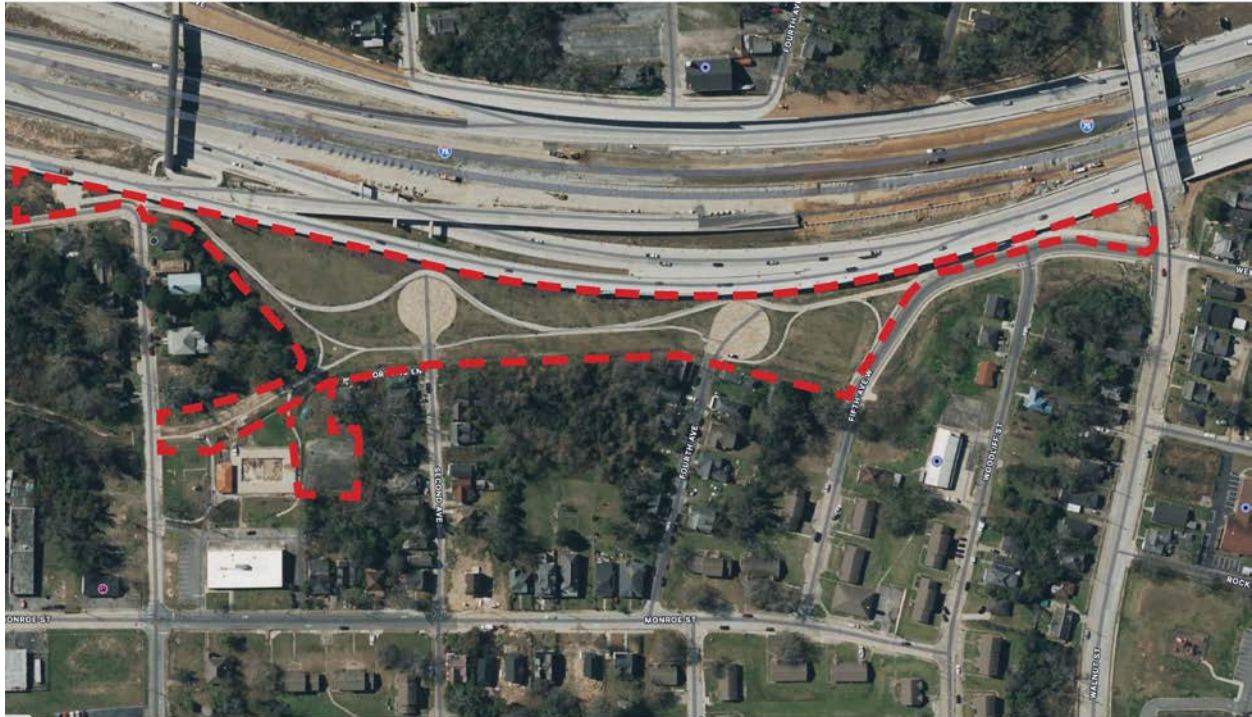


PROJECT MANUAL for

LINEAR PARK RENOVATIONS

**1494 SECOND AVENUE
MACON, GEORGIA**



**Oak Haven Studio
BTBB #2024-15**

Date: October 4, 2024

SPECIFICATION INDEX

LINEAR PARK RENOVATIONS
MACON, GEORGIA

<u>SECTION</u>	<u>TITLE</u>	<u>NO. OF PAGES</u>
013000	SUBMITTALS.....	2
018000	PROJECT RECORD DOCUMENTS.....	2
REFER TO CIVIL DRAWINGS FOR SPECIFICATIONS		
	EROSION, SEDIMENT AND POLLUTION CONTROL PLAN	
	ACTIVITIES WITHIN STREAM BUFFERS	
	WASTE PICKUP AND DISPOSAL	
	SPILL PREVENTION AND LEAKS	
	INSPECTIONS	
	STORM WATER SAMPLING	
	STORM WATER REPORTING	
	RETENTION OF RECORDS	
	WASHDOWN AREAS	
033000	CAST-IN-PLACE CONCRETE.....	18
051200	STRUCTURAL STEEL.....	9
076100	STANDING SEAM METAL ROOFING.....	8
079100	JOINT SEALANTS.....	4
099113	EXTERIOR PAINTING.....	5
107113	EXTERIOR SUN CONTROL DEVICES.....	2
260000	ELECTRICAL (refer to drawings).....	1
310000	EARTHWORK.....	13
311100	CLEARING AND GRUBBING.....	4
321116	AGGREGATE BASE COURSE.....	3
321313	CONCRETE WALKS, CURBS, AND MISCELLANEOUS FLATWORK.....	5
323300	SITE FURNISHINGS.....	3
329113	SOIL PREPARATION.....	9
329120	TOPSOIL.....	4
329223	SODDING.....	9
329300	TREES, SHRUBS, AND GROUNDCOVERS.....	10

013000 – SUBMITTALS

PART 1 - GENERAL

1.1 Quality Assurance:

A. Submittals: All submittals shall be transmitted to the Architect electronically unless noted otherwise. Submittals shall include a transmittal describing attached submittal information. **All submittals must bear the Contractor's stamp and signature (par. 3.1.D.)**

1. Timing of Submittals: Make all submittals far enough in advance of scheduled dates of installation to allow at least twenty (20) full working days for review following Architect's receipt of the submittal.

2. Forward all submittals / samples requiring color selections at one time. All color selections shall be made together at one time and released as a complete color schedule.

a. Any submittal requiring a color selection shall be actual manufacturer's color charts (hard copy) rather than electronic copy.

3. Delays: Cost of delays occasioned by tardiness of submittals may be back charged to the Contractor and shall not be borne by the Owner.

1.2 Related Sections:

A. Section 018000, Project Record Documents

PART 2 - PRODUCTS (OMITTED)

PART 3 - EXECUTION

3.1 Detail Requirements:

A. Identification: Completely identify each submittal by showing at least the following:

1. Name of Project and Architect as they appear on the Project Manual cover.
2. Name and address of submitter.
3. Sheet Number and/or Project Manual Section Number to which submittal applies.
4. Whether the submittal is an original submittal or a resubmittal.

B. Recycled Material Content: Any submittal for an item/product/material containing recycled material content shall include a manufacturer's certification of the recycled material content and the amount (as a percentage of the total material or weight, as specified) of recycled material content.

C. Grouping: Unless otherwise permitted by the Architect, make all submittals in groups, containing all associated items. The Architect may reject partial submittals as not complying with the contract documents.

1. All submittals requiring color selections shall be submitted at one time. Interior color selections shall all be made at one time and a Color / Finish Schedule for the complete project shall follow. Exterior color / finish selections may be made at a separate time.

D. Contractor's Approval: The Contractor shall affix his stamp and signature to all submittals, indicating his approval of the submittal. No submittal will be reviewed by the Architect which does not bear the Contractor's stamp of approval.

END OF SECTION

018000 – PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 Quality Assurance:

A. Qualifications of Workmen: Contractor shall designate one workman in his employ who shall maintain all Project Record Documents and who shall record all changes to the original contract documents.

B. Identification of Documents: All project record documents shall be clearly marked PROJECT RECORD COPY, not used for construction purposes and available to the Architect or his representative.

1.2 Related Section:

A. Section 013000, Submittals

1.3 Submittal:

A. General: At least 10 days prior to date of final inspection and as a condition of acceptance of the work, submit all project record documents to the Architect.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 As-Built Construction Documents:

A. Marking: Mark the most appropriate document within twenty-four (24) hours of receipt of information to show.

1. Changes made during construction.
2. Details not shown on original Contract Documents.
3. Location of Underground Utilities and Appurtenances, Reference to permanent surface improvements.
4. Location of all Internal Utilities and Appurtenances concealed in the building structure, referenced to visible and accessible features of the structure.

B. Method of Marking and Recording:

1. Using colored markers for graphic work, conform to following:
 - a. Architectural Work - Red
 - b. Structural Work - Brown
 - c. Mechanical Work - Green
 - d. Electrical Work - Yellow

2. Use a red pen for all written work.

3.2 Quality Control:

A. Documents shall be kept current; no work shall be concealed before required information has been recorded and documents shall be clearly marked "PROJECT RECORD DOCUMENTS", not used for construction purposes and available to Architect and/or his representative at all times.

1. Progress Payments nor Final Payment will be made until the Architect is satisfied that the status of documents is current.

3.3. Final Submittal of Project Record Documents:

A. The Contractor shall submit to the Architect, Record Drawings reflecting all changes caused by addenda, field changes, change orders or observed changes by the Design Professional, the General Contractor, or subcontractor(s).

B. The Contractor shall pay all costs for scanning/reproducing marked-up as-built plans and closeout documents into digital format.

1. Two (2) digital copies (.pdf format) on flash-drives of all documents noted below, organized and labeled as noted below. Files shall be named such that the documents are clearly identifiable as to their content.

- a. As-Built Construction Drawings
- b. Project Specifications (Project Manual), including addenda
- c. Approved Change Orders / Field Orders
- d. Approved Shop Drawings/Submittals / Product Data (Section 013000)
- e. O&M Manuals (Mechanical, Plumbing, Electrical). Refer also to mechanical, plumbing, and electrical specifications.
- f. Warranties: Label per project specifications.

- (1) For manufacturer's warranties, include all required documentation required by the manufacturer (i.e. proof of purchase, invoice, etc.) should the Owner need to submit a claim.

- (2) All warranty forms shall be filled out completely by the Contractor (include dates of installation, serial and model numbers, etc.).

- g. Test Reports / Certifications / Inspection Reports
- h. Agency Approval(s) secured by the Contractor

END OF SECTION

033000 - CAST-IN-PLACE CONCRETE

PART1 - GENERAL

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

- B. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Footings.
 - 2. Slabs-on-grade.

1.3 DEFINITIONS

- C. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 SUBMITTALS

- D. Product Data: For each type of product indicated.
- E. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- F. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- G. Provide ICC Evaluation Service Reports for all adhesive anchors and power actuated fasteners used to attach other items to concrete slabs and other concrete work.
- H. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
 - 1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

I. Minutes of preinstallation conference.

1.2 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

D. American Society for Testing and Materials (ASTM)

1. ASTM E1745 – Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
2. ASTM E154 – Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs.
3. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.
4. ASTM E1643 – Standard Practice for Installation of Water Vapor Retarders Used in Contact With Earth or Granular Fill Under Concrete Slabs.
5. ASTM F1249-01 – Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.

E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5 and Section 7, "Lightweight Concrete."
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
3. ACI 302.1R-04, Vapor Barrier Component (plastic membrane) is not less than 10 mils thick.
4. ACI 302.1R-04, Guidelines for layout of construction, isolation and contraction joints.

F. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.

- d. Concrete subcontractor.
 - e. Owner's Representative
2. Review: special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, forms and form removal limitations, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending, corrosion and damage.
- B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - 1. Plywood, metal, or other approved panel materials.
 - 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlay, Class 1 or better.
- B. Chamfer Strips: Wood, metal, PVC, or rubber strips, **3/4 by 3/4 inch**, minimum.
- C. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
 - 2. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, **Grade 60** (Grade 420), deformed.
- B. Plain-Steel Wire: ASTM A 1064/A 1064M, as drawn.

- C. Plain-Steel Welded Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.

2.3 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.4 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type I, gray.
- B. Normal-Weight Aggregates: ASTM C 33, coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
 - 1. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
 - 3. Aggregate shall be provided and classified as follows:
 - a. Footings, foundations, columns and beams not exposed to weather. Interior floor slabs with floor coverings: Class 1M.
 - b. Foundation walls above grade, retaining walls, piers and beams exposed to weather: Class 3M.
 - c. Pavements, driveways and curbs, walks: Class 4M.
- C. Lightweight Aggregate: ASTM C 330, 1-inch nominal maximum aggregate size.
- D. Water: ASTM C 94/C 94M and potable.

2.5 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride. No other admixtures will be permitted without prior approval.

2.6 FIBER REINFORCEMENT

- A. Synthetic Micro-Fiber: fibrillated polypropylene micro-fibers engineered and designed for use in concrete, complying with ASTM C 1116/C 1163M, Type III, 1 to 2-1/4 inches (25 to 57mm) long.
 - 1. Products: Provide one of the following:
 - a. Fibrillated Micro-Fibers:
 - 1) FORTA Coporation; FORTA Econo-Net.
 - 2) Grace Construction Products, W. R. Grace & Co.; Grace Fibers.
 - 3) Propex Concrete Systems; Fibermesh 300.

2.7 WATERSTOPS

- A. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch.
 - 1. Products: Provide one of the following :
 - a. CETCO; Volclay Waterstop-RX.
 - b. Greenstreak; Swellstop.
 - c. JP Specialties, Inc.; Earth Shield Type 20.

2.8 VAPOR RETARDER PREMOLDED BITUMINOUS WATERPROOFING MEMBRANE (Horizontal Surfaces Under Slab)

2.8 VAPOR RETARDERS

- A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.
- B. Sheet Vapor Retarder: Polyethylene sheet, ASTM D 4397, not less than 10 mils (0.25 mm) thick.
- C. Pipe Boots: Construct pipe boots from vapor barrier material and pressure sensitive tape per manufacturer's instructions or use manufacturer's standard premanufactured pipe boots.
- D. Granular Fill: Clean mixture of crushed stone or uncrushed gravel; ASTM D448, Size 57, with 100% passing a 1½"(37.5 mm) sieve and 0 % passing a No. 8 (2.36 mm) sieve.

2.9 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

1. Products: Provide one of the following:

- a. Dayton Superior Corporation; Day-Chem Sure Hard (J-17).
- b. Euclid Chemical Company (The), an RPM company; Euco Diamond Hard.
- c. Meadows, W.R., Inc.; LIQUI-HARD.
- d. BASF Sonneborn Building Products; Lapidolith.
- e. Davidson Chemicals; Concrete Hardener.

2.10 CURING MATERIALS

- A. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet. Keep in place for 7 days, minimum.
- B. Water: Potable.

2.11 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber
- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.
- C. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.12 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) to 1/2 inch (12.7 mm) and that can be feathered at edges to match adjacent floor elevations.
 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
 4. Compressive Strength: Not less than 5000 psi at 7 days when tested according to ASTM C 109/C 109M.

- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from **1/4 inch (6.4 mm)** and that can be filled in over a scarified surface to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, **1/8 to 1/4 inch** or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than **5000 psi** at 7 days when tested according to ASTM C 109/C 109M.

2.13 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Admixtures: Use admixtures according to manufacturer's written instructions.

