least 2'-0" on each side of wall.
2. Protect finished exposed work from stains.
3. Mortar droppings that stick to unit faces shall be allowed to dry, and then removed with trowel and surface lightly scrubbed with bristled brush.
4. Particular care shall be given to keeping masonry units clean in areas not to be painted.

C. Coordinate installation of masonry anchors with structural system to which masonry is attached.

PART 2 - PRODUCTS

2.01 CONCRETE MASONRY UNITS:

A. Hollow Non-load-bearing Units:

1. Meeting ASTM C90-85, Type I.
2. Nominal Face Dimensions: 8" by 1'-4".
3. Weight: Lightweight; maximum 105 lbs./cu. ft.

B. Fire-Rated Units: Manufacture in accordance with Underwriters' Laboratories, Inc., (UL) Standard UL-618, "Standard for Concrete Masonry". Manufacturer shall be one capable of furnishing specified certification that units are manufactured per UL requirements for ratings indicated.

2.02 ACCESSORY PRODUCTS:

A. Masonry Cleaning Compound:

1. Acceptable Products:
   a. Hallmark Chemical Corp. - DC-6.
   b. National Chemsearch Corp. - Deox.
   c. Process Solvent Co. - Sure Kleen 600.

2. Type: Inorganic acid.

PART 3 - EXECUTION

3.01 WORKMANSHIP:

A. Lay only dry masonry units.

B. Lay masonry plumb, level and true to line with accurate coursing as indicated on the drawings.

C. Lay units in running bond with head joints centered in alternate courses.

D. Cutting of masonry shall be done with abrasive power saw only. Lay out work to minimize cutting. Breaking or chisel sizing masonry is not acceptable.

3.02 BUILDING IN OF OTHER WORK:

A. Build in work of other trades indicated to be built in with masonry, including anchors, wall plugs, expansion joints and accessories, as erection progresses. Space and align built-in parts and exercise care not to displace other materials from position. Fill in spaces around built-in items with cement grout.

B. Fill hollow metal frames in masonry walls with cement grout as wall is laid. Rake back 1/2" joint between hollow metal frame and adjacent masonry to receive sealant.

C. Lay masonry to receive flashing with smooth joints

free from projections which might puncture flashing materials. Provide mortar on both sides of flashing in masonry joints.

D. Unless indicated otherwise, provide minimum 8" of solid end bearing full height of wall from floor to bearing points for lintels, beams and other load-supporting members by either solid block or filling cores with cement grout.

E. Provide lintels and bond beams where indicated using lintel blocks laid with joints matching adjacent work. Reinforcement shall be as indicated and block filled with concrete.

F. Where indicated, reinforce vertical concrete block cells, grouting solid. Reinforcement shall be as specified in Division 3.

3.03 MORTAR JOINTS:

A. Bed joints, unreinforced partitions:

1. Lay first course in full bed of mortar.
2. On all other bed joints, apply mortar on face shell only of masonry unit already laid.
3. On masonry unit to be laid, apply a beveled buttering to face shell to insure full bed joints.

B. Bed Joints, Reinforced and Fire-rated Partitions: Lay all courses in full bed of mortar.

C. Head Joints: Apply mortar to vertical face shells on both the masonry unit already laid and the unit to be laid to insure full head joint.

D. Place masonry unit by rolling it to a vertical position and shoving it against adjacent unit, achieving position and alignment with minimum of adjustment.

E. Adjustment shall be made only while mortar is still

soft and plastic by tapping to plumb and bringing to alignment.

F. Check unit laid with mason's level for level and for plumbness with wall below.

G. Where adjustment must be made after mortar has started to harden, remove and replace mortar with fresh mortar.

H. Keep bed and head joints uniform in width, except for minor variations required to maintain bond and locate returns. Standard thickness for both horizontal and vertical mortar joints shall be 3/8".

I. Mortar shall not protrude into spaces designed to be filled with grout.

3.04 CONTROL JOINTS:

A. Make joint 3/8" wide, unless otherwise indicated.

B. Stop horizontal joint reinforcement 1" from control joint.

C. Build PVC control joints into masonry using sash block to secure shear flange of joint filler.

D. Keep joint clean of debris and mortar.

E. Provide joints:

1. In running walls spaced not more than 37'-4" o.c.
2. At intersecting walls, either of which is more than 10'-0" long.
3. At intersections with concrete walls.
4. At joint between masonry and structural slabs, columns, beams or decks.

F. Leave joint open and clean for caulking in accordance with Sealants section.

3.05 JOINT TREATMENT:

A. Flush Joints: Strike joints flush in masonry to receive finish work of trades other than painting.

B. Tooled Joints: Strike exposed joints in standard masonry units flush and, when partially set, tool using concave tool.

3.06 CLEANING AND POINTING:

A. Keep masonry work free of mortar droppings as work progresses and, at completion of work, rub masonry to remove excess mortar.

B. Point Mortar Joints: Remove and replace units with excessive spalls or chips.

3.07 FIELD QUALITY ASSURANCE:

A. Allowable Tolerances:

1. Maximum variation from plumb: 1/4" in 10'-0", not exceeding 3/8" in 20'-0".
2. Maximum variation from level: 1/4" in 20'-0", not exceeding 1/2" in 40'-0" or more.

3. Maximum variation in linear building line from location indicated:
1/2" in 20'-0".

END OF SECTION

SECTION 04 73 00

SIMULATED STONE

PART I - GENERAL

1.01 SUBMITTALS

A. General: Submit in accordance with Section 01 33 23 - Submittals.

B. Product Data: Submit product data indicating manufacture, size, pattern, colors and manufacturer's recommended storage and installations.

1.02 PROJECT MOCK-UP:

A. Provide project mock-up indicating patterns and colors.

B. Mock-up shall be constructed in conjunction with Precast Concrete Shapes as specified.

1.03 DELIVERY, STORAGE AND HANDLING:

A. Deliver materials, handle and store in accordance with the manufacturer's printed recommendations.

1.04 PROJECT CONDITIONS

A. Protect materials from rain, moisture, and freezing temperatures prior to, during and for 48 hours after completion of work.

B. Allow no construction activity on opposite side of wall to which work is being applied during, and for 48 hours after completion of work.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

A. Boulder Creek Stone Products
B. Coronado

C. Cultured Stone
D. Eldorado Stone

2.02 TYPE:

A. Simulated Stone

1. Pattern & Color:

2.03 MANUFACTURED UNITS:

A. Characteristics:
1. Compressive Strength: Tested in accordance with UBC Standard No. 26-10, Parts I and IV.
2. Shear (adhesion) Strength: Tested in accordance with ASTM C 482.
3. Thermal Resistance: R factor 1.19 in accordance with ASTM C 177-71. R factor is based on a 1.779" thick sample.
4. Fire Hazard Test: Flame spread of 0, smoke development of 0 in accordance with UL 723.

2.04 ACCESSORIES:

A. Mortar: Factor mixed Portland Cement, ASTM C 150, Type 1 or masonry cement (Type N), ASTM C91.

B. Masonry Sealer: Breather type, non-film forming sealer.

C. Weather-Resistant Barrier: Kraft waterproof building paper, UBC Standard No. 17-1 or equal.

D. Metal Lath: Paperbacked 3/8" rib galvanized expanded metal lath.

PART 3 - EXECUTION

3.01 PREPARATION:

A. Install one layer of weather-resistant barrier with 4" lap joints. Apply metal lath, attached with galvanized screws 6" o.c. vertical and 16" o.c. horizontal.