2.14 CONCRETE MIXTURES FOR BUILDING ELEMENTS (as applicable)

- A. Footings/Exterior Slabs on Grade: Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength: **3000 psi** at 28 days.
 - 2. Minimum Water-Cementitious Materials Ratio: 0.45.
 - 3. Slump Limit: **4 inches** plus or minus **1 inch**.
 - 4. Air Content: 4.5 percent, plus or minus 1.5 percent at point of delivery for **1-1/2-inch** nominal maximum aggregate size.
 - 5. Exposure Class: F1
- B. Interior Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength: **3000 psi** at 28 days.
 - 2. Minimum Water-Cementitious Materials Ratio: N/A
 - 3. Slump Limit: **4 inches**, plus or minus **1 inch**.
 - 4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4" nominal maximum aggregate size. Except do not allow air content of trowel-finished floors to exceed 3 percent.
 - 5. **Exposure Class: F0**
- C. **Coarse Grout (Normal Weight)**
 - 1. **Proportion in accordance with prescriptive method as described in ASTM C476.**

2.15 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.16 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
 - 1. When air temperature is between **85 and 90 deg F** , reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above **90 deg F** , reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
 - 1. Class C, **1/2 inch** for smooth-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 1. Install keyways, reglets, recesses, and the like, for easy removal.
 - 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely

braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

- H. Chamfer exterior corners and edges of permanently exposed concrete, unless shown otherwise on drawings.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 - 2. Post installed anchors shall comply with and meet requirements of ICC-ES AC308.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of turndowns, curbs and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than **50 deg F** for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Design Professional.
 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 2. Form keyed joints as indicated. Embed keys at least **1-1/2 inches** into concrete.
 3. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint filler strips at slab junctions with vertical surfaces such as column pedestals, foundation walls, grade beams and other locations as indicated.
 1. Terminate full-width joint filler strips not less than ½ inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 7 “Joint Sealants” are indicated.
 2. Install joint filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.6 WATERSTOPS

- A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.
- B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.7 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. No additional water may be added to any concrete mixture delivered to the Project site unless the amount of mix water withheld at batch plant is indicated on delivery ticket and the total amount of water does not exceed the total amount of mix water on the approved design mix.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Maintain reinforcement in position on chairs during concrete placement.

3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 4. Slope surfaces uniformly to drains where required.
 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- G. Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.8 FINISHING FORMED SURFACES

- A. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed the specified limits on formed surface irregularities.
1. Apply to concrete surfaces exposed to public view.
- B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.9 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of **1/4 inch** in one direction.
 - 1. Apply scratch finish to surfaces indicated and to receive mortar setting beds for bonded cementitious floor finishes.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
 - 1. Apply float finish to surfaces indicated to receive trowel finish.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 - 1. Apply a trowel finish to surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 - 2. Finish surfaces to the following tolerances, according to **ASTM E 1155** , for a randomly trafficked floor surface:
 - a. Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15.
 - b. Levelness testing F(L), is not required at suspended slabs.
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated. While concrete is still plastic, slightly scarify surface with a fine broom.
 - 1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
 - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.10 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.
- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

3.11 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings and other surfaces.
- C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches , and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to

heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

- a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.12 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
 2. Do not apply to concrete that is less than seven days old.

3.13 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 1. Defer joint filling until concrete has aged at least one month. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

3.14 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a **No. 16** sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than **1/2 inch** in any dimension to solid concrete. Limit cut depth to **3/4 inch**. Make

- edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of **0.01 inch** wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14 days, correct high areas by grinding.
 3. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 4. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of **1/4 inch** to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 5. Repair defective areas, except random cracks and single holes **1 inch** or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a **3/4-inch** clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 6. Repair random cracks and single holes **1 inch** or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.15 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Design Professional will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Inspections:
 - 1. Steel reinforcement placement.
 - 2. Headed bolts and studs.
 - 3. Verification of use of required design mixture.
 - 4. Concrete placement, including conveying and depositing.
 - 5. Curing procedures and maintenance of curing temperature.
- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. , but less than 25 cu. yd. , plus one set for each additional 50 cu. yd. or fraction thereof.
 - 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - 3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173/C 173M, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
 - 5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 6. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - 7. Compressive-Strength Tests: ASTM C 39/C 39M;
 - a. Test one laboratory-cured specimen at 7 days and one set of two specimens @ 28 days.
 - b. When two specimens are tested, the compressive strength test shall be the average compressive strength from a set of two specimens obtained from the same composite sample and tested at the age indicated.
 - c. Retain one specimen for additional testing if requested by the Design Professional.
 - 8. Strength of each concrete mixture will be satisfactory if concrete has achieved the specified 28-day compressive strength.
 - 9. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall

contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
 11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
 12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- D. Measure floor and slab flatness and levelness according to **ASTM E 1155** within 48 hours of finishing.

3.16 PROTECTION OF LIQUID FLOOR TREATMENTS

- A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION

051200 - STRUCTURAL STEEL

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. Structural steel.
- 2. Grout.

- B. Related Sections:

- 1. Section 013000, Submittals
- 2. Section 321313, Concrete Walks, Curbs, and Misc Flatwork

1.3 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.4 PERFORMANCE REQUIREMENTS

- A. Connections: As indicated on structural drawings.
- B. Moment Connections: As indicated on structural drawings.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. For each approved fabricator that is exempt from Special Inspections of shop fabrications and implementation procedures in accordance with Section 1704.2.5.2 of the International Building Code, the contractor shall submit "Fabricator's Certificate of Compliance". Contractor shall provide copies of fabricator's certification or building code evaluation services report and fabricator's quality control manual.

- C. Shop Drawings: Show fabrication of structural-steel components.
1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 2. Include embedment drawings.
 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
 4. Elements designed by the fabricator must be signed and sealed by professional engineer licensed in State of Georgia. As an alternate, a signed and sealed cover letter shall be submitted with the shop drawings substantiating the design information. The fabricator's design engineer must review and confirm in writing that the shop and erection drawings properly incorporate his design.
- D. Qualification Data: For Erector, Manufacturer, Professional Engineer, Land Surveyor and Testing Agency.
- Surveys:
1. Submit surveys indicating elevations and locations of concrete and masonry-bearing surfaces and locations of anchor rods, bearing plates and other embedments to receive structural framing. Indicate discrepancies between actual installation and the Contract Documents.
 2. Submit Survey indicating final elevations and locations of columns and other major structural steel elements. Steel survey shall include column plumbness after structural steel erection. Indicate discrepancies between actual installation and the Contract Documents.
 3. Surveyor who performs surveys to submit written certification authenticating surveys' accuracy.
- E. Welding certificates.
- F. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- G. Mill test reports for structural steel, including chemical and physical properties.
- H. Product Test Reports: For the following:
1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 2. Direct-tension indicators.
 3. Tension-control, high-strength bolt-nut-washer assemblies.
 4. Shear stud connectors.
 5. Shop primers.
 6. Nonshrink grout.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- C. Land Surveyor Qualifications: A Professional Land Surveyor who is legally qualified to practice in jurisdiction where Project is located and with a minimum of five years experience in providing surveying services of the kind indicated.
- D. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC 303.
- E. Preinstallation Conference: Conduct conference at Project site.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 - 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
 - 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
 - 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

1.8 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than the following:
 - 1. W-Shapes: 50 percent.
 - 2. Channels, Angles, M, S-Shapes: 50 percent.
 - 3. Plate and Bar: 25 percent.
 - 4. Cold-Formed Hollow Structural Sections: 25 percent.
 - 5. Steel Pipe: 25 percent.
 - 6. All Other Steel Materials: 25 percent.
- B. W-Shapes: ASTM A 992/A 992M, Grade 50
- C. Channels, Angles, M, S-Shapes: ASTM A 36/A 36M
- D. Plate and Bar: ASTM A 36/A 36M, ASTM A 572/A 572M, Grade 50, as noted (moment connection plates.)
- E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.
- F. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
 - 1. Weight Class: Standard.
 - 2. Finish: Black.
- G. Steel Castings: ASTM A 216/A 216M, Grade WCB with supplementary requirement S11.
- H. Steel Forgings: ASTM A 668/A 668M.
- I. Welding Electrodes: Comply with AWS requirements, E70XX.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, round head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
 - 1. Finish: Plain.
- B. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.
- C. Unheaded Anchor Rods: ASTM F 1554, Grade 55.
 - 1. Configuration: Straight.
 - 2. Nuts: ASTM A 563 heavy-hex carbon steel.

3. Plate Washers: ASTM A 36/A 36M carbon steel.
4. Washers: **ASTM F 436**, Type 1, hardened carbon steel.
5. Finish: Plain

D. Threaded Rods: ASTM A 36/A 36M

1. Nuts: **ASTM A 563** heavy-hex carbon steel.
2. Washers: ASTM A 36/A 36M carbon steel.
3. Finish: Plain

E. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.

F. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.

G. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.

2.3 PRIMER

- A. Primer: SSPC-Paint 25, Type II, alkyd primer.

2.4 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
4. Mark and match-mark materials for field assembly.
5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

- C. Bolt Holes: Drill or punch standard bolt holes perpendicular to metal surfaces.

- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Connection Holes: Provide holes required for securing other work to structural steel.
 - 1. Drill, or punch holes perpendicular to steel surfaces.
 - 2. Baseplate Holes: Drill or punch holes perpendicular to steel surfaces.
 - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "[Specification for Structural Joints Using High-Strength Bolts](#)" dated December 31, 2009 for type of bolt and type of joint specified.
 - 1. Joint Type: Pretensioned
- B. Weld Connections: Comply with AWS D1.1/D1.1M [and AWS D1.8/D1.8M] for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.7 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
 - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of **2 inches**.
 - 2. Surfaces to be field welded.
 - 3. Surfaces to be coated with bituminous material.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 - 1. SSPC-SP 3 "Power Tool Cleaning" for other steel.
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of **1.5 mils**. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Before erection proceeds, survey elevations and locations of concrete and masonry-bearing surfaces and locations of anchor rods, bearing plates and other embedments to receive structural framing, with Erector present, for compliance with requirements and specified tolerances.
 1. Engage land surveyor to perform surveying.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Base Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 2. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
- E. Splice members only where indicated.
 - F. Coat columns and base plates below floor slab with ultra-high build, single component coal tar mastic for protecting steel and concrete substrates subject to aggressive conditions and below grade damp proofing in strict accordance with manufacturer's published instructions.
 - G. Do not use thermal cutting during erection unless approved by Architect. Finish approved thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
 - H. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
 - I. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "[Specification for Structural Joints Using High-Strength Bolts](#)" dated December 31, 2009 for type of bolt and type of joint specified.
 1. Joint Type: Snug tightened
 2. Bolt Type: Tension Control of size, quantity and style noted on drawings.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
 3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Bolted Connections: Bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.

- D. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
 - 1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 - 2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.
- E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

- A. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

END OF SECTION

076100 – STANDING SEAM METAL ROOFING

PART 1 - GENERAL

1.1 Section Includes:

- A. Preformed, prefinished metal roofing, flashings, gutters, and downspouts.
- B. Miscellaneous trim, flashing, closures, drip flashing, and accessories.
- C. Sealant
- D. Fastening devices.

1.2 Related Sections:

- A. Section 130000, Submittals
- B. Section 051200, Structural Steel

1.3 References:

- A. American Iron & Steel Institute (AISI) Specification for the Design of Coldformed Steel Structural Members.
- B. ASTM A-653 & ASTM A924 Steel Sheet, Zinc-Coated (Galvanized)
- C. ASTM E-1680 (Air Infiltration Test)
- D. ASTM E-1646 (Water Penetration Test)
- E. ASTM E-1592
- F. Spec Data Sheet - Galvalume Sheet Metal by Bethlehem Corp.
- G. SMACNA - Architectural Sheet Metal Manual.
- H. Building Materials Directory - Underwriter's Laboratories, Test Procedure 580.

1.4 Assembly Description:

A. The roofing assembly includes preformed sheet metal panels, related accessories, valleys, hips, ridges, eaves, corners, rakes, miscellaneous flashing abutting roofing and/or part of roofing system, attaching devices, eave drip flashing, and other flashing abutting roofing system.

1.5 Submittals:

- A. Submit detailed drawings showing layout of panels, anchoring details, joint details, trim, flashing, and accessories. Show details of weatherproofing, terminations, and penetrations of metal work.
- B. Submit a sample of each type of roof panel, complete with factory finish.

C. Submit results indicating compliance with minimum requirements of the following performance tests:

1. Air Infiltration ASTM E-1680 and ASTM E-283
2. Water Infiltration ASTM E-1646 and ASTM E-331
3. Wind Uplift - U.L.90

4. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

a. Temperature Change (Range): 120 degree F. ambient, 180 degree F. material surfaces.

D. Submit calculations with registered engineer seal, verifying roof panel and attachment method resists wind pressures imposed on it pursuant to applicable building codes.

1.6 Quality Assurance:

A. Manufacturer: Company specializing in Architectural Sheet Metal Products with ten (10) years minimum experience.

1.7 Delivery, Storage and Handling

A. Upon receipt of panels and other materials, installer shall examine the shipment for damage and completeness.

B. Panels should be stored in a clean, dry place. One end should be elevated to allow moisture to run off.

C. Panels with strippable film must not be stored in the open, exposed to the sun.

D. Stack all materials to prevent damage and to allow for adequate ventilation.

1.8 Warranty:

A. Special Galvalume Substrate Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, or perforating.
 - b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: 20 years and 6 months from date of Substantial Completion.

B. Special Warranty on Panel Finish: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

following:

D 2244.

4214.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the
 - a. Color fading more than 5-Hunter units when tested according to ASTM
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D
 - c. Cracking, chipping, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 20 years from date of Substantial Completion.

C. Special Watertightness Warranty: Manufacturer's standard from in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain watertight, including leaks, within specified warranty period.

1. Warranty Period: 5 years from date of Substantial Completion.
2. Shop drawings must be provided to, reviewed, and approved by panel manufacturer prior to panel system installation.
3. Inspections by panel system manufacturer technical representative are required. Perform first inspection when underlayment and flashing are in place and second inspection when the roof is complete.

D. Special Installer Warranty: Furnish a written warranty signed by the Panel Applicator guaranteeing materials and workmanship for watertightness of the roofing system, flashings, penetrations, and against all leaks.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCT

2.1 Acceptable Manufacturers:

A. Basis of Design: Cee-Lock Panel as manufactured by Berridge Manufacturing Company / Houston, Texas

1. Product information is listed for reference purposes to establish material characteristics, quality, and finish. Alternate manufacturer's products shall meet or exceed the listed products.

2.2 Sheet Materials:

A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.

1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.

B. Vertical-Rib, Snap-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and a flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and snapping panels together.

1. Metallic-Coated Steel Sheet: Aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

a. Nominal Thickness: 0.24 inch, Grade 40

b. Exterior Finish: Two-coats fluoropolymer, Kynar 500 / Hylar 5000, AAMA 621; containing not less than 70 percent PVDF resin by weight in color coat applied by panel manufacturer on a continuous coil coating line, with a top side dry film thickness of 0.75 ± 0.05 mil over 0.2 ± 0.05 mil primer coat, to provide a total dry film thickness of 0.95 ± 0.10 mil. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

c. Painted materials shall have a removable plastic film to protect the paint during roll forming, shipping, and handling.

d. Color: As selected by Architect from manufacturer's full range.

2.3 Accessory Materials:

A. Clips: Continuous Cee-Rib with Vinyl Weatherseal Insert to accommodate thermal movement.

1. Material: 0.024 inch nominal thickness, aluminum-zinc alloy-coated steel sheet.

B. Panel Fasteners: Zinc-coated steel, corrosion resisting steel, zinc cast head, or nylon capped steel, type and size as approved for the applicable loading requirements.

C. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match materials and finish of metal panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.

2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

D. Flashing and Trim: Provide flashing and trim formed from same materials as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

E. Sealant: As specified in Section 079100.

F. Roofing Deck Underlayment: Fiberglass-reinforced, water-repellant breather-type 30-lb. asphalt felt, U.L. classified; meeting ASTM D226, Type 1.

G. Asphalt Cement: Fibrated asphalt cement, asbestos free and meeting ASTM D4586.

H. Waterproofing Underlayment: Self-adhering sheet barrier membrane with rubberized asphalt adhesive backed by a layer of slip-resistant coated high-density cross-laminated polyethylene film. The rubberized asphalt is backed with a foldless release paper, equal to W. R. Grace Ice and Water Shield.

I. Nails: 11 or 12 gauge aluminum or hot-dipped galvanized, with barbed shanks, 3/8-inch minimum diameter head; length as necessary to penetrate through decking, or 3/4-inch into solid wood.

2.4 Fabrication:

A. All exposed adjacent flashing shall be of the same material and finish as the roof panels.

B. Hem all exposed edges of flashing on underside, 1/2 inch.

2.5 Standing Seam Panel:

A. Panels shall have 1-1/2" high vertical legs, spaced 16-1/2" on center.

B. Standing seam to be of an interlocking, "snap-lock" design.

C. Panels shall be factory-formed (max 40') unless specifically approved by the manufacturer for site-formed.

D. Continuous Rib to be 1-3/8" wide and 2-1/8" in height. Rib shall be connected to purlin with two #12-14 x 1" self-drilling/tapping fasteners at 3'-0" max.

E. Panel assembly to bear Underwriter's Laboratories Label UL90, pursuant to Construction Number 334 and applicable Fire Ratings.

2.6 Eave Drip Flashing:

A. Profile as detailed. Fabricate from same material as roofing panels 10'-0" lengths and finished to match roofing.

1. Continuous cleats and other accessories, manufacturer's standard as required for complete installation.

2.8 Miscellaneous Flashing:

A. Profile as detailed. Fabricate from same material as roofing panels 10'-0" lengths and finished to match roofing.

1. Continuous cleats and other accessories, manufacturer's standard as required for complete installation.

PART 3 - EXECUTION

3.1 Inspection:

A. Substrate:

1. Examine roof deck to ensure proper attachment to framing with joints solidly supported and blocked.
2. Inspect roof deck to verify deck is clean and smooth, free of depressions, waves or projections, level to +/- 1/4" in 20', and properly sloped.
3. Verify roof openings, curbs, pipes, sleeves, ducts or vents through roof are solidly set, cant strips and reglets in place, and nailing strips located.
4. Verify deck is dry.

B. Roof Deck Underlayment shall be installed in accordance with manufacturer's instructions. Apply one layer of underlayment horizontally over substrate, with 2-inch minimum side laps and 4-inch minimum end laps. Secure with roofing nails until shingles are installed.

C. Waterproofing Underlayment:

1. Eaves, Rakes, etc.: Install one layer of waterproofing underlayment in accordance with manufacturer's instructions, to a min. of 36" around complete perimeter roof edge (eaves, rakes, etc.) Lap over roof deck underlayment a min. of 6" at rakes; lap roof deck underlayment over waterproofing underlayment a minimum of 6" at eaves.
2. Junctures with Vertical Surfaces: Where any roof abuts a vertical surface, install one layer of waterproofing underlayment a min. of 36" wide and to 24" beyond each direction. Lap over roof deck underlayment a min. of 6".
3. Valleys: Install one layer of waterproofing underlayment in accordance with manufacturer's instructions, a min. of 36" wide centered over valleys; lap joints a min. of 6" and lap over roof deck underlayment a min. of 6".
4. For roof slopes less than 4:12, apply waterproofing underlayment to complete roof deck surface and to a min. of 24" beyond each direction. Lap over roof deck underlayment a min. of 6".
5. Roof Penetrations: Install waterproofing underlayment at all roof penetrations, to a minimum of 20" beyond the penetration in all directions.

3.2 Installation of Metal Roofing:

A. Comply with manufacturers standard instructions and conform to standards set forth in the Architectural Sheet Metal Manual published by SMACNA, in order to achieve a watertight installation.

B. Install panels in such a manner that horizontal lines are true and level and vertical lines are plumb.

C. Install starter and edge trim before installing roof panels.

- D. Remove protective strippable film prior to installation of roof panels.
- E. Attach panels using manufacturer's standard clips and fasteners, spaced in accordance with approved shop drawings.
- F. Install sealants for preformed roofing panels as approved on shop drawings.
- G. Do not allow panels or trim to come into contact with dissimilar materials.
- H. Do not allow traffic on completed roof. If required, provide cushioned walk boards.
- I. Protect installed roof panels and trim from damage caused by adjacent construction until completion of installation.
- J. Remove and replace any panels or components which are damaged beyond successful repair.

3.3 Installation of Eave Drip Flashing and Other Miscellaneous Flashing:

A. Eave Drip: Install in locations shown on the drawings, in lengths not exceeding 10-feet; each joint shall have back-up plate and over plate; cover plate to be 8" in width as is back-up plate; joint to be 1/4"; set back-up plate in mastic; hold molding in place with continuous cleats.

1. Eave drip shall be installed in maximum possible lengths so as to minimize short pieces.
2. Joints shall be located symmetrically.
3. Inside corners and outside corners shall be neatly cut and sealed. Do not bend eave drip around corners.
4. Eave drip shall be securely snuffed against the roof edges and fascia and shall follow the fascia in neat, straight lines.
5. At joints, provide a min. 4" wide cover plate to cover face nails at the joints.
6. Exposed face nails at eave drip will not be allowed.
7. Seal all joints at eave drip. Refer to Section 079100.

B. Install other miscellaneous flashing abutting roof system in method as specified for eave flashing.

3.4 Installation of Gutters and Downspouts:

- A. Furnish and install continuous gutter with downspouts at locations shown on the plans.
- B. Install gutters in locations shown on drawings and in accordance with details shown thereon. Furnish gutter sections in 10'-0" lengths with 6" wide concealment joint covers. Furnish 1" wide straps at 32" o.c. at gutters. For gutters provide corners, end caps, expansion joints, outlets, elbows, etc., as required for complete installation. Install strainer at each downspout.

1. Install downspouts in locations shown on drawings; provide 2-inch wide straps to secure downspouts, spaced as recommended by SMACNA. Downspouts shall be located symmetrically unless an architectural element prohibits such.

3.5 Cleaning:

A. Clean any grease, finger marks or stains from the panels per manufacturer's recommendations.

B. Remove all scrap and construction debris from the site.

END OF SECTION

079100 – JOINT SEALANTS

PART 1 - GENERAL

1.1 Quality Assurance:

A. Industry Standards:

1. Some products and execution are specified in this section by reference to published specifications or standards (with respective abbreviations used). These referenced publications may be subject to special conditions or limitations where specified hereinafter.

2. Reference Publications:

- a. American Society for Testing and Materials (ASTM).
- b. Federal Specifications (FS).

1.2 Related Sections:

- A. Section 013000, Submittals
- B. Section 321313, Concrete Walks, Curbs, and Misc Flatwork
- C. Section 099000, Painting
- D. Section 107113, Exterior Sun Control Devices

1.3 Definitions:

A. Sealant: A weatherproof elastomer used in filling and sealing joints, having properties of adhesion, cohesion, extensibility under tension, compressibility and recovery.

B. Caulk: Term used to denote the process of filling and sealing the joints, without regard to type of material.

1.4 Submittals:

A. General: Make submittals in accordance with Section 013000.

B. Product Data: Manufacturer's detailed descriptive and specification data for each type of sealant and joint filler described hereinafter; furnish color card showing full range of colors available.

1. For each sealant type, submit manufacturer's certification that product complies with South Coast Air Quality Management District Rule 1168 (Low / No VOC – 250 g/L or less).

C Samples: For each type and color of sealant required accompanied by sample of joint filler.

1.5 Product Handling:

A. Delivery: Deliver the products of this section in manufacturer's original unopened packaging with labels intact and legible.

B. Storage and Protection: Store and protect products of this section in accordance with manufacturer's instructions.

1.6 Job Conditions:

A. Temperature: Do no caulking if ambient temperature is 32 degree F or below.

PART 2 - PRODUCTS

2.1 Materials:

A. Basis of Design: Products as listed in par. 2.1.B.

1. Product information is listed for reference purposes to establish material characteristics, quality, and finish. Alternate manufacturer's products shall meet or exceed the listed products.

B. Sealants:

1. Type 1: Elastomeric acrylic urethane, complying with ASTM C-920, Type S or M, Grade P, Class 25, use T; color as selected by Architect, equal to Sika 2cns.

2. Type 2: Elastomeric, ultra-low modulus designed for minimum 100% elongation and minimum 50% compression, meeting ASTM C-920, Type S or M, Grade NS, Class S5, Use NT; color as selected by Architect.

3. Type 3: Epoxy, semi-flexible resin, 2-component, self-leveling, 80% elongation,, meeting ACI 302.1R, equal to Sikadur – 58 CJR

C. Joint Filler: Fiber roving or neoprene, butyl, polyurethane, or polyethylene foams free from oil or other staining elements as recommended by sealant manufacturer. Backstop material shall be compatible with sealant. Do not use oakum and other types of absorptive materials as backstops.

D. Primers: Non-staining, quick-drying type and consistency recommended by the sealant manufacturer for the particular application.

E. Cleaning Solvents: As recommended by the sealant manufacturer.

F. Bond Breakers: Type and consistency recommended by the sealant manufacturer for the particular application.

G. Application Equipment: Sealant application equipment shall be only such equipment as is specifically recommended by the manufacturer of the sealant being installed.

PART 3 - EXECUTION

3.1 Installation:

A. Preliminary Requirements:

1. Surface Preparation:

a. Surfaces to be sealed shall be sound, clean, dry, frost free and free of contamination by laitance, form release agents, concrete curing compounds or other surface treatments. When resealing an existing joint, remove existing caulk or sealant prior to applying new sealant.

b. Masonry and concrete surfaces shall be wire brushed.

c. Metal, glass and wood surfaces shall be cleaned prior to applying sealants.

d. Steel Surfaces: Remove loose mill scale by sandblasting or, if sandblasting is impractical or would damage finish work, scraping and wire brushing. Remove protective coatings by sandblasting or using a residue-free solvent.

e. Aluminum Surfaces: Remove temporary protective coatings from surfaces that will be in contact with sealant. When masking tape is used as a protective coating, remove tape and any residual adhesive just prior to sealant application. For removing protective coatings and final cleaning, use non-staining solvents recommended by the manufacturer of the item(s) containing aluminum surfaces.

2. Masking: Surfaces adjacent to joints shall be masked to obtain a neat sealant line.

3. Bond Breaker: Provide bond breakers to the back or bottom of joint cavities, as recommended by the sealant manufacturer for each type of joint and sealant used, to prevent sealant from adhering to these surfaces. Carefully apply the bond breaker to avoid contamination of adjoining surfaces or breaking bond with surfaces other than those covered by the bond breakers.

4. Joint Filler: Joints exceeding the maximum allowable depth as hereinafter described shall be filled to within the allowable depth with the specified joint filler.

5. Primer: Apply primer to surfaces to be caulked as recommended by the manufacturer of the sealant being installed.

B. Locations:

1. As the work progresses caulk and seal all joints subject to movement or subject to passage of air or moisture.

a. Type 1 Sealant: Install wherever sealant is required in conjunction with metal flashings and sheet metal work.

b. Type 2 Sealant: Where sealant is required for joints in masonry, including metal reglets where flashing is inserted into masonry joints.

c. Type 3 Sealant: Where sealant is required for concrete control joints.

C. Application of Sealant:

1. Install sealant under pressure to fill joint, taking care to produce beads of proper width and depth; tool as recommended by the manufacturer; immediately remove all surplus sealant.

2. Width and depth of sealed joint shall not exceed the proportions of 1/2 inch width x 1/2 inch diameter and 3/4 inch width x 1/4 inch diameter, except that metal thresholds and sills shall be set in full bed of specified sealant.

3.2 Field Quality Control:

A. Protection: To insure proper curing, sealed joints shall not be touched, washed or otherwise disturbed for 48 hours after installation unless specifically recommended otherwise by the sealant manufacturer.

END OF SECTION

099113 – EXTERIOR PAINTING

PART 1 - GENERAL

1.1 Quality Assurance:

A. Manufacturers: All paints/stains selected for the coating and finishing system for each type of surface shall be the product of a single manufacturer and as described hereinafter.

1.2 Related Sections:

- A. Section 013000, Submittals
- B. Section 321313, Concrete Walks, Curbs, and Misc Flatwork
- C. Section 051200, Structural Steel

1.3 Definitions:

A. Paint: Term used in a general sense and has reference to sealers, primer, stains, oils, alkyd, latex, epoxy and enamel type paints.

B. Painting: Term used in a general sense and has reference to the application of "paint" without regard to the type of material, to an item.

C. Back Prime: Terms used in a general sense and has reference to the application of "paint" (first coat), without regard to the type of material, to the back side (unexposed to view) of an item.

1.4 Submittals:

A. General: Make submittals in accordance with Section 013000.

B. Material List: Prior to delivery of any paint materials to the project site, submit a complete list of all paint materials to be used in this project as described hereinafter.

C. Manufacturer's Data: Accompanying the materials list, furnish the paint manufacturers detailed descriptive and specification data and application instructions for each type of paint required including INTERIOR Green Seal Standard GS-11 compliance :

Architectural Paints: Flats:	50 g/L
Non-flats:	100 g/L
Coatings and Primers:	100 g/L

D. Color Cards: Manufacturer's full range of colors available for each finish described hereinafter in the "Painting Systems Schedule".

E. Color Samples:

1. After review of the material list color cards and manufacturer's data, but prior to delivery of any paint to the project site, submit color samples, not less than 12 inches x 12 inches each, for each type and color of finish required.

2. Wherever possible, the material upon which the sample colors are applied shall be the same material as that on which the paint will be applied in the project.

1.4 Product Handling:

A. Delivery: Deliver the products of this section in manufacturer's original unopened packaging with labels intact and legible.