3.02 MORTAR MIXING:

A. Thoroughly mix mortar ingredients in quantities needed

for immediate use in accordance with ASTM C 482, Type N.

B. Do not use anti-freeze compounds.

3.03 APPLICATION:

A. Apply 1/2" to 3/4" of mortar to lath, covering a maximum of 10 sq.ft. at one time. Press units firmly into position in soft mortar bed, joggle each piece slightly to bond firmly, causing mortar to extrude slightly around edge of units.

B. Place units with uniform mortar joints. Joints should not be over 1/2" width. Install outside corner return units with short and long lengths alternated.

C. Plan work to minimize job site cutting. Cut stone only with saws approved by the manufacturer to provide uniform edges; use care to prevent breaking unit corners or edges.

D. Minimum width of units at inside corners and at perimeter of openings shall be 4" to 6".

E. Remove excess mortar; do not allow mortar to set up on face of units. Point, rake and tool joints before mortar has set. Clean and finish joints in accordance with the manufacturer's written instructions.

F. Apply breather type non-film forming masonry sealer to clean completed surfaces in accordance with manufacturer's written instructions.

END OF SECTION

SECTION 31 10 00 – SITE PREPARATION

PART 1 -GENERAL

1.1 - SCOPE

A. This Section described materials and equipment to be utilized and requirements for their use in preparing the work site for construction. The Contractor shall furnish all materials, equipment and labor necessary to complete the work.

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

1.2 - CLEARING AND GRUBBING

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

B. Clearing

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

2. Where the tree limb structure interferes with utility wires, or where the trees to be felled are in close proximity to utility wires, the tree shall be taken down in sections to eliminate the possibility of damage to the appropriate utility.

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

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

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

1.3 - PRELIMINARY GRADING

A. Before beginning construction, the Contractor shall grade the entire work site to conform, in general, to the finish elevations shown on the Drawings. The Drawings show both existing contour elevations and finished contour elevations.

1.4 - TESTING AND INSPECTION SERVICES

A. Not Applicable

PART 2 - PRODUCTS (NOT USED) PART 3

-EXECUTION

3.1 - PREPARATION

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

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SITE PREPARATION

3.2 - CLEARING

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

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

C. Clear undergrowth and deadwood, without disturbing subsoil.

3.3 - DISPOSAL OF REFUSE

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

END OF SECTION 31 10 00

SECTION 31 25 00
EROSION AND SEDIMENTATION CONTROL

PART 1 GENERAL

1.01 SCOPE

A. The work specified in this Section consists of providing, maintaining and removing temporary erosion and sedimentation controls and complying with the requirements contained in the NPDES permit for this specific project.

B. Temporary erosion controls, include, but are not limited to, grassing, mulching, watering and reseeding on-site surfaces and spoil and borrow area surfaces, and providing interceptor ditches at ends of berms and at those locations which will ensure that erosion during construction will be either eliminated or maintained within acceptable limits as established by the Georgia Erosion and Sedimentation Act of 1975, as amended, Section 402 of the Federal Clean Water Act, and applicable codes, ordinances, rules, regulations and laws of local and municipal authorities having jurisdiction.

C. Temporary sedimentation controls include, but are not limited to, silt dams, traps, barriers, filter stone and appurtenances at the foot of sloped surfaces which will ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits as established by the Federal Clean Water Act of 1987, as amended.

D. Land disturbance activity shall not commence until the Land Disturbance Activity Permit has been issued, a notice of intent and associated fees submitted to EPD (14 days) in advance of commencing work, with copies provided to the city, which authorizes land disturbance activities.

E. Basic Principles

1. Conduct the earthwork and excavation activities in such a manner to fit the topography, soil type and condition.

2. Minimize the disturbed area and the duration of exposure to erosion elements.

3. Stabilize disturbed areas immediately.

4. Safely convey run-off from the site to an outlet such that erosion will not be increased off site.

5. Retain sediment on site that was generated on site.

6. Minimize encroachment upon watercourses.

F. Temporary Erosion and Sedimentation Control: In general, temporary erosion and sedimentation control procedures shall be directed toward:

1. Preventing soil erosion at the source.

2. Preventing silt and sediment from entering any waterway if soil erosion cannot be prevented.

3. Preventing silt and sediment from migrating downstream in the event it cannot be prevented from entering the waterway.

G. Permanent Erosion Control: Permanent erosion control measures shall be implemented to prevent sedimentation of the waterways and to prevent erosion of the Project site.

1.02 QUALITY ASSURANCE

A. General: Perform all work under this Section in accordance with all pertinent rules and regulations including, but not necessarily limited to, those stated herein and these Specifications.

B. Conflicts: Where provisions of pertinent rules and regulations conflict with these Specifications, the more stringent provisions shall govern.

PART 2 PRODUCTS

2.01 TEMPORARY EROSION AND SEDIMENTATION CONTROL MATERIALS

A. Silt Fence: Silt fence shall meet the requirements of Section 171 - Temporary Silt Fence of the Department of Transportation, State of Georgia, Standard Specification, latest edition. Silt fence fabric must be on the Georgia DOT Qualified Product List. Type “C”, wire back fencing.

B. Hay bales shall be clean, seed free cereal hay type.

C. Netting shall be 1/2-inch, galvanized steel, chicken wire mesh.

D. Filter stone shall be crushed stone conforming to Georgia Department of Transportation Table 800.01H, Size Number 3.

E. Concrete block shall be hollow, non-load-bearing type.

F. Plywood shall be 3/4-inch thick exterior type.

2.02 RIP RAP

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

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

C. Type 3 Rip Rap: The largest pieces shall have a maximum approximate volume of one cubic foot. At least 35 percent of the mass shall be comprised of pieces which weigh 15 pounds or more. The remainder shall be well graded down to the finest sizes. Rock fines shall comprise a maximum of 10 percent of the total mass. Rock fines are defined as material passing a No. 4 sieve. Rip rap size shall conform to Georgia Department of Transportation Section 805.01 Stone Dumped Rip Rap, Type 3.

D. 200 Pound Rip Rap: Minimum weight of individual stones shall be 200 pounds.

2.03 FILTER FABRIC

A. The filter fabric for use under rip rap shall be a monofilament, polypropylene woven fabric or a non-woven fabric meeting the specifications as established by Task Force 25 for the Federal Highway Administration. The filter fabric shall have an equivalent opening size (EOS) of 70.

B. Filter fabric under rip rap shall be equal to Mirafi, Amoco or Exxon.

PART 3 EXECUTION

3.01 GENERAL

Provide all materials and promptly take all actions necessary to achieve effective erosion and sedimentation control in accordance with the Georgia Erosion and Sedimentation Act of 1975, as amended, local enforcing agency guidelines, NPDES guidelines, and these Specifications.

3.02 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Temporary erosion and sedimentation control procedures should be initially directed toward preventing silt and sediment from entering the creeks. The preferred method is to provide an undisturbed natural buffer, extending a minimal 50 feet from the top of the bank, to filter the run-off. Should this buffer prove infeasible due to construction activities being too close to the creek, or if the amount of sediment overwhelms the buffer, the Contractor shall place silt fences to filter the run-off and, if necessary, place permanent rip rap to stabilize the creek banks. When excavation activities disturb the previously stated preventative measures, or if they are not maintained, or whenever the construction activities cross the creeks, the check dams shall be installed downstream and within 200 feet of the affected area.