B. Storage and Protection: Store products of this section in a housed, dry and ventilated area, and protect from damage.

1.5 Job Conditions:

A. Temperature: Maintain a constant temperature of not less than 65 degrees F during interior painting and drying operations.

B. Ventilation: Provide ventilation to allow for the proper drying of the paint materials by using either of the following:

1. Temporary air circulators (spark proof)
2. Air conditioning system.

PART 2 - PRODUCTS

2.1 Materials:

A. Manufacturers:

1. The use of manufacturer's names and products are for reference only to indicate characteristics of the material and the finished required.

2. Subsequent to the requirements of these specifications, acceptable manufacturers include:

- a. Benjamin Moore BM
- b. Pratt & Lambert PL
- e. PPG Paints PPG
- d. Sherwin Williams SW

B. Colors: Colors shall be as selected by the Architect.

C. Accessory Equipment: Ladders, scaffolding, drop clothes, scrapers, dusters and similar items are not required to be new, but they shall be safe, adequate and acceptable of producing the results for which they are intended.

D. Application Equipment: Brushes, rollers, spray apparatus and similar application equipment are not required to be new, but they shall be capable of producing the required results specified hereinafter.

E. Thinners: Only those recommended for that purpose by the manufacturer of the material being installed.

PART 3 - EXECUTION

3.1 Installation:

A. Surface Preparation:

1. General: Do not begin painting on any surface until it has been inspected and is in condition to receive the paint as specified herein. Should any surface be found unsuitable to produce a proper paint finish, the Architect shall be notified in writing and no material shall be applied until the unsuitable surfaces have been made satisfactory. Absence of such notification shall be construed as acceptance of such surface to receive paint. Later claims of defects in surfaces prior to painting shall not relieve the Contractor from his responsibility for compliance with the requirements of the Specifications.

2. Steel and Iron: Remove grease, dirt, mud, rust and scale. Touch up any chipped or abraded places on items that have been shop coated. Where steel and iron have a heavy coating of scale, it shall be removed by de-scaling or wire brushing to produce a smooth surface for painting.

3. Hardware, hardware accessories, lighting fixtures, switch and outlet plates, in place and not to be painted shall be removed prior to surface preparation and painting operations or protected. Following completion of painting of each space, removed items shall be reinstalled.

B. Application and Instructions:

1. The proportions of all ingredients in all paints and stains mixed on the site shall be in accordance with the recommendations of the paint manufacturer printed on the container applicable to the particular use for which the specific mixture is intended. No thinner or flattening oil will be used in the last coat. Screen out all lumps and impurities during mixing using clean containers, and protect against dirt or trash entering the mix. Stir until uniform consistency is procured.

2. During the actual application and drying of the paint, and until normal occupancy of the building occurs, a minimum temperature of 65 degrees F. shall be maintained. This temperature shall be held as constant as possible to prevent condensation. Ventilation shall be provided at all times so that the humidity cannot rise above the dew point of the coldest wall.

3. Do not apply exterior paint in damp rainy weather or until the surface has dried thoroughly from the effects of such weather.

4. Surface to be stained or painted shall be clean, dry and smooth. Each coat of paint shall be smoothly applied, worked out evenly and allowed to dry before the subsequent coat is applied.

5. Enamel or varnish undercoats on wood surfaces and on steel surfaces shall be sanded smooth prior to recoating. Undercoats on steel and iron shall be dusted prior to recoating.

6. Finished work shall be uniform and of the specified color. It shall completely cover, be smooth and free from runs, sags, clogging or excessive flooding. Make edges of paint adjoining other materials or color, sharp and clean without overlapping. Where high gloss enamel is used, lightly sand undercoats to obtain a smooth finish coat.

7. Each coat of paint shall be slightly different shade than preceding coat. Final coat shall not be applied until the previous coat has been approved by the Contracting Officer.

8. Correction of improper or damaged work may be by "spot touching" except that in final coat corrections, a re-coating of the entire surface between corners or "breaks" will be required without additional charge.

9. Prime coated butts shall be painted the same color as door trim to which they are attached.

10. Exposed piping, conduit, duct work and hangers in finished spaces, shall be painted a color and texture to match walls or ceilings adjacent to them. Where adjacent surfaces are unpainted, use color as directed by the Architect.

12. Cleaning: At completion of the work, clean all paint, coatings, oil and stain spots from all surfaces not required to be paint under this section. Remove all surplus materials and debris resulting from the work included herein.

13. Schedule indicates minimum number of coats. Additional coats shall be applied as required for full coverage.

C. Painting Systems Schedule:

1. Exterior Painting:

a. Ferrous Metal:

- 1) Primer – Multi Purpose Alkyd
One coat (in addition to shop coat):

BM V131 Corotech Univ Metal Primer
PL Steeltech® Rust Inhibitive Metal Primer
PPG 6-208 Speedhide Rust Inhibitive Primer
SWKromil Primer E41

- 2) Finish - Rust Inhibitive Alkyd Gloss Industrial Enamel
Two coats:

BM V200 Corotech Alkyd Enamel
PL S1100 Red Seal Enamel
PPG 7 Line Industrial Enamel Gloss Oil
SWPro Industrial B50WZ3

b. Galvanized Metal:

- 1) Primer – Multi Purpose Alkyd Primer
One coat:

BM HP04 Ultra Spec
PL P1001 Multi Purpose Primer
PPG 90-712 Pitt-tech DTM Primer
SWPro Industrial DTM B66W1

- 2) Finish - Gloss Acrylic Enamel:
Two coats:

BMHP28 Ultra Spec
PL Z2400 Red Seal Enamel
PPG 90-374 Pitt-tech High Gloss DTM
SWPro Industrial DTM B66W111

c. Concrete Paving: For alternate product, provide submittals that meet or exceed the below

- 1) Primer – Concrete Bonding Primer
Streetbond Concrete Primer “WB”
- 2) Finish – Streetbond SB150 (coats as required per manufacturer instructions)

3.2 Field Quality Control:

A. Painting:

1. During progress of the work, do not allow the accumulation of empty containers or other excess items except in areas specifically set aside for that purpose.
2. Prevent accidental spilling of paint materials and, in event of such spill, immediately remove all spilled material and the waste or other equipment used to clean up the spill, and wash the surfaces to their original undamaged condition.
3. Upon completion of this portion of the work, visually inspect all surfaces and remove all paint and traces of paint from surfaces not scheduled to be painted.

END OF SECTION

107113 – EXTERIOR SUN CONTROL DEVICES

PART 1 - GENERAL

1.1 Quality Assurance:

A. **Qualification of Manufacturer:** Manufacturer of the products of this section shall have been successfully engaged in the business of manufacturing and fabricating architectural louvers for a period of not less than five years immediately prior to furnishing the products of this section.

B. **Special Warranty:** As a condition of acceptance, furnish a written warranty agreeing to replace products found to be defective as a result of inferior grade of materials or inferior workmanship within one year of date of Architect's Certificate of Substantial Completion.

C. **Referenced Publications:** Air Movement and Control Association (AMCA)

1.2 Related Sections:

A. Section 013000, Submittals

B. Section 051200, Structural Steel

1.3 Submittals:

A. **General:** Make submittals in accordance with Section 013000.

B. **Shop Drawings:** Prior to commencing fabrication of the products of this section, submit manufacturer's shop drawings for review, fully dimensioned, showing actual field measurements and showing method of installation and anchorage.

C. **Manufacturer's Data:** Accompanying the shop drawing submittal, furnish for review manufacturer's detailed materials and fabrication specifications and installation recommendations.

D. **Manufacturer's color chart.**

PART 2 - PRODUCTS

2.1 Materials:

A. **Aluminum sunshade:** Design is based on 4" louvered aluminum sunshade units, Stanley Series "New Jersey" as manufactured by AGS, Inc., Frankfort / Illinois, in extruded aluminum frame. Color shall be selected from the manufacturer's standard colors.

1. Coordinate with mechanical where louvers are utilized for mechanical ventilation.

B. **Accessories:** Furnish accessories and anchors as required for a complete installation.

2.2 Fabrication:

A. General: Fabricate architectural louvers to the design and sizes shown on the drawings from the materials and in compliance with AMCA and the published specifications of the louver manufacturer.

PART 3 - EXECUTION

3.1 Inspection:

A. The Contractor shall examine the areas and conditions under which the products of this section are to be installed; notify the Architect in writing of conditions detrimental to the installation of the products of this section and the completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2 Installation:

A. Install all members in accordance with the details shown on the drawings and in strict compliance with the manufacturer's instructions. Louvers shall be level, plumb, square, and securely anchored. Seal perimeter flanges.

3.3 Field Quality Control:

A. Cleaning: Prior to final inspection, remove maskings and labels and clean all exposed to view surfaces as recommended by the manufacturer of the items installed.

END OF SECTION

260000 – ELECTRICAL

REFER TO DRAWINGS

310000 - EARTHWORK

1. GENERAL

1. RELATED DOCUMENTS

- A. Contract 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. This Section includes the requirements for excavation, re-grading, stripping and stockpiling of topsoil, filling, moisture conditioning, backfilling, compaction, fine grading, hauling, and legal off-site disposal of spoil materials to meet the required lines and grade as specified to complete the work.
- B. Related Sections:
 - 1. Division 311100 "Clearing and Grubbing".
 - 2. Division 329120 "Topsoil".
 - 3. Division 329113 "Soil Preparation".

3. DEFINITIONS

- A. Excavation: The removal of material encountered to subgrade or over-excavation and subsequent disposal or placement of materials removed.
- B. Unclassified Excavation: The term "unclassified excavation", as used herein, includes the excavation of all materials required for the work obtained within construction limits of project, including bedrock, surface boulders, wasted sections of concrete, asphalt or other debris including historic landfills that may be encountered. All excavation will be considered unclassified regardless of the nature of material encountered.
- C. Classified Excavation: The term "classified excavation", as used herein, defines the soil conditions that are expected to be encountered and makes provisions for measurement and payment of any rock encountered at an agreed upon unit price.
- D. Unauthorized Excavation: Inadvertent or purposely removing materials beyond indicated subgrade elevations or dimensions without specific direction of the Project Manager. Unauthorized excavation, as well as remedial work resulting from unauthorized excavation shall be at Contractor's expense.
- E. Unsuitable Materials: For the purposes of classified excavation, unsuitable material shall be defined as material below subgrade elevation that exhibits excessive pumping or that does not meet density requirements due to unsatisfactory material as determined by geotechnical engineer and/or Project Manager.

- F. Subgrade: The undisturbed earth or the compacted soil layer immediately below proposed pavement and topping materials.
- G. Structure: Walls, foundations, slabs, pavement or other manmade stationary features occurring above or below ground surface.
- H. Structural Fill: The term “structural fill”, as used herein, includes soil materials used for general site filling under pavements or structures.
- I. Rough Grade: Cutting and filling the earth for preparation of finish grade. Elevation shall be within +/- one-tenth (.10') of a foot to the elevation indicated for that point.
- J. Finished Grade: Any surface which has been cut to or built to the elevation indicated for that point. Elevation shall be +/- five one-hundredths (.05') of a foot from required elevation.

1.4 SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:
 1. Location of soil source.
 2. Classification according to ASTM D 2487.
 3. Laboratory compaction curve according to ASTM D 698.
- C. Provide a minimum of one (1) gallon sample of imported fill material for approval by the Project Manager.
- D. For imported fill materials, general or structural, the Contractor shall provide, at a minimum, a soils report indicating gradation tests, liquid limit, plasticity index and standard proctor density test and free of environmental contaminants. Depending on the use of the imported backfill materials the Project Manager may request that a soils analysis be performed to determine percent organic content of the soils, salt levels, and environmental contaminants of concern. Division 32 Section “Topsoil” for additional information.

1.5 QUALITY CONTROL

- E. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.
- F. Comply with requirements within project Geotechnical Report.
- G. Codes and Standards: Comply with all applicable local, state and Federal rules, regulations and ordinances concerning sloping of excavation, trenching and safety of workers, including the latest version of OSHA requirement.

- H. Testing Agency: Testing Agency to test the following, and as stated throughout this Section:
 - 1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
 - 2. Determine that fill material and maximum lift thickness comply with requirements.
 - 3. Determine, at the required frequency, that in-place density of compacted fill complies with requirements.
- I. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable.
- J. Comply with applicable requirements of CABO/ANSI A117.1 for accessibility requirements related to walks, ramps, parking areas, drives, curb ramps, etc.

6. PROJECT CONDITIONS

- A. Protection and Repair of Underground lines:
 - 1. Existing Public Utilities: Locate existing underground utilities within the limits of work per General Contract Conditions. Request utility locates seventy-two (72) hours in advance of any excavations by calling the Utility Notification Center of Georgia at 811. The Contractor is responsible for providing written and graphical documentation from the utility owner. Take whatever precautions are necessary including potholing to verify location and depth to protect these underground lines from damage. Should unmarked or incorrectly marked utilities or other piping be encountered during excavation, notify the Project Manager immediately for direction. If damage does occur, all damage shall be repaired by the utility owner and all costs of such repair shall be paid by the Contractor. Only written all clears will be acceptable, verbal all clears will not be accepted.
 - 2. Existing Private Utilities: Locate existing underground utilities within the limits of work per General Contract Conditions. The Contractor is required to contact all private utility companies to locate all utilities. The Contractor is responsible for providing written and graphical documentation from the private utility owner. The request for locates shall be a minimum of seventy-two (72) hours prior to proceeding with any excavation. If, after such requests, private utilities are encountered and damaged by the Contractor these shall be repaired at no cost to the City. If the Contractor damages staked or located private utilities, they shall be repaired by the utility owner and all costs of such repair shall be paid by the Contractor. Only written all clears will be acceptable, verbal all clears will not be accepted.
- B. Use of Explosives: Use of explosives is not permitted.
- C. Protection of Persons and Property: The Contractor is responsible for installing barricades and posting warning lights with all open excavations occurring as part of the work.

1. Protect structures, utilities, walkways, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- D. Environmental Requirements: Blasting is not permitted. Employ jack hammering and other loud noises and methods sparingly; comply with all applicable noise abatement ordinances or regulations. Onsite burning is not allowed.
- E. Existing Benchmarks: Carefully preserve and maintain existing benchmarks, vertical/horizontal control, monuments, property line pipes and pins, and other reference points. If disturbed or destroyed, restore or replace at no additional cost to the City.
- F. Do not commence earth moving operations until temporary erosion- and sedimentation-control measures are in place.

7. GENERAL

- A. All earthwork operations shall be executed in a manner, which minimizes dust, noise, excessive accumulation of debris, danger to the public and interference with other construction. Only pneumatic-tired equipment shall be permitted over paved streets, walks and curb surfaces. Any damage to related site improvements shall be repaired at the expense of the Contractor prior to acceptance by the Town. Positive drainage shall be provided at all times throughout the earthwork operations.
- B. Earthwork operations shall be executed to provide subsoil compaction to a minimum 85 to 90 percent (85 to 90%) modified Proctor density at a + 3 percent (3%) of optimum moisture on areas to be eventually turfed or planted, and compaction to a minimum 95 percent (95%) modified Proctor density at + 2 percent (2%) of optimum moisture under all walks, trails, structures and other site improvements. Testing to demonstrate compliance with this specification shall be performed by a registered professional engineer practicing in the field of soils mechanics, per ASTM D 1557. All costs for tests shall be paid by the Contractor. The amount of testing shall be at the sole discretion of the Designated City Authority.
- C. All walks and trails shall be graded to meet all current ADA standards and guidelines to include a minimum cross pitch in the appropriate direction of one quarter inch per foot (1/4" per foot) or two percent (2%), and centerline gradient shall not exceed one foot in twenty feet or five percent (5%) (per ADA recommendations). Concentrated drainage shall be designed to pass under walks and trails by culvert or standard approved walk chase. Culverts or walk chases should be designed for the two- (2) year to ten- (10) year event and coordinated with surrounding drainage facilities. The minimum allowed culvert size is eighteen (18) inches and flared end sections (F.E.S.) will be required. Low water trail crossings will not be allowed unless approved by the City.

8. GUARANTEE

- A. Upon completion of earthwork operations, Contractor shall guarantee that in areas that have been excavated, no rock, concrete, vegetation, construction materials or other rubble shall lie within twenty-four inches (24") of the ground surface, nor within the path of

any proposed planting, irrigation lines, utilities or foundations, or other site improvements. Contractor shall also guarantee against settlement for one full year after final acceptance of the project by the City. Any corrections required to meet this specification, including repair/replacement of seed, sod, pavements, or other site improvements shall be at the Contractor's expense.

- B. Completed grades shall be smoothly and uniformly sloped, properly compacted, and shall provide drainage away from site improvements. All banks or slopes constructed shall be maintained in a stable condition to prevent slips, washouts or erosion, by approved methods. All maintenance shall be at Contractor's expense until City acceptance (typical warranty period is two (1) year.) All finished grades to be within .2 feet (two tenths) of final design grade elevation.

PART 2 - PRODUCTS

1. SOIL MATERIALS

- A. General: All fill material, regardless of intended use category, must be clean and free from organic matter, roots, brush or other vegetation, trash, debris or other detrimental substances, and rocks or unbroken lumps larger than three-inches (3"). The Project Manager is to approve material prior to placement.
 - 1. The Contractor is responsible for furnishing load tickets and providing a daily log of cubic yards of soil materials imported or exported.
 - a. Structural Fill: Shall be Class 1 or Class 2 material composed of non-organic mineral aggregates and soil from excavations of existing soils obtained from on-site or imported fill, including granular or aggregate base course from removed pavements. Fill containing organic matter or any other deleterious substances, including overly wet soils, bedrock, or high swell content soils will not be accepted. If sufficient materials meeting the above requirements are not available from on-site sources, provide additional material obtained from off-site sources and approved by the testing and inspections agency, at no additional cost to the City. The soil must be compactable and pass, at minimum, a proof roll prior to being accepted for supporting paving materials.
 - b. On-Site Topsoil: The top four-inches (4") minimum of organic material in the excavation zone shall be stripped stockpiled prior to other earthwork operations. All stockpiled topsoil shall be reused on site.

2.2 ACCESSORIES

- a. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, six-inches (6") wide and four (4) mils thick, continuously inscribed with a description of the utility.
- b. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of six-inches (6") wide and four (4) mils thick, continuously

inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to thirty-inches (30") deep.

- c. Tape: Colored as follows:
 - i. Red: Electric.
 - ii. Yellow: Gas, oil, steam, and dangerous materials.
 - iii. Orange: Telephone and other communications.
 - iv. Blue: Water systems.
 - v. Green: Sewer systems.

3.EXECUTION

1. EXAMINATION

- A. Examine areas where the Work of this Section will be performed for compliance with requirements and conditions affecting installation and performance.
 - i. 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 the work area.
 - ii. Proceed with installation only after unsatisfactory conditions have been corrected and approved by Project Manager.

2. GENERAL PROCEDURES

- A. Comply with all local, state and national erosion control requirements.
- B. Erosion Control shall be maintained during all phases of site excavation and site development and maintained throughout the construction period in order to protect adjacent properties, streets, and storm sewers from erosion and sediment runoff during the construction process. Do not commence excavation and grading work until erosion control measures are in place and have been inspected by the Project Manager. Contractor shall be responsible for maintaining erosion control measures throughout construction. Frequent monitoring, cleaning and other work required for proper operation shall be Contractor's responsibility. Contractor shall modify/replace all erosion control measures to fit field conditions following direction for corrective actions from Project Manager and or Wastewater Management Inspector.

3.3 FIELD QUALITY CONTROL

- A. Testing and inspections shall be coordinated and paid for by the Contractor.

- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- C. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; re-compact and retest until specified compaction is obtained.

3.4 DEWATERING

- A. Wherever possible, prevent surface water and subsurface or groundwater from flowing into excavations and from flooding the project site and surrounding area.
- B. Contractor shall be required to dewater excavated areas by pumping, or otherwise control the water so that the project can be constructed in accordance with the plans. Any controlling of the water must be performed in such a manner that recently constructed portions of the project are not damaged. Repairs shall be at the Contractor's expense.
- C. Damage to adjacent property that results from the Contractor's alteration of any surface drainage, ground water flows or pumped water shall be repaired by the Contractor at no additional cost to the City.

5. GROUND SURFACE PREPARATION

- A. Complete clearing and grubbing operations in accordance with Division 31 Section "Clearing and Grubbing". Where new material is to be placed on compacted subgrade, scarify ground surface until surface is free from ruts, hummocks or other uneven features, which would prevent uniform compaction and bond between old and new material.

B. Unsuitable Conditions:

- a. Inspection: Following stripping, examine exposed surface for unsuitable soil, areas of loose or soft soil, disturbed soils, or soft moist soils.
- b. Removal: Remove soil at areas of unsuitable conditions down to undisturbed acceptable soils.
- c. Replacement: Replace with specified fill material at specified compaction requirements.

3.6 STRIPPING AND STOCKPILING TOPSOIL

- A. Strip all topsoil from the excavation zone for new facilities (four-inches (4") in depth for all disturbed areas). Stockpile topsoil in locations indicated on the Drawings or as directed by the Project Manager.

- B. Placing topsoil, refer to Section "Topsoil".

3.7 EXCAVATION

- A. Stability of excavations: Comply with local codes, ordinances, and requirements of agencies having jurisdiction to include the latest revision to OSHA standards.
- B. Excavation for Structures: Conform to elevations and dimensions shown within a tolerance of +/- one-tenth (0.1') of a foot, and extending a sufficient distance to permit installation of services and other construction, and for inspection.
- C. Excavation for Pavements: Cut surface under pavements to comply with crosssections, elevations and grades as indicated within a tolerance of +/- one-tenth (0.1') of a foot.
- D. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
 - 2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
 - a. Twenty-four inches (24") outside of concrete forms other than at footings.
 - b. Twelve-inches (12") outside of concrete forms at footings.
 - c. Six-inches (6") outside of minimum required dimensions of concrete cast against grade.
 - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
 - e. Six-inches (6") beneath bottom of concrete slabs-on-grade.
 - f. Six-inches (6") beneath pipe in trenches, and the greater of twenty-four inches (24") wider than pipe or forty-two inches (42") wide.
- E. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by the Project Manager and approved by the Project Manager. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract Time may be authorized for rock excavation.
 - 1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.
 - a. Intermittent drilling; ram hammering; or ripping of material not classified as rock excavation is earth excavation.
 - 2. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the following dimensions:
 - a. Twenty-four inches (24") outside of concrete forms other than at footings.
 - b. Twelve-inches (12") outside of concrete forms at footings.
 - c. Six-inches (6") outside of minimum required dimensions of concrete cast against grade.

- d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
- e. Six-inches (6") beneath bottom of concrete slabs-on-grade.
- f. Six-inches (6") beneath pipe in trenches, and the greater of twenty-four inches (24") wider than pipe or forty-two inches (42") wide.

9. INSPECTION

- A. Subgrade and Rough Grade Inspection:
 - 1. Contractor shall notify Project Manager when excavations have reached required subgrade.
 - 2. If Project Manager determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
 - 3. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
 - 4. For concrete subgrade preparation, proof-roll subgrade in locations identified by the Project Manager with a pneumatic-tired and loaded ten (10-wheel), tandem-axle dump truck weighing not less than fifteen (15) tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - a. Completely proof-roll subgrade in one direction. Limit vehicle speed to three (3) mph.
 - b. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by the Project Manager, and replace with compacted backfill or fill as directed.
 - 5. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by the Project Manager, without additional compensation.

3.10 SPECIAL CONDITIONS

- A. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than thirty five degrees (35°) F.
- B. Dust Control: Provide dust control to alleviate dust nuisance to the public, to adjacent properties and other work underway at the project site.
- C. Unanticipated Conditions: Notify the Project Manager immediately upon finding subsurface or other conditions which are not shown or which cannot be reasonably assumed from existing surveys. Secure Project Manager's instructions before proceeding with further work in such areas.
- D. Unsatisfactory Soils: Remove or otherwise correct unsanitary, sour, or otherwise unsatisfactory soil. Remove contaminated or unsuitable material from under paved areas.
- E. Additional Excavation: When excavation has reached required subgrade elevations, the Contractor shall contact the testing agency, which will make an observation of conditions. If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by the testing agency.

3.11 FILL AND BACKFILL

- A. General: Place soil material in layers to required subgrade elevations, for each area classification listed below, using materials specified in this Section.
 - 1. Under grassed areas, use satisfactory, excavated or borrow material.
 - 2. Under walks and pavements, use satisfactory, excavated or borrow materials, or a combination to meet structural fill requirements.
- B. Backfill excavations as promptly as work permits, but not until completion of the following:
 - 1. Inspection, testing, approval, and recording locations of underground utilities have been performed and recorded.
 - 2. Removal of all trash and debris from excavation.

12. DRAINAGE AND PUMPING

- A. Maintain soil under foundations and slabs at natural moisture content.
- B. Provide and maintain slopes, crowns, and ditches in excavation to insure satisfactory surface drainage at all times. Provide temporary drainage facilities to prevent water from draining into excavations. When work is completed, restore temporary ditches or cuts to original grade or finish grade as indicated.
- C. Bailing or Pumping: Immediately pump or bail out water found in excavations, whether rain or seepage. Excavations shall be kept free from water at all times. Take measures and furnish equipment and labor necessary to control the flow, drainage, and accumulation of water as required to permit completion of the work under this Section to avoid damage to the work.

13. PLACEMENT AND COMPACTION

- A. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Ground surfaces that are steeper than four-to-one (4:1) (horizontal to vertical) shall be stripped of vegetation, scarified to a depth of six-inches (6") and create excavated benches to ensure that fill material will bond with the existing surface.
 - 1. Present remediation options to Project Manager for any soils that do not meet the specified standard proctor density to bring those soils into compliance with the specifications.
- B. Place backfill and fill materials in layers not more than eight-inches (8") in loose depth for material compacted by heavy compaction equipment, and not more than four-inches (4") in loose depth for material compacted by handoperated tampers, each layer to be compacted to meet requirements herein.
- C. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

- D. Compaction of Fill for Hardscape Areas:
1. Select fill material shall be placed and mixed in evenly spread layers. After each fill layer has been placed, it shall be uniformly compacted. Fill materials shall be placed such that the thickness of loose material does not exceed eight-inches (8") and the compacted lift thickness does not exceed six-inches (6").
 2. Compaction shall be obtained by the use of sheepsfoot rollers, multiple-wheel pneumatic-tired rollers, or other equipment required to meet specifications. Granular fill shall be compacted using vibratory equipment or other equipment required to meet specifications. Compaction of each layer shall be continuous over the entire area. Compaction equipment shall make sufficient passes to ensure that the required density is obtained. Refer to Paragraph 3.12.1 herein for criteria.
 3. Prior to placement of any base or surfacing materials, one hundred percent (100%) of the subgrade shall be proof rolled with a fully loaded tandem-axle truck.
- E. Compaction of Landscape Slope Areas:
1. Fill slopes shall be compacted by means of sheepsfoot rollers or other suitable equipment. Compaction operations shall be continued until slopes are stable, compact to a density as specified in Paragraph 3.12.1. Permanent fill slopes shall not exceed four-to-one (4:1) (horizontal to vertical).
 2. Where natural slopes are steeper than twenty percent (20%) in grade and the placement of fill is required, cut benches shall be provided at the rate of one bench for each five feet (5') in height (minimum of two benches). Benches shall be at least ten feet (10') in width. Fill shall be placed on completed benches as outlined within this specification.
- F. Control soil and fill compaction, providing minimum percentage of density specified. Correct improperly compacted areas or lifts as directed if soil density tests indicate inadequate compaction.
- G. Moisture Control: Control moisture content within 2% of optimum moisture as determined by ASTM D 698. Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade or layer of soil material. Apply water in minimum quantity as necessary to prevent free water from appearing on surface during or subsequent to compaction operations.
1. Moisture Content: The Contractor may be required to add moisture to the excavation materials in the stockpile area if it is not possible to obtain uniform moisture content by adding water on the fill surface. The Contractor may be required to rip or disc the fill soils to provide uniform moisture content through the soils.
 2. The application of water to the embankment materials shall be made with any type of watering equipment which will give the desired results. Water jets from the spreader shall not be directed at the embankment with such force that fill materials are washed out.
 3. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
 4. Stockpile or spread soil material that has been removed because it is too wet to permit compaction. Assist drying by disking, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.
- H. Density Tests: Field density tests shall be made by the Contractor. Where sheepsfoot rollers are used, the soil may be disturbed to a depth of several-inches. Density tests shall be taken in compacted material below the disturbed surface. When density tests

indicate that the density or moisture content of any layer of fill or portion thereof is below that required, the particular layer or portion shall be reworked until the required density or moisture content has been achieved. Criteria for acceptance are as follows:

1. Under pavements and structures: Intervals and quantities of tests required shall be established by the Project Manager. On-site or imported clay materials shall be compacted to at least ninety five percent (95%) of maximum standard Proctor dry density (ASTM D 698) at moisture content within two percent (2%) of optimum. Granular material, whether imported or developed on-site, shall be moisture conditioned to within two percent (2%) of optimum and compacted to at least 95% of maximum modified Proctor dry density (ASTM D 1557).
2. Under landscape areas (top 12-inches): Eighty five percent (85%) of maximum standard Proctor dry density at moisture content within two percent (2%) of optimum (ASTM D 698).

3.13 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of existing trees or within Tree Protection Fencing.