B. Silt dams, silt fences, traps, barriers, check dams, appurtenances and other temporary measures and devices shall be installed as indicated on the approved plans and working drawings, shall be maintained until no longer needed, and shall then be removed. Deteriorated hay bales and dislodged filter stone shall be replaced with new materials. Detention ponds, if constructed, shall be maintained in a condition ensuring that unfiltered water will not leave the pond.

C. Where permanent grassing is not appropriate, and where the Contractor's temporary erosion and sedimentation control practices are inadequate, the Engineer may direct the Contractor to provide temporary vegetative cover with fast growing seedings. Such temporary vegetative cover shall be provided by the Contractor in compliance with the Manual for Erosion and Sedimentation Control in Georgia, specifically in the selection of species, planting dates and application rates for seedings, fertilizer and mulching, with the exception that kudzu shall not be permitted.

D. All erosion and sedimentation control devices, including check dams, shall be inspected by the Contractor at least weekly and after each rainfall occurrence and cleaned out and repaired by the Contractor as necessary.

E. Temporary erosion and sedimentation control devices shall be installed and maintained from the initial land disturbance activity until the satisfactory completion and establishment of permanent erosion control measures. At that time, temporary devices shall be removed.

3.03 PERMANENT EROSION CONTROL

A. Permanent erosion control shall include:

1. Restoring the work site to its original contours, unless shown otherwise on the Drawings or directed by the Engineer.

2. Permanent vegetative cover shall be performed in accordance with Article 3.04 of this Section.

3. Permanent stabilization of steep slopes and creeks shall be performed in accordance with Article 3.05 of this Section.

B. Permanent erosion control measures shall be implemented as soon as practical after the land disturbance for each segment of the Project. In no event shall implementation be postponed when no further construction activities will impact that portion or segment of the Project. Partial payment requests may be withheld for those portions of the Project not complying with this requirement.

3.04 GRASSING

A. General

1. All references to grassing, unless noted otherwise, shall relate to establishing permanent vegetative cover as specified herein for seeding, fertilizing, mulching, etc.

2. When final grade has been established, all bare soil, unless otherwise required by the Contract Documents, shall be seeded, fertilized and mulched in an effort to restore to a protected condition. Critical areas shall be sodded as approved or directed by the Landscape Architect.

3. Specified permanent grassing shall be performed at the first appropriate season following establishment of final grading in each section of the site.

4. Permanent grassing shall be per the drawings.

B. Outside of landscaped areas, grass the entire area disturbed by the work on completion of work in any area. In all areas, promptly establish successful stands of grass.

C. Grassing activities shall comply with the Manual for Erosion and Sediment Control in Georgia, specifically for the selection of species, with the exception that kudzu shall not be permitted, planting dates and application rates for seeding, fertilizer and mulching. Where permanent vegetative cover (grassing) cannot be immediately established (due to season or other circumstances) the Contractor shall provide temporary vegetative cover. The Contractor must return to the site (at the appropriate season) to install permanent vegetation in areas that have received temporary vegetative cover.

3.05 RIP RAP

A. Unless shown otherwise on the Drawings, rip rap shall be placed where ordered by the Landscape Architect, at all points where banks of streams or drainage ditches are disturbed by excavation, or at all points where natural vegetation is removed from banks of the streams or drainage ditches. Carefully compact backfill and place rip rap to prevent subsequent settlement and erosion. This requirement applies equally to construction along side a stream or drainage ditch as well as crossing a stream or drainage ditch.

C. Preparation of Foundations: The ground surface upon which the rip rap is to be placed shall be brought in reasonably close conformity to the correct lines and grades before placement is commenced. Where filling of depressions is required, the new material shall be compacted with hand or mechanical tampers. Unless at creek banks or otherwise shown or specified, rip rap shall begin in a toe ditch constructed in original ground around the toe of the fill or the cut slope. The toe ditch shall be two feet deep in original ground, and the side next to the fill or cut shall have that same slope. After the rip rap is placed, the toe ditch shall be backfilled and the excess dirt spread neatly within the construction easement.

D. Placement of Filter Fabric: The surface to receive fabric shall be prepared to a relatively smooth condition free from obstructions, depressions and debris. The fabric shall be placed with the long dimension running up the slope and shall be placed to provide a minimum number of overlaps. The strips shall be placed to provide a minimum width of one foot of overlap for each joint. The filter fabric shall be anchored in place with securing pins of the type recommended by the fabric manufacturer. Pins shall be placed on or within 3-inches of the centerline of the overlap. The fabric shall be placed so that the upstream strip overlaps the downstream strip. The fabric shall be placed loosely so as to give and therefore avoid stretching and tearing during placement of the stones. The stones shall be dropped no more than three feet during construction. The fabric shall be protected at all times during construction from clogging due to clay, silts, chemicals or other contaminants. Any contaminated fabric or any fabric damaged during its installation or during placement of rip rap shall be removed and replaced with uncontaminated and undamaged fabric.

E. Placement of Rip Rap

1. Rip rap shall be placed on a 6-inch layer of soil, crushed stone or sand overlaying the filter fabric. This 6-inch layer shall be placed to maximize the contact between the soil beneath the filter fabric and the filter fabric. Rip rap shall be placed with its top elevation conforming with the finished grade or the natural slope of the stream bank and stream bottom.

2. Stone rip rap shall be dumped into place to form a uniform surface and to the thickness specified on the Drawings. The thickness tolerance for the course shall be -6-inches and +12-inches. If the Drawings or the Bid do not specify a thickness, the course shall be placed to a thickness of not less than 18-inches.

END OF SECTION 31 25 00

SECTION 32 10 00 CONCRETE SIDEWALK AND DRIVEWAY

PART 1 - GENERAL

1.1 SCOPE

A. Concrete sidewalk shall be constructed of Portland cement concrete, at the locations and to the dimensions, lines, grades and cross section indicated on the Drawings or as directed by the Landscape Architect and in conformity with the provisions and requirements set out in these Specifications.

B. Concrete driveways shall be constructed of Portland cement concrete, at the locations and to the dimensions, lines, grades and cross section indicated on the Drawings or as directed by the Landscape Architect, and in conformity with the provisions and requirements set out in these Specifications.

C. Concrete sidewalk and driveway shall include all the necessary excavation, unless otherwise indicated, subgrade and subbase preparation, backfilling, final clearing up and completing all incidentals thereto, as indicated on the Drawings or as directed by the Landscape Architect.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials used in the construction of sidewalks and driveways, in addition to the general requirements of these Specifications, shall conform, unless otherwise stipulated, to the following:

1 Concrete shall be manufactured of the materials meeting the requirements of and in accordance with the provisions and requirements for Class “A” concrete as set out in Section 03 30 00 of these Specifications.

2 Crushed stone for base shall meet the gradation requirements for Size 7 or 8 as specified in ASTM D 448 or AASHTO M43.

2.2 FORM MATERIAL

A. Forms may be constructed of wood or metal.

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

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

PART 3 - EXECUTION

3.1 LABOR

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

3.2 EQUIPMENT

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

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

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

3.3 CLEARING AND GRUBBING

A. Clearing and grubbing shall be performed in accordance with the requirements of Section 31 10 00 of these Specifications.