3.14 GRADING

- A. General: Uniformly grade areas within project limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations or contours are indicated or between such points and existing grades.
- B. Subgrade tolerances are as follows:
 1. Lawn, Seeded, and Unpaved Areas: Finish areas to receive topsoil to within not more than +/- one-tenth (0.10') of a foot above or below required subgrade elevations.
 2. Athletic Fields: Finish areas to receive topsoil to within not more than +/- five one-hundredths (.05') of a foot from required elevation.
 3. Pavements: Shape surface of areas under pavement to line, grade, and crosssection, with finish surface not more than two one-hundredths (0.02') of a foot above or below required subgrade elevation.
 4. Structures: Backfill within 3' of all structures and for full height of walls, shall be selected non swelling material, structural. Backfill material shall be relatively impervious, well graded and free from stones larger than 3". All backfill around structures shall be consolidated by mechanical tamping. The material shall be placed in 6" loose lifts and compacted as specified.
 5. Compaction of all concrete subgrade: 95% of standard proctor density at 2% optimum moisture.
- C. Under no circumstances shall variations from specified grade elevations create any ponding or retention of water on intermediate pavement levels, or finished surfaces.

15. PLACING STOCKPILED TOPSOIL

- A. Refer to Section "Topsoil".

3.16 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace soil material to depth as directed by Project Manager; reshape and re-compact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work.

3.17 MAINTENANCE

- A. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.
- B. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

18. DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Remove waste materials, including materials not allowed for fill, backfill or site grading as specified within, trash, contaminated materials, and debris, and legally dispose of it off City's property at Contractor's expense.
- B. Remove any excess fill material from the site, unless otherwise directed by the Project Manager. Soils rendered unfit to receive tree planting due to concrete water, mortar of lime water, fly ash, or concrete/asphalt rubble shall be removed from the site and disposed of properly.
- C. The Contractor shall conduct all site grading operations and other construction activities to minimize erosion of site soil materials. Contractor shall be responsible to maintain streets daily removing any spillage of dirt, rocks, or debris from equipment entering leaving the site.

END OF SECTION

311100 - CLEARING AND GRUBBING

1. GENERAL

1. RELATED DOCUMENTS

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

2. SUMMARY

- A. This Section includes requirements for stripping sod, and removing and disposing of vegetation and debris.
- B. Related Sections:
 - 1. Section 310000 "Earthwork"

3. DEFINITIONS

- A. The term "sod stripping" shall be used when the vegetative material to be removed is mowable and generally less than twelve-inches (12") tall.
- B. The term "tree removal" refers to individual woody plants with a caliper over four-inches (4"). Any removals shall be performed by a licensed tree Contractor approved by the City.
- C. The term "clearing" refers to removing and disposing trees, brush, stumps, logs, grass, weeds, roots, decayed vegetable matter, poles, stubs, rubbish, refuse dumps, sawdust piles, and loose boulders of one cubic yard (1 yd³) or less existing outside of the construction limits, debris resting on or protruding through the ground surface, or appearing on the construction limits before final acceptance of the work. Clearing also includes removing and disposing of obstructions, such as fences, bridges, buildings, and other incidental structures within the construction limits and shown on the Site Demolition Plans.
- D. The term "grubbing" refers to removal from the area within the construction limits and proper disposal of all objectionable matter defined above under clearing, which is embedded in the underlying soil. Grubbing also includes removing and properly disposing of sidewalks, driveways, catch basins, drop inlets, manholes, curbing, retaining walls, utilities, foundations, paved floors, underground tanks, and portions of plants to be removed that are below grade, and other structures within the construction limits.
- E. Subsoil: All soil beneath the topsoil layer of the soil profile and typified by the lack of organic matter and soil organisms.
- F. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow, and ; reasonably free of subsoil, clay lumps, gravel, and other objects more than two-inches (2") in diameter; and free of subsoil and weeds, roots, toxic materials, or other non-soil materials.

- G. Plant-Protection Area: Area surrounding shrub beds or massings, or other vegetation or sensitive areas to be protected during construction, and indicated on Contract Drawings.
 - H. Tree-Protection Area: Area surrounding individual trees or groups of trees to be protected during construction.
 - I. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.
4. MATERIAL OWNERSHIP
- A. All materials except for stripped topsoil and those materials indicated to remain or to be stockpiled, shall remain the property of the City. All other materials shall be removed at the Contractor's expense.
5. PROJECT CONDITIONS
- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Project Manager.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by Project Manager.
 - B. Improvements on Adjoining Property: Not allowed without prior approval from Project Manager. Work only within Work Limit Line as defined on drawings.
 - C. Protection and Repair of Underground lines:
 - 1. Existing Public Utilities: Locate existing underground utilities within the limits of work per General Contract Conditions, Article 804 Protection of Municipal, Public Service or Public Utility Systems. Request utility locates seventy-two (72) hours in advance of any excavations by calling the Utility Notification Center of Georgia at 811. The contractor is responsible for providing written and graphical documentation from the utility owner. Take whatever precautions are necessary including potholing to verify location and depth to protect these underground lines from damage. Should unmarked or incorrectly marked utilities or other piping be encountered during excavation, notify the Project Manager immediately for direction. If damage does occur, all damage shall be repaired by the utility owner and all costs of such repair shall be paid by the contractor. Only written all clears will be acceptable, verbal all clears will not be accepted.
 - 2. Existing Private Utilities: Locate existing underground utilities within the limits of work per General Contract Conditions. The contractor is required to contact all private utility companies including the City of Macon and Macon Water Authority. The contractor is responsible for providing written and graphical documentation from the private utility owner. The request for locates shall be a minimum of seventy-two (72) prior to proceeding with any excavation. If, after such requests, private utilities are encountered and damaged by the contractor these shall be repaired at no cost to the City. If the contractor damages staked or located private utilities, they shall be repaired by the utility owner and all costs of such repair shall be paid by the contractor. Only written all clears will be acceptable, verbal all clears will not be accepted.
 - D. Do not commence site clearing operations until temporary erosion- and sedimentation-control and tree and or plant protection measures are in place.

2.PRODUCTS (Not Used)

3.EXECUTION

1. PROTECTION

- A. Protect existing site conditions from damage during construction.
 - 1. Restore existing conditions damaged by Contractor during the work of this Contract to their original condition, as acceptable by Project Manager.

2. CLEARING

- A. Remove brush and vegetation from areas designated to be cleared. As directed by Project Manager, trim low hanging, unsound, or unsightly branches on existing trees and shrubs designated to remain.

3. GRUBBING

- A. Remove all stumps, roots, and debris a minimum of twelve-inches (12") below finish grade in all areas as required. Use hand methods for grubbing inside drip line of trees to remain. Backfill and compact stump and root holes to a maximum of eighty five percent (85%) standard proctor in landscape areas and ninety five percent (95%) standard proctor under hardscape or as directed by the Project Manager.

4. TOPSOIL STRIPPING

- A. See Section "Earthwork".

5. SOD STRIPPING

- A. Strip sod in all areas to be re-graded to a depth of one-inch (1"), so that a relatively clean dirt surface remains.

6. TREE REMOVAL

- A. In all proposed landscaped areas, stumps and surface roots shall be ground to a minimum of twelve-inches (12") below finish grade. In proposed hardscape areas, all roots shall be removed entirely.

7. DISEASED TREE REMOVAL AND DISPOSAL

- A. The removal of diseased and infested trees includes the requirement of offsite burial of all parts of the trees immediately following removal. This includes logs, stumps, roots, branches and composted and un-composted chips. Under no circumstances should diseased or infected wood be left or taken for firewood, mulch or taken to a wood processing mill.

8. HERBICIDES

- A. Read the label.
- B. Use an aquatic approved formulation of triclopyr or glyphosate.

- C. Use the highest allowable rate indicated in the label for cut-stump treatments.
 - D. Follow all requirements stated on the label.
 - E. Herbicide may only be applied by state licensed commercial applicators that are licensed to apply herbicide in the category that the application will be made in.
9. DISPOSAL
- A. Haul and dispose of all removed materials, trash, debris and waste materials legally outside of the City's property.

END OF SECTION

321116 - AGGREGATE BASE COURSE

1.GENERAL

1. RELATED DOCUMENTS

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

2. SUMMARY

- A. This Section includes the requirements for furnishing and placing crushed aggregate, bonded with fine aggregate, constructed on a prepared underlying course in accordance with these specifications and in conformity with the dimensions, typical cross section, and the lines and grades shown on the Contract Drawings. The locations where aggregate base course will be used are shown on the Contract Drawings.

- B. Related Sections:

- 1. Division 32 Section "Concrete Walks, Curbs, and Miscellaneous Flatwork".

3. SUBMITTALS

- A. See Division 01 Section "Submittals" for submittal requirements.
- B. Certification: Contractor shall provide a certificate of compliance for any imported Aggregate Base Course materials.
- C. Gradation and Standard Proctor Density Test Results: For imported backfill materials, at a minimum, submit results of gradation tests and standard proctor density test.
- D. Sample: Provide a 1-pound (1#) sample of material(s) for approval.

2.PRODUCTS

1. AGGREGATE BASE COURSE

- A. Aggregate base course shall meet the requirements of AASHTO #57 Stone and on Contract Drawings.

2. AGGREGATE

- A. The use of this term implies the use of Aggregate Base Course within this Section only.

3.EXECUTION

1. EQUIPMENT

- A. All equipment necessary for the proper construction of this work shall be in working condition, and shall be free of fluid leaks. Project Manager reserves the right to have any piece of equipment removed from the site if it is deemed inoperable and/or is leaking fluids.

2. PREPARING SUBGRADE

- A. The underlying subgrade or base course shall be tested at the Contractors expense and accepted by the Project Manager before placing and spreading operations are started.

3. METHOD OF SPREADING

- A. The aggregate material shall be placed on the prepared underlying course and compacted in layers not to exceed six-inches (8") in depth before compaction. The depositing and spreading of material shall commence where designated and shall progress continuously without breaks. The material shall be deposited and spread in a uniform layer and without segregation of size to a uniform thickness.
- B. The aggregate spread shall be of uniform grading with no pockets of fine or course materials. During the spreading process, sufficient caution shall be exercised to prevent the incorporation of underlying materials in the aggregate.

4. COMPACTION OF AGGREGATE BASE COURSE

- A. When aggregate base course is used as part of asphalt roadway system (asphalt and base course composite section), the aggregate base course shall be compacted to 95% of Modified Proctor per ASTM D-1557, within 2% of optimum moisture.
- B. Aggregate material shall be placed and mixed in evenly spread layers. After each fill layer has been placed, it shall be uniformly compacted. Fill materials shall be placed such that the thickness of loose material does not exceed eight-inches (8") and the compacted lift thickness does not exceed six-inches (6").
- C. Compaction shall be obtained by the use of vibratory rollers, multiple-wheel pneumatic-tired rollers, or other equipment approved by the Project Manager. Granular fill shall be compacted using vibratory equipment or other equipment approved by the Project Manager. Compaction of each layer shall be continuous over the entire area. Compaction equipment shall make sufficient passes to ensure that the required density is obtained.
- D. Prior to placement of any base or surfacing materials, one-hundred percent (100%) of the subgrade shall be proof rolled with a fully loaded tandem-axle truck.

5. PROTECTION

- A. Spreading of aggregate shall not take place when temperatures are below freezing. When the aggregate base course contains frozen material or the underlying subgrade is frozen, construction shall not occur.

6. MAINTENANCE

- A. Following the completion of the base course, the Contractor shall perform all maintenance work necessary to keep the aggregate in a satisfactory condition until acceptance of the project. The surface shall be kept clean and free from foreign material. The base course shall be properly drained at all times. Any work, maintenance or necessary repairs shall be performed at the expense of the Contractor.

321313 - CONCRETE WALKS, CURBS AND MISCELLANEOUS FLATWORK

PART 1: GENERAL

1.1 RELATED DOCUMENTS: The General Contract Conditions, Drawings, and Division - 1 Specification sections apply to Work of this section.

A. Related Sections:

1. Division 31 Section "Earthwork".
2. Division 31 Section "Clearing and Grubbing".
3. Division 32 Section "Soil Preparation".
4. Division 32 Section "Aggregate Base Course".

1.2 SUMMARY:

A. Work Includes: Constructing concrete flatwork, including walks, curbs and gutters, ramps, and pans.

1.3 SUBMITTALS

A. In compliance with Paragraph 5.3.2 of ASTM C94, furnish statement of composition of concrete mix and ad mixtures and evidence that mix meets specified quality.

B. Test reports as indicated below.

1.4 QUALITY ASSURANCE

A. All concrete for flatwork shall be Class P (4000 PSI) unless otherwise requested by the Project Manager. Concrete shall be tested by the District's testing agency. Contractor shall contact the agency to arrange for testing at least 48 hours prior to each pour.

1.5 PROJECT CONDITIONS:

A. Place concrete only when ambient air temperatures are above 45 degrees F and rising, unless it is protected from freezing. Do not place concrete on frozen ground. Refer to Section 03300 for hot weather and cold weather placement procedures.

PART 2: PRODUCTS

2.1 SUBGRADE MATERIAL: Dense, readily compactable material, free from vegetable matter and lumps of clay. Material excavated from on-site that meets this requirement may be used if approved.

2.2 CONCRETE:

- A. Materials: Materials, including cement, aggregates, water, and admixtures, shall meet the requirements of ASTM C94. Refer to Section 03300 and to the District Right of Way Services approved materials list of pre-approved concrete mixes for additional requirements.
1. Cement: Type II, complying with ASTM C 150.
 2. Coarse Aggregate: Maximum size 3/4 inch, complying with ASTM C33.
 3. Fly Ash: Shall be Type C or F, in compliance with CDOT 701.02.
 4. Water: Potable
 5. Air Entraining Admixture: ASTM C260. No chlorides will be permitted.
 6. Water Reducing Admixture: ASTM C494 Type A. Provide for all flatwork. No chlorides will be permitted.
 7. Color Admixtures: Integrally Colored Concrete. ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, non-fading, and resistant to lime and other alkalis. Davis Colors, Scofield, or approved equal. Color: As shown on the Drawings and as approved by sample panels
- B. Quality of Concrete: Concrete shall be furnished under Option C, ASTM C94, whereby the manufacturer assumes full responsibility for the selection of the proportions for the concrete mixture. Submit statement of composition as called for in Part 1 of this section.
- C. Total Average Air Content: 5 to 7 percent.
- D. Minimum Cement Content: 6 sacks per cubic yard.
- E. Water Cement Ratio: Max. (.48 ±).
- F. Slump: Maximum 4 inches.
- G. Compressive Strength: 4,000 PSI minimum at twenty-eight days.
- H. Manufacture and Delivery: Measurement of materials, batching, mixing, transporting, and delivery shall be as specified in ASTM C94. Discharge concrete into forms within 1 1/2 hours after introduction of water to cement. When temperature of concrete is 85 degrees F or above, the time between introduction of water to cement and complete discharge of concrete into forms shall not exceed 45 minutes.