3.4 REMOVAL OF STRUCTURES AND OBSTRUCTIONS

A. Unless otherwise indicated or stipulated, the removal of structures, obstructions, etc., will be performed in accordance with the requirements of Section 02 41 16.13 of these Specifications.

3.5 ROAD AND DRAINAGE EXCAVATION

A. Road and drainage excavation, as indicated on the Drawings or as directed by the Landscape Architect, shall be performed in accordance with the requirements of Section 02 41 16.13 of these Specifications.

3.6 EMBANKMENT CONSTRUCTION

A. Embankment construction, as indicated on the Drawings or as directed by the Landscape Architect, shall be performed in accordance with the provisions of Section 31 20 00 of these Specifications.

3.7 SUBGRADE PREPARATION

A. The subgrade for sidewalks and driveways shall be formed by excavation to a depth equal to the thickness of the concrete +2-inches.

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

C. Yielding, or unsuitable material shall be removed and backfilled with satisfactory material. Place 6-inches of graded aggregate base under commercial/industrial driveways, compacted thoroughly and finished to a smooth, unyielding surface and proper line, grade and cross section of the proposed construction.

3.8 FORMS

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

B. All forms shall be so constructed as to form the cross section, contour, etc., of the proposed construction.

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

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

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

3.9 EXPANSION JOINTS

A. Unless otherwise indicated on the Drawings or as directed by the Landscape Architect, premoulded expansion joint filler, 1/2-inch in thickness, shall be placed at the locations and in line with expansion joints in the adjoining pavement, gutter or curb. When expansion joints are not required in the adjoining pavement or gutter, and not otherwise indicated on the Drawings, a 1/2-inch premoulded expansion joint filler shall be placed at intervals of not over 50 feet apart. All premoulded expansion joint filler must be cut to full width or length of the proposed construction and shall extend to within 1/2-inch of the top or finished surface. All longitudinal expansion joints shall be placed [as indicated on the Drawings or] as directed by the Landscape Architect.

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

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

3.10 MANUFACTURING AND PLACING CONCRETE

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

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

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

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

E. The concrete shall be manufactured and placed in accordance with the requirements of Section 03 30 00 of these Specifications.

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

3.11 FINISHING

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

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

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

D. The surface of sidewalks shall be divided into blocks by use of a grooving tool. Grooves shall be placed so as to cause contraction joints to be placed at a groove line, where practical. The grooves shall be spaced approximately five feet apart and the blocks shall be rectangular unless otherwise ordered by the Landscape Architect. The grooves shall be cut to a depth of not less than 1-inch. The edges of the groves shall be edged with an edging tool having a radius of 1/4-inch, and any marks caused by edging or otherwise shall be removed with a wetted brush or wooden float so as to give the surface an uniform texture and finish.

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

3.12 PROTECTION AND CURING

A. Immediately after finishing the concrete, it shall be covered and cured in accordance with the requirements of Section 03 30 00 of these Specifications. If the temperature falls to below freezing, satisfactory heating devices shall be placed under suitable covers to keep the temperature around the concrete at above 45 degrees F.

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

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

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

3.13 BACKFILLING

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

3.14 CLEANING

A. All excess or unsuitable material shall be removed and disposed of in accordance with requirements of Section 01 74 19 of these Specifications.

B. Final clean-up shall be performed in accordance with the requirements of Section 01 74 23 of these Specifications.

C. All material becoming the property of the Owner shall be stored in a manner and at locations near or on the Project as directed by the Landscape Architect.

END OF SECTION

SECTION 32 92 00
TURF & GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1 Fine grading and preparing lawn areas.
   2 Furnishing and applying soil amendments.
   3 Furnishing and applying fertilizers.
   4 Sodding new lawns.
   5 Replanting unsatisfactory or damaged lawns.

B. Related Sections: The following Sections contain requirements that relate to this Section: N/A

1.3 DEFINITIONS

A. Laser Grading: Laser Grading shall include the use of a land leveler that is equipped with a laser controlled hydraulic system that automatically raises and lowers the implement.

B. Rootzone: The combination of topsoil, subsurface soil, sand, lime and fertilizer lightly blended into a loose homogenous mixture, the sand being approximately 85% of the mixture.

C. Warrantied Sod: The specific area(s) of sod harvested and installed during the dormant season that later does not demonstrate reasonable regrowth of stolens to sufficiently re-establish an acceptable playing surface, therefore, is subsequently replaced by the Contractor at no cost to the Owner.

1.4 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Planting schedule indicating anticipated dates and locations for each type of planting.

C. Lime Certification from grassing contractor stating type of lime (pelletized or powdered), lime supplier and rate of application.

D. Fertilizer Certification from grassing contractor stating composition of fertilizer and rate of application.

E. Soil Analysis Report giving soil analysis and amendment recommendations. Alter fertilizer and lime requirements as dictated by the soil analysis data.

F. Sod Certification from grassing contractor for the Zeon Zoysia (Zoysia x ‘Zeon’)

G. Maintenance instructions recommending procedures to be established by Owner for maintenance of landscaping during an entire year. Submit before expiration of required maintenance periods.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed landscaping work similar in material, design, and extent to that indicated for this Project and with a record of successful grass establishment.

B. Topsoil Analysis: Furnish a soil analysis made by a qualified independent soil-testing agency stating percentages of organic matter, inorganic matter (silt, clay, and sand), deleterious material, pH, and mineral and plant-nutrient content of topsoil.
   1. Report suitability of topsoil for lawn growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and any limestone, aluminum sulfate, or other soil amendments to be added to produce a satisfactory topsoil.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Sod: Harvest, deliver, store, and handle sod according to the requirements of the American Sod Producers Association's (ASPA) "Specifications for Turfgrass Sod Materials and Transplanting/Installing."

B. Fertilizer & Lime: Deliver in original sealed, labeled, and undamaged containers.

1.7 COORDINATION AND SCHEDULING

A. Planting Season: Sow lawn seed and install sod during normal planting seasons for type of lawn work required. Correlate planting with specified maintenance periods to provide required maintenance from date of Substantial Completion.

B. Weather Limitations: Proceed with planting only when existing and forecast weather conditions are suitable for work.

1.8 MAINTENANCE

A. Begin maintenance of lawns immediately after each area is planted and continue until acceptable lawn is established, but for not less than the following periods:

1. Sodded Lawns: 60 days after date of Substantial Completion.

B. Maintain and establish lawns by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn.

1 Replant bare areas with same materials specified for lawns.

2 Add new mulch in areas where mulch has been disturbed by wind or maintenance operations sufficiently to nullify its purpose. Anchor as required to prevent displacement.

C. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawns uniformly moist to a depth of 4 inches.

1 Lay out temporary lawn-watering system and arrange watering schedule to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly seeded, plugged, or sprigged areas.

2 Water lawn at the minimum rate of 1 inch per week.

D. Mow lawns as soon as there is enough top growth to cut with mower set at specified height for principal species planted. Repeat mowing as required to maintain specified height without cutting more than 40 percent of the grass height. Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain following grass height:

1. Mow grass from 2 to 3 inches high.

E. Post-fertilization: Apply fertilizer to lawn after first mowing and when grass is dry.

1. Use fertilizer with a 10-10-10 content of nitrogen, phosphorus and potassium.

PART 2 - PRODUCTS

2.1 SOD

A. Sod: (For lawns) Certified turfgrass sod complying with ASPA specifications for machine-cut thickness, size, strength, moisture content, and mowed height, and free of weeds and undesirable native grasses. Provide viable sod of uniform density, color, and texture of the following turfgrass species, strongly rooted, and capable of vigorous growth and development when planted.

1. Species: Zeon Zoysia (Zoysia x ‘Zeon’)

2.2 TOPSOIL

A. Topsoil: Free of stones 1 inch or larger in any dimension, and other extraneous materials harmful to plant growth.

1. Topsoil Source: Reuse surface soil stockpiled on the site. Verify suitability of surface soil to produce topsoil meeting requirements and amend when necessary. Clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.

2.3 SOIL AMENDMENTS

A. Lime: ASTM C 602, Class T, agricultural limestone containing a minimum 80 percent calcium carbonate

equivalent, with a minimum 99 percent passing a No. 8 sieve and a minimum 75 percent passing a No. 60 sieve. An equivalent liquid lime is acceptable.

B. Herbicides: EPA registered and approved, of type recommended by manufacturer.

C. Water: Potable.

2.4 FERTILIZER

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast-and slow-release nitrogen, 50 percent derived from natural organic sources of urea-form, phosphorous, and potassium in the following composition:

1 First and Second Year Fertilizer Analysis: 6-12-12; 6% nitrogen, 12% phosphorus and 12% potassium.

2 Maintenance Composition: 1 lb per 1000 sq. ft. of actual nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive lawns and grass for compliance with requirements and for conditions affecting performance of work of this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 PLANTING SOIL PREPARATION

A. Limit subgrade preparation to areas that will be planted in the immediate future.

B. Loosen subgrade to a minimum depth of 4 inches. Remove stones and clods larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter.

C. Mix soil amendments and fertilizers with topsoil at rates indicated. Delay mixing fertilizer if planting does not follow placing of planting soil within three days. Either mix soil before spreading or apply soil amendments on surface of spread topsoil and mix thoroughly into top 4 inches of topsoil before planting.

1 Mix lime with dry soil prior to mixing fertilizer.

2 Uniformly mix 2000 lbs. of lime and 1500 lbs. of fertilizer per acre.

D. Spread planting soil mixture to depth required to meet thickness, grades, and elevations shown, after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen or overly wet.

1 Place approximately 1/2 the thickness of planting soil mixture required. Work into top of loosened subgrade to create a transition layer and then place remainder of planting soil mixture.

2 In sodded areas, allow for sod thickness.

E. Preparation of Unchanged Grades: Where lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations, prepare soil as follows:

1 Remove and dispose of existing grass, vegetation, and turf. Do not turn over into soil being prepared for lawns.

2 Till surface soil to a depth of at least 6 inches. Apply required soil amendments and initial fertilizers and mix thoroughly into top 4 inches of soil. Trim high areas and fill in depressions. Till soil to a homogenous mixture of fine texture.

3 Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

4 Remove waste material, including grass, vegetation, and turf, and legally dispose of it off the Owner's property.

F. Grade lawn and grass areas to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future. Remove trash, debris, stones larger than 1 inch in any dimension, and other objects that may interfere with planting or maintenance operations.

G. Moisten prepared lawn areas before planting when soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
H. Restore prepared areas if eroded or otherwise disturbed after fine grading and before planting.

3.4 SODDING NEW LAWNS

A. Lay sod within 24 hours of stripping. Do not lay sod if ground is frozen or overly wet.
B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
C. Lay sod across angle of slopes exceeding 3:1.
    1. Anchor sod on slopes exceeding 6:1 with wood pegs spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.
D. Saturate sod with fine water spray within 2 hours of planting. During first week, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below the sod.

3.7 SATISFACTORY LAWN

A. Sodded lawns will be satisfactory provided requirements, including maintenance, have been met and healthy, well-rooted, even-colored, viable lawn is established, free of weeds, open joints, bare areas, and surface irregularities.
B. Replant lawns that do not meet requirements and continue maintenance until lawns are satisfactory.

3.8 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto surface of roads, walks, or other paved areas.
B. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period until lawn is established.

END OF SECTION 32 92 00

SECTION 32 93 00
PLANTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1 Trees

2 Shrubs

3 Groundcovers

4 Plants.

5 Planting soils.

6 Tree stabilization.

7 Landscape edgings.

B. Related Sections:

1 Section "Tree Protection" for protecting, trimming, pruning, repairing, and replacing existing trees to remain that interfere with, or are affected by, execution of the Work.

2 Section "Site Preparation" for protection of existing trees and plantings, topsoil stripping and stockpiling, and site clearing.

3 Section "Earth Work" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.

4 Section "Turf and Grasses" for turf (lawn) and meadow planting, hydroseeding, and erosion-control materials.

1.3 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.

C. Balled and Potted Stock: Plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required.

D. Bare-Root Stock: Bare root stock will not be accepted for this project.

E. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

F. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

G. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of plant.

H. Finish Grade: Elevation of finished surface of planting soil.

I. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

J. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

K. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

L. Planting Area: Areas to be planted.

M. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

N. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

O. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

P. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

Q. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

R. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

S. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated, including soils.

1 Plant Materials: Include quantities, sizes, quality, and sources for plant materials.

2 Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to the Project.

3 Plant Photographs: Include color photographs in digital format of each required species and size of plant material as it will be furnished to the Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 20 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.

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

1 Organic and Compost Mulch: 1-pint volume of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.

2 Mineral Mulch: 10 lb of each mineral mulch required, in sealed plastic bags labeled with source of mulch. Sample shall be typical of the lot of material to be delivered and installed on the site; provide an accurate indication of color, texture, and makeup of the material.

3 Imported Top Soil: 1-pint volume of each amended imported top soil required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of soil. Each Sample shall be typical of the lot of material to be furnished.

4 Weed Control Barrier: 12 by 12 inches.

5 Edging Materials and Accessories: Manufacturer's standard size, to verify color selected.

6 Root Barrier: Width of panel by 12 inches.

C. Qualification Data: For qualified landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

D. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:

1 Manufacturer's certified analysis of standard products.

2 Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

E. Material Test Reports: For existing in-place surface soil and imported or manufactured topsoil.

F. Planting Schedule: Indicating anticipated planting dates for exterior plants.

G. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before start of required maintenance periods.

H. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

SECTION 32 93 00
PLANTS

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants.

1. Installer shall be a firm that shall have a minimum of five years of successful installation experience with projects utilizing turf and grasses and plant materials similar in type and scope to that required for this project.

2. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:

a. Certified Landscape Technician -Exterior, with installation specialty area(s), designated CLT-Exterior.

b. Certified Landscape Technician -Interior, designated CLT-Interior.

c. Certified Ornamental Landscape Professional, designated COLP.

3. Pesticide Applicator: State licensed, commercial.

B. Soil-Testing Laboratory Qualifications: An independent or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio**;** deleterious material; pH; and mineral and plant-nutrient content of the soil.

1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.

2. The soil-testing laboratory shall oversee soil sampling; with depth, location, and number of samples to be taken per instructions from Landscape Architect. A minimum of four representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.