2.3 FIBROUS CONCRETE REINFORCEMENT:

- A. Shall be 100% virgin polypropylene, fibrillated fibers containing no reprocessed olefin materials and specifically manufactured to an optimum gradation utilizing 25 individual fiber designs for use as concrete secondary reinforcement.

- B. Volume per cubic yard shall equal a minimum of 0.1% (1.5 pounds).
 - C. Fiber manufacturer must document evidence of 5 year satisfactory performance history, compliance with applicable building codes and ASTM C1116 Type III 4.1.3 and ASTM C1116 Performance Level I.
 - D. Fibrous concrete reinforcement shall be utilized in all trail and flatwork applications.
- 2.4 EXPANSION JOINT FILLERS: Pre-molded closed cell polyethylene foam or bituminous saturated fiber conforming to ASTM D1751, 1/2-inch thick. Provide ½-inch thick by depth of the slab material, allow ½ thickness for joint sealer.
- 2.5 EXPANSION JOINT SEALANT: Shall be a silicone material that is on CDOT's approved silicone sealant list. Where color additive is used, color to match. Provide manufacturer's certification of compatibility with specified sealants where required.
- 2.6 CURING COMPOUND: Minimum 30% solids content, maximum moisture loss of three-hundred grams (0.030 per square centimeter / 300 square feet per gallon coverage), flat finish. Curing Compound shall not reduce bonding or adhesion of finish materials applied to concrete surfaces.
- 2.8 CONCRETE SURFACE RETARDER: Water-based top-surface retarder.
- A. Sand Finish: Aggregate size to expose for sandblast finish.

PART 3: EXECUTION

- 3.1 PREPARATION OF SUBGRADE: Excavate to required depth. Remove soft, yielding material and replace with select fill. Compact to min. 95% Standard Proctor within 2% of optimum moisture.
- 3.2 MAINTENANCE OF SUBGRADE: Maintain subgrade in a compacted condition until concrete is placed.
- 3.3 FORMS: Metal or uniform warp free lumber, coated with form release agent. Slope forms to give slabs positive drainage and stake securely. Obtain approval of Project Manager for alignment and grade before placing concrete. Radii shall be continuous and flowing to avoid angular intersections in the horizontal alignment.
- 3.4 PLACING:
- A. Concrete shall be formed, placed, vibrated and finished by hand using conventional methods. Concrete shall be placed at the line and grade shown on plans.
 - B. Place concrete on moistened subgrade monolithically between construction joints. Deposit to full depth in one operation. Consolidate immediately. After

depositing concrete, screed and darby or bullfloat.

3.5 CONCRETE FINISHING (standard):

- A. After darbying or bullfloating, stop finishing until bleeding has ceased and until concrete can support foot pressure with only about 1/8-inch indentation. During or after the first floating, check planeness of surface with a 10-foot straightedge applied at not less than two different angles, and then cut down all high spots and fill all low spots to achieve a true plane within 1/8 inch in 10 feet.
- B. Refloat slab immediately to a uniform sandy texture. Use steel trowel to densify surface, then apply medium broom finish to slab perpendicular to line of traffic.

3.6 CONCRETE FINISHING (Sand Finish):

- A. After darbying or bullfloating, apply surface retarder uniformly over surface per the manufacturer's recommendations for application.
- B. Expose aggregate by power washing per the manufacturer's recommendations for application.
- C. Clean surface.
- D. Apply sealer.
- E. Avoid traffic on the concrete during this operation. High pressure water may be used if desired finish is more easily achieved without harm to the concrete. Use same method of exposure, throughout the project.

7. CONCRETE FINISHING (Light Broom):

- A. After darbying or bullfloating, provide a light pressure "broom finish" perpendicular to line of traffic or as indicated on plans.
- B. Exact texture and coarseness of broom finish shall match approved site sample.

8. FORM REMOVAL: Remove forms after concrete surface is hard enough so as not to be injured in any way. Reasonable care is to be used in removing forms. Repair minor defects with mortar. Plastering will not be permitted on exposed faces.

3.9 JOINTS: Construct joints true to line with faces perpendicular to surface.

- A. Expansion Joints: Expansion joint material shall be provided at the following locations and shall be in place prior to the placing of concrete: 1) at each end of curb return; 2) between sidewalk and driveway slabs or service walks; 3) between new concrete and existing concrete; 4) as shown on the plans; 5) between new concrete and fixed vertical objects, 5) at max. 120 foot spacing, or 6) as directed by the Project Manager.
 - 1. Thoroughly clean all surfaces prior to installation of caulking material.
- B. Contraction (Control) Joints in Walks: Contraction joints shall be formed with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 3/8-inch-wide joints into concrete that has hardened sufficiently that cutting action will not tear, abrade, or otherwise damage surface, but before development of random contraction cracks. Saw cut joints shall be spaced at a distance equal to

the width of the walk, but not over 10 feet unless approved by the Project Manager. Depth of joints shall be one-fourth the slab thickness.

1. Tooled joints will not be allowed on concrete trails, unless directed by the Project Manager.

- C. Curb and Gutter Contraction (Control) Joints: Space curb and gutter joints not more than 12 feet 6 inches on center, and align them with sidewalk joints. Contraction joints shall be tooled. Form plane of weakness by inserting and later removing a metal divider, finish with an edger or groover, or by saw cutting a previously tooled joint.
- 3.10 CURING: Thoroughly cure and protect concrete by keeping the surface moist for 7 calendar days or by use of curing compound applied in accordance with manufacturer's written instructions. Cure slabs with integral color in accordance with instructions of the pigment manufacturer using a pigmented membrane-forming curing compound with integral color to match concrete pigment. On exposed slabs with integral color, do not use polyethylene or paper sheeting.
- 3.11 FIELD QUALITY CONTROL: Surfaces shall not vary more than 1/8-inch when tested with a 10 foot straightedge.
- 3.12 PROTECTION: Contractor shall be responsible for protecting the concrete flatwork until it is sufficiently hard. Concrete that is damaged by footprints, writing implements, or weather conditions is subject to replacement at no cost to the District.
- 3.13 CONCRETE WARRANTY: Reference Division 1.

END OF SECTION

323300 - SITE FURNISHINGS

1. GENERAL

1. SUMMARY

- A. Section Includes: backed benches, waste receptacles, bike racks, pet waste stations, planter pots, ledge tables and chairs

2. QUALITY ASSURANCE

- A. Material and craftsmanship for site furnishings shall conform to recognized association standards.
- B. Contractor to submit color samples, technical data, and installation methods prior to any ordering and or installing of these items.
- C. Contractor to field locate each item and associated paving prior to any installation and/ or construction and shall have Owner's Representative's review.

3. SUBMITTALS

- A. Submit information listed in contract documents and this section, for review and approval by landscape architect and Macon-Bibb Parks and Beautification Department. If proposing alternates submit product data for review and approval by landscape architect and Macon-Bibb Parks and Beautification Department during the bidding process. Site furnishings substitutions will not be allowed during construction.

2. PRODUCTS

1. PICNIC TABLES

- A. Charlie Table by Landscape Forms, or Landscape Architect approved alternate.
 - 1. Material: Powercoated aluminum and steel construction
 - 2. Color: Loll Green Leaf
 - 3. 67" Oval shape
 - 4. ADA compliant
 - 5. Install per manufacturers details and recommendations.
 - 6. Quantity: 6

2. DRINKING FOUNTAIN

- A. ADA accessible Drinking Fountain by Most Dependable Fountains, or Landscape Architect approved alternate.
 - 1. Powdercoated black frame

2. Surface mounted
 3. Install per manufacturers details and recommendations.
 4. Quantity: 1
3. WORK OUT STATION
- A. T-REX 6 Post Station by Move Strong, or Landscape Architect approved alternate.
 1. Powdercoated black and blue frame
 2. In ground mounted in concrete footing per manufacturers details and recommendations
 3. Quantity: 1
4. PET WASTE SIGN AND BAG DISPENSER
- A. Pet Waste Sign and bag dispenser by DogiPot, or Landscape Architect approved alternate.
 1. Aluminum post
 2. Pet waste and on-leash sign
 3. Aluminum bag dispenser
 4. In ground mounted in concrete footing per manufacturers details and recommendations
 5. Quantity: 3
5. BIKE RACKS
- A. Traditional Inverted U Rack by Belson, or Landscape Architect approved alternate.
 1. Powdercoated black frame
 2. Surface mounted
 3. Install per manufacturers details and recommendations.
 4. Quantity: 2
6. BASKETBALL HOOPS
- A. Basketball Backboard: Shall be fan-shaped, thirty-nine inches (39”) by fifty-four inches (54”) with a heavy-duty mounting support structure, twelve-gauge (12 ga) steel skin, white powder-coated finish and a ten (10) year limited warranty. Product: Bison BA495 or approved equal.
 - B. Basketball Goal: Shall have two (2) five-eighths inch (5/8”) carbon steel rims welded together at a minimum of six (6) places, with no-fail netlocks, three-sixteenths inch (3/16”) thick steel box-style backplate and rim supports, continuously welded with a lifetime warranty. Include a nylon cloth net, chain nets are not approved. Product: Bison BA39U or approved equal.
 - C. Basketball Pole: Shall be heavy-duty four-and one-half inches (4 ½”) outside diameter, hot dipped galvanized steel pipe with forty-eight-inch (48”) safe play area, heavy-duty

one and five eighths inch (1-5/8") support braces, and forty-eight-inch (48") in-ground bury pole with a twenty-five (25) year limited warranty. Product: Bison BA777 or approved equal.

7. MUSIC PLAY EQUIPMENT- ALTERNATES

- A. Melody Chimes by Game Time, or Landscape Architect approved alternate.
 - 1. Model: 4677
 - 2. HDPE color frame: Blue
 - 3. In ground mounted in concrete footing per manufacturers details and recommendations
 - 4. Quantity: 1

- B. Drum Circle by Game Time, or Landscape Architect approved alternate.
 - 1. Model: 81749
 - 2. In ground mounted in concrete footing per manufacturers details and recommendations
 - 3. Quantity: 1

- C. Harmonic Chimes, Set of 3 by Game Time, or Landscape Architect approved alternate.
 - 1. Model: 4676
 - 2. HDPE color frame: Blue
 - 3. In ground mounted in concrete footing per manufacturers details and recommendations
 - 4. Quantity: 1

8. BENCHES AND TRASH CANS

- A. Existing benches and trash cans by Victor Stanley are specified for removal, storage, and relocation on site. Contractor shall contact manufacturer for recommendations regarding deinstallation, cleaning, installation, and paint touch up. Contractor is responsible for ordering and installing any parts, pieces, and hardware that are missing from the existing benches and trash cans.

2.EXECUTION

1. INSTALLATION

- A. All site furniture shall be installed per Drawings and manufacturer's instructions.

END OF SECTION

329113 SOIL PREPARATION

1. GENERAL

1. RELATED DOCUMENTS

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

2. SUMMARY

- A. This Section includes requirements for the preparation of soil for seeding, sodding, or planting operations. Soil preparation consists of ripping, fertilizing, soil conditioning, and fine grading the topsoil. Soil preparation as specified herein must precede all seeding, sodding, and planting.
- B. Related Sections:
 - 1. Division 31 Section "Clearing and Grubbing".
 - 2. Division 31 Section "Earthwork".
 - 3. Division 32 Section "Topsoil".
 - 4. Division 32 Section "Sodding".
 - 5. Division 32 Section "Trees, Plants, and Groundcovers".

3. DEFINITIONS

- A. On-site Topsoil: 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.
- B. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sands with stabilized organic soil amendments to produce topsoil or planting soil.
- C. 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.
- D. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- E. Fertilizer: A substance that is added to soil to help the growth of plants.
- F. Soil Amendment: Any substance which is intended to improve the physical, chemical, or other characteristics of the soil.
- G. Soil Conditioner: Combination of slow-release fertilizer, hummate, and Mycorrhiza.

4. SUBMITTALS

- A. Testing Agency Qualifications: Project Manager to approve prior to construction.
- B. Soils Test Data: See Quality Control.
- C. Product Data (for each type of product):

1. Include recommendations for application and use.
 2. Include test data substantiating that products comply with requirements.
 3. Material Certificates: For each type of soil conditioner, soil amendment, and fertilizer before delivery to the site, according to the following:
 - a. Manufacturer's qualified testing agency's certified analysis of standard products.
 - b. State, Federal and other inspection certificates shall accompany invoice for materials showing source or origin.
- D. Samples: For each bulk-supplied material, one (1) quart volume of each in sealed containers labeled with content, source, and date obtained. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of composition, color, and texture.
5. QUALITY CONTROL
- A. Testing Agency: Retain an independent, state-operated, or university operated laboratory experienced in soil science, soil testing, and plant nutrition; with the experience and capability to conduct the testing indicated and that specializes in the types of tests to be performed.
1. Laboratories: Subject to compliance with requirements, provide testing of materials in the Section by a qualified testing laboratory approved by the Project Manager.
 2. Multiple Laboratories: Work may be divided among qualified testing laboratories specializing in physical testing, chemical testing, and fertility testing.
- B. Testing: Contractor is responsible for performing the following tests:
1. Soils Test of existing soil, after rough grading, including testing agency's recommendations for amendment and fertilizer for landscape plants, turf, and native seed.
- C. Preconstruction Testing
1. Engage the approved testing agency to perform preconstruction soil analyses on existing on-site soil, imported topsoil, and pre-amended imported soil.
 2. Notify Project Manager seventy-two (72) hours in advance of the dates and times when laboratory samples will be taken.
- D. Soil Sampling Requirements
1. Sample Collection and Labeling: Have samples taken and labeled by the Contractor in the presence of the Project Manager and under the direction of the testing agency.
 2. Number and Location of Samples: Minimum of five (3) samples from varied locations for each soil to be used or amending for planting purposes, including seed/sod, native seeding, planting beds, and gardens. Provide a site plan of the sampling locations to the Project Manager for approval, prior to sampling.
 3. Procedures and Depth of Samples: Collect samples to a depth of six inches (6") and combine in a clean plastic container.
 4. Mixing of Samples: Mix samples together thoroughly, removing plant debris and breaking up clods.
 5. Labeling: Label each sample with the date, location keyed to a site plan or other location system, visible soil condition, and sampling depth.
- E. Testing Requirements