3. Report suitability of tested soil for plant growth.

a. Based upon the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.

b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

D. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

1 Locate and pre tag plant materials that conform to the project standards and arrange for their review by the Landscape Architect at the nursery sources. Allow sufficient time to locate, tag, and prepare for transplanting, considering seasons and scheduled installation. Notify the Landscape Architect, in writing, at least seven days prior to the review trip. Indicate the proposed schedule for tagging, the name and location of nurseries, and the type and quantity of plants available for review. Review trips shall not take place without Contractor verification of availability and pre tagging. The Landscape Architect may choose not to accept pre tagged materials. Contractor to ensure sufficient quantities

are available for review.

2 The Landscape Architect will review plant materials only for conformance with the design concept of the work and with the information given in the Contract Documents. The Landscape Architect will tag all trees and representative samples of shrubs and ground covers. These tags shall remain in place until the date of substantial completion. Tree tagging is not an acceptance process, the Landscape Architect has the right to accept or reject plant materials until the date of Substantial Completion.

E. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.

1 Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.

2 Other Plants: Measure with stems, petioles, and foliage in their normal position.

F. Plant Material Observation: Landscape Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Landscape Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1. Notify Landscape Architect of sources of planting materials seven days in advance of delivery to site.

G. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver exterior plants freshly dug.

1. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.

B. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

C. Bulk Materials:

1 Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.

2 Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

3 Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

D. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

E. Handle planting stock by root ball.

F. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1 Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.

2 Do not remove container-grown stock from containers before time of planting.

3 Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

B. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:

1 Notify Architect, Landscape Architect, Construction Manager and Owner no fewer than two days in advance of proposed interruption of each service or utility.

2 Do not proceed with interruption of services or utilities without Architect's written permission.

C. Planting Restrictions: Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.

D. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

E. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.

1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.8 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories immediately that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.

b. Structural failures including plantings falling or blowing over.

c. Faulty performance of tree stabilization edgings

d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Periods from Date of Substantial Completion:

a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.

b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.

c. Annuals: Three months.

3. Include the following remedial actions as a minimum:

a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.

b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.

c. Provide extended warranty for period equal to original warranty period, for replaced plant material.

PART 2 PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Master Plant List or Plant Schedule shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

1 Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots will be rejected.

2 Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Landscape Architect, with a proportionate increase in size of roots or balls.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

D. Labeling: Label at least one plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant as shown on Drawings.

E. If formal arrangements, datum line or consecutive order of plants is shown on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

F. Shade and Flowering Trees:

1. Shade Trees: Single-stem trees with straight trunk, well-balanced crown, and intact leader, of height and caliper indicated, complying with ANSI Z60.1 for type of trees required.
    a. Provide **balled and burlapped** or **container-grown** trees. As indicated on plan.
2. Small Upright Trees: Branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to ANSI Z60.1
    a. Provide **balled and burlapped** or **container-grown** trees. As indicated on plan.
3. Multistem Trees: Branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to ANSI Z60.1; minimum three stems or canes.
    a. Provide **balled and burlapped** or **container-grown** trees. As indicated on plan.

G. Deciduous Shrubs

1. Form and Size: Deciduous shrubs with not less than the minimum number of canes required by and measured according to ANSI Z60.1 for type, shape, and height of shrub.

    a. Provide **balled and burlapped** or **container-grown** trees. As indicated on plan.

H. Coniferous Evergreens

1. Form and Size: High-quality, well-balanced, coniferous evergreens, of type, height, spread, and shape required, complying with ANSI Z60.1.
    a. Provide **balled and burlapped** or **container-grown** trees. As indicated on plan.

I. Broadleaf Evergreens

1. Form and Size: High-quality, well-balanced, broadleaf evergreens, of type, height, spread, and shape required, complying with ANSI Z60.1.
    a. Provide **balled and burlapped** or **container-grown** trees. As indicated on plan.

J. Groundcover Plants

1. Provide groundcover of species indicated, established and well rooted in pots or similar containers, and complying with ANSI Z60.1 and examples below:
    a. Wintercreeper Euonymus (Euonymus fortunei var. coloratus): 1 gallon container with a minimum of 6 to 8 runners not less than 12” long.

K. Perennials: Provide healthy, field-grown plants from a commercial nursery, of species and variety shown or listed.

L. Fast-Growing Vines: Provide vines of species indicated complying with requirements in ANSI Z60.1 as follows:

1. Two-year plants with heavy, well-branched tops, with not less than 3 runners 18 inches or more in length, and with a vigorous well-developed root system.
2. Provide field-grown vines. Vines grown in pots or other containers of adequate size and acclimated to outside conditions will also be acceptable.

M. Annuals and Biennials: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery and that are in bud but not yet in bloom.

2.2 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

1 Class: T, with a minimum of 99 percent passing through No. 8 sieve and a minimum of 75 percent passing through No. 60 sieve.

2 Provide lime in form of ground dolomitic limestone.

B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent sulfur, with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.

C. Perlite: Horticultural perlite, soil amendment grade.

D. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 sieve.

E. Sand: Clean, washed, natural or manufactured, and free of toxic materials.

2.3 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1/2-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.

B. Muck Peat: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent.

C. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.

D. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, debris, and material harmful to plant growth.

2.4 FERTILIZERS

A. Slow-Release Fertilizer: Commercial grade granular or pelleted complete fertilizer of neutral character consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.5 PLANTING SOILS

A. Planting Soil: Existing, in-place surface soil. Verify suitability of existing surface soil to produce viable planting soil. Remove stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth. Mix surface soil with the following soil amendments and fertilizers in the following quantities to produce planting soil:

1 Ratio of Loose Compost to Surface Soil by Volume: According to soil analysis recommendations.

2 Ratio of Loose Muck Peat to Surface Soil by Volume: According to soil analysis recommendations.

3 Ratio of Loose Wood Derivatives to Surface Soil by Volume: According to soil analysis recommendations.

4 Weight of Lime per 1000 Sq. Ft.: According to soil analysis recommendations.

5 Weight of Sulfur per 1000 Sq. Ft.: According to soil analysis recommendations.

6 Weight of Agricultural Gypsum per 1000 Sq. Ft.: According to soil analysis recommendations.

7 Volume of Sand Plus 10 Percent per 1000 Sq. Ft.: According to soil analysis recommendations.

8 Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: According to soil analysis recommendations.

B. Planting Soil: Imported topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs, or marshes.

1. Additional Properties of Imported Topsoil or Manufactured Topsoil: Screened and free of stones 1 inch or larger in any dimension; free of roots, plants, sod, clods, clay lumps, pockets of coarse sand, paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials harmful to plant growth; free of obnoxious weeds and invasive plants including quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass; not infested with nematodes; grubs; or other pests, pest eggs, or other undesirable organisms and disease-causing plant pathogens; friable and with sufficient structure to give good tilth and aeration. Continuous, air-filled pore space content on a volume/volume basis shall be at least 15 percent when moisture is present at field capacity. Soil shall have a field capacity of at least 15 percent on a dry weight basis. Provide soil with a ASTM 5268 pH range of 6.5 to 7. Contractor shall provide sample and soil test analysis to the Landscape Architect prior to delivery of topsoil to site.

2. Mix imported topsoil or manufactured topsoil with the following soil amendments and fertilizers in the following quantities to produce planting soil:

a. Ratio of Loose Compost to Topsoil by Volume: According to soil analysis recommendations.

b. Ratio of Loose Muck Peat to Topsoil by Volume: According to soil analysis recommendations.

c. Ratio of Loose Wood Derivatives to Topsoil by Volume: According to soil analysis recommendations

d. Weight of Lime per 1000 Sq. Ft.: According to soil analysis recommendations.

e. Weight of Sulfur per 1000 Sq. Ft.: According to soil analysis recommendations.

f. Weight of Agricultural Gypsum per 1000 Sq. Ft.: According to soil analysis recommendations.

g. Volume of Sand Plus 10 Percent per 1000 Sq. Ft.: According to soil analysis recommendations.

h. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: According to soil analysis recommendations.

2.6 MULCHES

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

1 Type: Ground or shredded bark or chips, Pine straw, Pine needles.

2 Size Range: 3 inches maximum, 1/2 inch minimum.

3 Color: Natural.

B. Mineral Mulch: Hard, durable stone, washed free of loam, sand, clay, and other foreign substances, of following type, size range, and color:

1 Type: Rounded riverbed gravel or smooth-faced stone.

2 Size Range: 5 inches maximum, 3 inch minimum.

3 Color: Uniform tan-beige color range acceptable to Landscape Architect.

2.7 WEED-CONTROL BARRIERS (When Specified On Drawings)

A. Nonwoven Geotextile Filter Fabric: Polypropylene or polyester fabric, 3 oz./sq. yd. minimum, composed of fibers formed into a stable network so that fibers retain their relative position. Fabric shall be inert to biological degradation and resist naturally-encountered chemicals, alkalis, and acids.

B. Composite Fabric: Woven, needle-punched polypropylene substrate bonded to a nonwoven polypropylene fabric, 4.8 oz./sq. yd.

2.8 PESTICIDES

A. General: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.9 TREE STABILIZATION MATERIALS

A. Stakes and Guys:

1 Upright and Guy Stakes: Rough-sawn, sound, new hardwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated, pointed at one end.

2 Wood Deadmen: Timbers measuring 8 inches in diameter and 48 inches long, treated with specified wood pressure-preservative treatment.

3 Flexible Ties: Wide rubber or elastic bands or straps of length required to reach stakes or turnbuckles.

4 Guys and Tie Wires: ASTM A 641/A 641M, Class 1, galvanized-steel wire, two-strand, twisted, 0.106 inch in diameter.

5 Tree-Tie Webbing: UV-resistant polypropylene or nylon webbing with brass grommets.

6 Guy Cables: Five-strand, 3/16-inch-diameter, galvanized-steel cable, with zinc-coated turnbuckles, a minimum of 3 inches long, with two 3/8-inch galvanized eyebolts.

7 Flags: Standard surveyor's plastic flagging tape, white, 6 inches long.

8 Proprietary Staking-and-Guying Devices: Proprietary stake and adjustable tie systems to secure each new planting by plant stem; sized as indicated and per manufacturer's written recommendations.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) Arborbrace; ArborBrace Tree Guying System.

2) Decorations for Generations, Inc.; Reddy Stake System.

B. Root-Ball Stabilization Materials:

1 Upright Stakes and Horizontal Hold-Down: Rough-sawn, sound, new hardwood or softwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated; stakes pointed at one end.

2 Wood Screws: ASME B18.6.1.

3 Proprietary Root-Ball Stabilization Devices: Proprietary at-or below-grade stabilization systems to secure each new planting by root ball; sized per manufacturer's written recommendations unless otherwise indicated.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) Border Concepts, Inc.; Tomahawk Tree Stabilizers.

2) Foresight Products, LLC; Duckbill Rootball Fixing System.

3) Tree Staple, Inc.; Tree Staples.

2.10 LANDSCAPE EDGINGS (When Specified on Drawings)

A. Steel Edging: Standard commercial-steel edging, rolled edge, fabricated in sections of standard lengths, with loops stamped from or welded to face of sections to receive stakes.

1. Manufacturers: Subject to compliance with requirements available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Border Concepts, Inc.

b. Collier Metal Specialties, Inc.

c. Russell, J. D. Company (The).

d. Sure-Loc Edging Corporation.

2 Edging Size: 3/16 inch wide by 4 inches deep.

3 Stakes: Tapered steel, a minimum of 12 inches long.

4 Accessories: Standard tapered ends, corners, and splicers.

5 Finish: Standard paint.

6 Paint Color: Brown.

2.11 MISCELLANEOUS PRODUCTS

A. Wood Pressure-Preservative Treatment: AWPA C2, with waterborne preservative for soil and freshwater use, acceptable to authorities having jurisdiction, and containing no arsenic; including ammoniacal copper arsenate, ammoniacal copper zinc arsenate, and chromated copper arsenate.

B. Root Barrier: Black, molded, modular panels manufactured with 50 percent recycled polyethylene plastic with ultraviolet inhibitors, 85 mils thick, with vertical root deflecting ribs protruding 3/4 inch out from panel, and each panel 18 inches wide.

C. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.

D. Burlap: Non-synthetic, biodegradable.

E. Planter Drainage Gravel: Washed, sound crushed stone or gravel complying with ASTM D 448 for Size No. 8.

F. Planter Filter Fabric: Woven geotextile manufactured for separation applications and made of polypropylene, polyolefin, or polyester fibers or combination of them.

G. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb of vesiculararbuscular mycorrhizal fungi and 95 million spores per lb of ectomycorrhizal fungi, 33 percent hydrogel, and a maximum of 5.5 percent inert material.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.

2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.

3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

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

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Landscape Architect and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Lay out plants at locations directed by Landscape Architect. Stake locations of individual trees and shrubs and outline areas for multiple plantings.

D. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.

1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.

E. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

3.3 PLANTING AREA ESTABLISHMENT

A. Loosen subgrade of planting areas to a minimum depth of 4 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Apply fertilizer directly to subgrade before loosening.

2. Spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.

a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.

b. Mix lime with dry soil before mixing fertilizer.

3. Spread planting soil to a depth of 6 inches but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

a. Spread approximately one-half the thickness of planting soil over loosened subgrade. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil.

B. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

C. Before planting, obtain Landscape Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

D. Application of Mycorrhizal Fungi: Broadcast dry product uniformly over prepared soil.

3.4 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 45degree angle. Excavations with vertical sides are not acceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.

1 Excavate approximately three times as wide as ball diameter.

2 Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.

3 If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.

4 Maintain required angles of repose of adjacent materials as shown on the Drawings. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.

5 Maintain supervision of excavations during working hours.

6 Keep excavations covered or otherwise protected

7 If drain tile is shown on Drawings or required under planting areas, excavate to top of porous backfill over tile.

B. Subsoil and topsoil removed from excavations may be used as planting soil if amended per 2.5.A of this section (32 93 00).

C. Obstructions: Notify Landscape Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

1. Hardpan Layer: Drill 6-inch-diameter holes, 24 inches apart, into free-draining strata or to a depth of 10 feet, whichever is less, and backfill with free-draining material.

D. Drainage: Notify Landscape Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

E. Drainage Testing:

1. Wait a minimum of 24 hours after rain and dig test pit 12 inches square or12-1/2 inches in diameter to a depth of bottom of tree pit in representative locations on site. Remove loose soil. If standing water is visible, notify the Landscape Architect.

2. Quickly fill the bottom with 6 inches of water (approximately 3-1/4 gallons of water).

3. Record length of time from filling until disappearance of water. Divide number of minutes by six to give average time of 1 inch fall.

4. Compare 1 inch percolation time with table below:

    a. 1 Inch in 0 to 3 Minutes: Rapid percolation.

    b. 1 Inch in 3 to 5 Minutes: Medium percolation.

    c. 1 Inch in 5 to 30 Minutes**:** Slow percolation (semi-impervious soil).

    d. 1 Inch in Over 30 Minutes: Impervious soil.

5. If the tests indicate semi-impervious soil or impervious soil or if standing water is initially found in the pit, notify the Landscape Architect before beginning work.

6. If the Contractor does not make proper tests and does not file complete reports of semi-impervious and impervious soils or plants in areas shown to have poor drainage, without written release from the Owner, he shall be responsible for any warranted replacements due to substrate water damage.

3.5 TREE, SHRUB, AND VINE PLANTING

A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

B. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Set balled and burlapped stock plumb and in center of planting pit or trench with root flare 4 inches above adjacent finish grades.

    1 Use planting soil for backfill.

    2 After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.

    3 Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.

    4 Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.

    5 Continue backfilling process. Water again after placing and tamping final layer of soil.

D. Set container-grown stock plumb and in center of planting pit or trench with root flare 2 inches above] adjacent finish grades.

    1 Use planting soil for backfill.

    2 Carefully remove root ball from container without damaging root ball or plant.

    3 Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.

4 Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.

5 Continue backfilling process. Water again after placing and tamping final layer of soil.

E. Set fabric bag-grown stock plumb and in center of planting pit or trench with root flare 2 inches above adjacent finish grades.

1 Use planting soil for backfill.

2 Carefully remove root ball from fabric bag without damaging root ball or plant. Do not use planting stock if root ball is cracked or broken before or during planting operation.

3 Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.

4 Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.

5 Continue backfilling process. Water again after placing and tamping final layer of soil.

F. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.6 TREE, SHRUB, AND VINE PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.

B. Prune, thin, and shape trees, shrubs, and vines as directed by Landscape Architect.

C. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Landscape Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.

D. Do not apply pruning paint to wounds.

3.7 TREE STABILIZATION

A. Install trunk stabilization as follows unless otherwise indicated:

B. Staking and Guying: Stake and guy trees more than 14 feet in height and more than 3 inches in caliper unless otherwise indicated. Securely attach no fewer than three guys to stakes 30 inches long, driven to grade.

1. Site-Fabricated Staking-and-Guying Method:

a. For trees more than 6 inches in caliper, anchor guys to wood deadmen buried at least 36 inches below grade. Provide turnbuckle for each guy wire and tighten securely.

b. Support trees with bands of flexible ties at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.

c. Attach flags to each guy wire, 30 inches above finish grade.

d. Paint turnbuckles with luminescent white paint.

2. Proprietary Staking and Guying Device: Install staking and guying system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

C. Root-Ball Stabilization: Install at-or below-grade stabilization system to secure each new planting by the root ball unless otherwise indicated.

1. Wood Hold-Down Method: Place vertical stakes against side of root ball and drive them into subsoil; place horizontal wood hold-down stake across top of root ball and screw at each end to one of the vertical stakes.

a. Install stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation. Saw stakes off at horizontal stake.

b. Install screws through horizontal hold-down and penetrating at least 1 inch into stakes. Predrill holes if necessary to prevent splitting wood.

c. Install second set of stakes on other side of root trunk for larger trees as indicated.

2. Proprietary Root-Ball Stabilization Device: Install root-ball stabilization system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

3.8 ROOT-BARRIER INSTALLATION

A. Install root barrier where trees are planted within 48 inches of paving or other hardscape elements, such as walls, curbs, and walkways unless otherwise shown on Drawings.

B. Align root barrier vertically and run it linearly along and adjacent to the paving or other hardscape elements to be protected from invasive roots.

C. Install root barrier continuously for a distance of 60 inches in each direction from the tree trunk, for a total distance of 10 feet per tree. If trees are spaced closer, use a single continuous piece of root barrier.

1 Position top of root barrier per manufacturer's recommendations.

2 Overlap root barrier a minimum of 12 inches at joints.

3 Do not distort or bend root barrier during construction activities.

4 Do not install root barrier surrounding the root ball of tree.

3.9 PLANTING IN PLANTERS

A. Place a layer of drainage gravel at least 4 inches thick in bottom of planter. Cover bottom with filter fabric and wrap filter fabric 4 inches up on all sides. Duct tape along the entire top edge of the filter fabric, to secure the filter fabric against the sides during the soil-filling process.

B. Fill planter with planting soil. Place soil in lightly compacted layers to an elevation of 1-1/2 inches below top of planter, allowing natural settlement.

3.10 GROUND COVER AND PLANT PLANTING

A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated in even rows with triangular spacing.

B. Use planting soil for backfill

C. Dig holes large enough to allow spreading of roots.

D. For rooted cutting plants supplied in flats, plant each in a manner that will minimally disturb the root system but to a depth not less than two nodes.

E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.11 PLANTING AREA MULCHING

A. Install weed-control barriers before mulching according to manufacturer's written instructions. Completely cover area to be mulched, overlapping edges a minimum of 12 inches and secure seams with galvanized pins.

B. Mulch backfilled surfaces of planting areas and other areas indicated.

1 Trees in Turf Areas: Apply organic mulch ring of 3-inch average thickness, with 36-inch radius around trunks or stems. Do not place mulch within 3 inches of trunks or stems.

2 Organic Mulch in Planting Areas: Apply 3-inch average thickness of organic mulch extending 12 inches beyond edge of individual planting pit or trench and over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches of trunks or stems.

3.12 EDGING INSTALLATION

A. Steel Edging: Install steel edging where indicated according to manufacturer's written instructions. Anchor with steel stakes spaced approximately 30 inches apart, driven below top elevation of edging.

3.13 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.

B. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated past management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.14 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Pre-Emergent Herbicides (Selective and Non-Selective): Apply to tree, shrub, and ground-cover areas in accordance with manufacturer's written recommendations. Do not apply to seeded areas.

C. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.15 CLEANUP AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.

B. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

C. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

3.16 DISPOSAL

A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

END OF SECTION 32 93 00

SECTION 32 94 53

LANDSCAPE DRAINAGE SYSTEM

PART 1 - GENERAL

1.01 SUBMITTALS:

A. General: Submit in accordance with Section 01 33 23 - Submittals.

B. Product Data: Submit manufacturer's product literature and instructions for vapor barrier material and mastic.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

A. Advanced Drainage Systems, Inc.
B. Approved equal

2.02 MATERIALS:

A. Piping and Fittings: 6", 8" and 12" ADS-N-12 piping in accordance with ASTM F 405, standard specification for corrugated polyethylene Pipes and fittings.

B. Downspout Adapter: ADS-N-12 in accordance with ASTM F 405.

C. Cleanout: ADS-N-12 in accordance with ASTM F 405.

D. Drainage Basins: Provide 24" diameter drainage basins where indicated on the drawings. Drainage Basins shall be provided with DOT H-20 grate.

PART 3 - EXECUTION:

3.01 INSTALLATION:

A. Install underground drainage system on crushed stone, gravel or compacted soil backfill material.

B. Install underground drainage system in accordance with the manufacturer's written instructions and in accordance with ASTM D 2321, standard practice for

installation of thermoplastic pipe.

C. Underground drainage system shall drain a minimum of 1% slope.

END OF SECTION