1. Soil Texture: Soil-particle, size-distribution analysis by the following methods according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods":
 - a. Sieving Method: Report sand-gradation percentages for very coarse, coarse, medium, fine, and very fine sand; and fragment-gradation (gravel) percentages for fine, medium, and coarse fragments; according to USDA sand and fragment sizes.
 - b. Hydrometer Method: Report percentages of sand, silt, and clay.
 2. Fertility Testing: Soil-fertility analysis shall, include the following:
 - a. Percentage of organic matter.
 - b. CEC, calcium percent of CEC, and magnesium percent of CEC.
 - c. Soil reaction (acidity/alkalinity pH value).
 - d. Buffered acidity or alkalinity.
 - e. Lime estimate.
 - f. Soil texture estimate.
 - g. Nitrogen ppm.
 - h. Phosphorous ppm.
 - i. Potassium ppm.
 - j. Manganese ppm.
 - k. Zinc ppm.
 - l. Iron ppm.
 - m. Boron ppm.
 - n. Copper ppm.
 - o. Sodium ppm, and sodium absorption ratio.
 - p. Soluble-salts ppm.
 - q. Presence and quantities of problem materials including salts and metals cited in the Standard protocol. If such problem materials are present, provide additional recommendations for corrective action.
 - r. Other deleterious materials, including their characteristics and content of each.
- F. Recommendations: Based on the test results, provide recommendations for soil treatments, amendments, and conditioners to be incorporated to produce a soil suitable for healthy viable plant growth for the species indicated in the Contract Documents. Include, at a minimum, recommendations for nitrogen, phosphorous, and potassium fertilization, and for micronutrients.
1. Fertilizers and Soil Amendment Rates: State recommendations in weight per one thousand (1,000) sq. ft. for six inch (6") depth of soil.
 2. Soil Reaction: State the recommended liming rates for raising pH or sulfur for lowering pH according to the buffered acidity or buffered alkalinity in weight per one thousand (1,000) sq. ft. for six inch (6") depth of soil.
6. DELIVERY, STORAGE, AND HANDLING
- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and compliance with State and Federal laws if applicable.
 - B. 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. Do not move or handle materials when they are wet or frozen.
 4. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.
- C. Notify Project Manager of delivery schedule in advance so material can be inspected upon arrival at the project site. Immediately remove unacceptable material from the project site.
- D. Take adequate measures to control offensive odors caused by delivery stockpiling and spreading of soil amendments.
1. Stockpile material on site at a location approved by Owner Representative.
 2. Avoid stockpiling soil amendments for more than seven (7) consecutive days prior to spreading.
 3. Incorporate materials into the ground as soon as possible.
 4. Take appropriate measures to protect stormwater runoff.
7. PROJECT/SITE CONDITIONS
- A. General: Do not perform work when climate and existing site conditions will not provide satisfactory results.
- B. Vehicular site access shall be limited to the area(s) indicated on the Contract Drawings or as defined by the Project Manager.
- C. Damage to turf, natural areas, pavements, irrigation systems, underground utilities, and other improvements shall be repaired by the contractor at no additional cost to the City.

2.PRODUCTS

1. MATERIALS

- A. Topsoil: Shall be as specified under Division 32 Section "Topsoil".
- B. Soil Amendments:
1. Mix topsoil with the following soil amendments and fertilizers in the following quantities to produce planting soil:
 - a. Class 1 compost at a rate of six (6) cubic yards per one thousand (1,000) square feet.
 - b. Based on the soil analysis results and recommendations: Nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy viable plants.
 2. Amendments for soil preparation shall be organic material Class I Compost. The organic material shall have acidity in the range of pH 6 to 8.5, shall not exceed 3.5 mmhos/cm. soluble salt content, and shall have a minimum 20% organic content.
 3. Sand, gypsum, aspen humus or peat moss are unacceptable materials.
 4. The mixture shall consist of aged organic matter, free of weed or other noxious plant seeds, lumps, stones, or other foreign contaminants harmful to plant life, and having the following characteristics based on a nutrient test performed no longer than 3 months prior to its incorporation into the project:
 - a. Organic matter: twenty-five (25%) percent maximum.
 - b. Salt content: Five (5.0) mmhos/cm maximum.
 - c. pH: 7.5, maximum.

- d. Carbon to nitrogen ratio shall be less than 20:1.
- 5. Mountain peat, aspen humus, gypsum and sand will not be accepted.

2. FERTILIZER

- A. General: Fertilizer shall conform to applicable State fertilizer laws. It shall be uniform in composition, dry, and free flowing, and shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis. Fertilizer that has become caked or damaged will not be accepted.
- B. Turf Grass Lawns: Diamonium phosphate (18-46-0). Nitrogen shall be composed of sulphur-coated Urea only. Provide in sufficient quantity to apply at the rate of one hundred (100) pounds nitrogen per acre, unless otherwise indicated by the soils tests.
- C. Native Grass Areas: Fertilizer shall only be applied as specified in Soil Conditioners.

3. HERBICIDE

- A. Post-Emergent Herbicide: "Plateau" by BASF, or approved equal.

3. EXECUTION

1. EXAMINATION

- A. General: Verify that existing site conditions are as specified and indicated on the Contract Drawings before beginning work under this Section.
- B. Grades: Inspect to verify rough grading is within +/- one tenth of one foot (0.1') of grades indicated and specified.
- C. 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 the work area.
- D. Unsatisfactory Conditions: The General Contractor shall notify the Project Manager in writing of any known unsatisfactory site conditions. If the soil is found to be unfit to support planting as described above, it is to be removed and replaced with clean soil from a source approved by the Project Manager.
- E. Beginning of soil preparation work means acceptance of existing conditions by the installer.

2. PREPARATION

- A. Locate all utilities (sewer, water, irrigation, gas, electric, phone, and other conduits and subsurface equipment) prior to commencing work.
- B. Contractor shall be responsible for the protection of all new and existing infrastructure, and repair of any damages caused by work under this section, at no cost to the Owner.

- C. Weed Seed Eradication: Perform herbicide treatment over the entire area to be planted. Allow sufficient time to successfully complete the entire pesticide treatment process (germinate / terminate) before proceeding with planting.
 - 1. Herbicide treatment must be completed during the growing season.
 - 2. Water surface one half (1/2") inch per week for two weeks prior to application if natural precipitation does not supply this amount to encourage weed seed germination.
 - 3. Notify Project Manager forty-eight (48) hours in advance of each herbicide treatment.
 - 4. Apply herbicide in accordance with manufacturer's recommendations.
 - 5. Water surface one half (1/2") inch per week if natural precipitation does not supply this amount to encourage weed seed germination.
 - 6. Fourteen (14) days after the first pesticide application, review surface for evidence of plant growth.
 - 7. If there is no evidence of plant growth, obtain Project Manager approval of surface conditions to proceed with Soil Preparation.
 - 8. If more than 10% of the area to be planted contains new plant growth, the herbicide and watering application shall be repeated until new plant growth is satisfactorily eradicated.
 - 9. Remove plant debris from treated area.
- D. Areas of Compacted Topsoil: Areas within the work limits, or as defined on Contract Drawings or by the Project Manager, that have vegetation that is sparse, stunted, anemic, weedy or was used as construction staging, a parking area, and/or subjected to heavy use will require ripping to prepare the soil for planting. Scarify compacted soil to an eight-inch (8") minimum depth to loosen topsoil.
- E. Areas of Disturbed Topsoil: Areas disturbed but not severely compacted, as determined by the Project Manager, shall be deep tine aerated or shattered to prepare the soil for revegetation.
- F. Areas of Undisturbed Natural Topsoil: Undisturbed sites that are or were supporting healthy plant growth need only surface seedbed preparation prior to sowing seed.

3. INSTALLATION

- A. Install topsoil as required in Division 31 section "Earthwork" and Division 32 Section "Topsoil".
- B. Timing: Perform soil preparation just prior to planting operations and in accordance with final planting schedule. Coordinate with irrigation system installation to avoid damage.
- C. Amendments shall be thoroughly mixed evenly throughout topsoil. Place topsoil in center of planting beds to create an eight (8) inch crown. Thoroughly mix to a minimum depth of six inches (6") of existing topsoil and smooth out grade to provide positive drainage.
- D. Soil Preparation in Turf Grass (Newly graded subgrades):
 - 1. Apply Soil Amendments at the following rates:
 - a. Soil Amendments: for turf areas amendments shall be added prior to soil placement on site and bid quantity shall be two (2) cubic yards per one thousand (1,000) square feet. For planting areas soil shall be amended in

place and bid quantity to be six (6) cubic yards per one thousand (1,000) square feet, or per soil test recommendations.

- b. Fertilizer: Diamonium phosphate, Bid quantity to be two (2) pounds of nitrogen per one thousand (1,000) square feet. Apply per manufacture's recommendations for the type of planting area, or per soil test recommendations.
2. Remove stones larger than $\frac{3}{4}$ inch in any dimension.
3. Legally dispose of waste material off owner's property.
4. After applying Soil Amendments, thoroughly till area to depth of six inches (6") minimum by plowing, rototilling, harrowing, or disking until soil is well pulverized and thoroughly mixed. Soil Conditioners and Fertilizer shall be applied topically once final grade has been established and just prior to sodding or seeding.
5. Take soil samples, in similar locations to pre-construction testing, and test amended soil to ensure the final product meets the laboratory recommendations prior to planting.

E. Soil Preparation in Unchanged Subgrades:

1. Remove existing vegetation to a depth of 2". Do not mix into surface soil.
2. Stay outside of drip line around existing trees.
3. Apply soil amendments and till existing soil to a minimum depth of 6".
4. Add approved topsoil to achieve 8" crown from the center of bed sloping to grade 4" below curb.
5. Apply additional soil amendments as needed and mix thoroughly into top 6" of soil.
6. Remove stones larger than $\frac{3}{4}$ inch in any dimension.
7. Legally dispose of waste material off owner's property.

F. Fine Grading in all Landscape Areas:

1. Complete fine grading for all areas prior to seeding or planting. Allow for natural settlement.
2. For ground surface areas surrounding buildings to be landscaped, maintain required positive drainage away from buildings.
3. Establish finish grades to within plus or minus one tenth (0.10') foot of grades indicated, in order to prevent "bird-baths" or ponding.
4. Finish grade shall be below edge of pavement prior to sodding, seeding or planting.
 - a. Sodded Areas: Allow one half inches (1/2") for sod.
 - b. Seeding Areas: Finish grade to top of adjacent pavement.
 - c. Planting Beds: Allow four inches (4") for mulch.
5. Compaction of Surface Grade Prior to Landscape Installation: Firm, but not hard, eighty five percent (85%) standard Proctor density within two percent (2%) optimum moisture.
6. Turfgrass Lawn Areas: Prior to acceptance of grades, hand rake to smooth, even surface, free of debris, clods, rocks and organic matter greater than one inch (1").
7. Native Seed Areas: Area shall not be graded smooth but left in a rough condition after tilling. Tilling shall occur parallel to the contours only.
8. Restore planting areas to specified condition if eroded or otherwise disturbed after fine grading and prior to planting.

4. CLEANING

- A. Protect areas adjacent to soil preparation and planting areas from contamination. Keep adjacent paving and construction clean and work area in an orderly condition.

- B. Remove debris and excess materials from site and legally dispose of them off owner's property. Clean out drainage inlet structures. Clean paved and finished surfaces soiled as a result of work.

5. PROTECTION

- A. Provide and install barriers as required and as directed by Project Manager to protect completed areas against damage from pedestrian and vehicular traffic until acceptance by the City.
- B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Parking vehicles or equipment.
 - 3. Vehicle traffic.
 - 4. Foot traffic.
 - 5. Erection of sheds or structures.
 - 6. Impoundment of water.
 - 7. Excavation or other digging unless otherwise indicated.
- C. If prepared soil or subgrade is disturbed or contaminated prior to planting, the Contractor shall restore or replace the planting soil as directed by Project Manager at no cost to the Owner.

6. ACCEPTANCE

- A. Maintenance Period: Shall begin immediately after site preparation of each area and shall continue in accordance with the following requirements:
 - 1. Protect prepared areas from erosion and traffic; repair and re-establish grades and reapply soil amendments in settled, eroded and disturbed areas to specified tolerances and requirements until final acceptance.
- B. Final Acceptance: Notify the Owner Representative for review and acceptance of soil preparation and fine grading prior to seeding or sodding.

7. GUARANTEE

- A. Upon completion of soil preparation work, the Contractor shall guaranty that no rock, concrete, construction materials or other rubble lie within the prepared areas, whether on the surface or below grade.
- B. Contractor shall also guaranty against settlement of one full year after initial acceptance. Any corrections required to meet this specification, including repair/ replacement of seed or sod shall be at the contractors' expense.

END OF SECTION

329120 - TOPSOIL

1. GENERAL

1. RELATED DOCUMENTS

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

2. SUMMARY

- A. This Section includes requirements for furnishing, stockpiling, and placing topsoil on a previously prepared subgrade.
- B. Related Sections:
 - 1. Section 329100 "Earthwork"
 - 2. Section 329113 "Soil Preparation".
 - 3. Section 329300 "Trees, Plants, and Groundcovers".

3. DEFINITIONS

- A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.
- B. Finish Grade: Elevation of finished surface of planting soil.
- C. On-site Topsoil: 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.
- D. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- E. 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.
- F. Planting Area: Areas to be planted.
- G. 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.
- H. 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.
- I. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

- J. 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.

4. QUALITY CONTROL

A. Existing On-Site Topsoil:

1. Existing, native surface topsoil formed under natural conditions with the duff layer retained during the excavation process. It should not be mixed with subsoil or subgrade soils and should be stockpiled on-site. Clean soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
2. Topsoil shall not include any minerals or elements detrimental to plant growth, including noxious, perennial, biennial or annual weeds. No rocks, sticks, or clods greater than ¾" diameter will be accepted. No plastic, metal or other trash will be accepted.
3. Submit soil analysis report for stockpiled on-site topsoil from the State University Agricultural Extension Service or other approved soil testing laboratory. Report shall cover soil textural classification (percentages of sand, silt, and clay), pH, percentage organic matter, and soluble salts (electric conductivity in millimos/centimeter), and shall include additive recommendations.
4. A minimum of three (3) representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes, with individual tests completed for each sample.
5. A map of the site illustrating the locations of each sample location is to be submitted to Project Manager for approval prior to collecting samples.
6. Follow instructions from soil testing laboratory when collecting samples.
7. Testing will be at the expense of the Contractor.

B. Imported Topsoil:

1. Submit source location for topsoil to be imported to site for approval by Project Manager.
2. Submit soil analysis report for topsoil imported to site, from the State University Agricultural Extension Service or other approved soil testing laboratory. Report shall cover soil textural classification (percentages of sand, silt, and clay), pH, percentage organic matter, and soluble salts (electric conductivity in millimos/centimeter), and shall include additive recommendations.
 - a. One 1-quart sample per five hundred (500) cubic yards of imported soil is required, with individual tests completed for each sample.
 - b. Follow instructions from soil testing laboratory when collecting samples.
3. Testing will be at the expense of the Contractor.
4. Submit a one (1) quart sample along with analysis results.

C. Manufactured Topsoil:

1. Submit source of manufactured topsoil to be imported to site for approval by Project Manager.
2. Submit soil analysis report for stockpiled on-site topsoil from the State University Agricultural Extension Service or other approved soil testing laboratory. Report shall cover soil textural classification (percentages of sand, silt, and clay), pH, percentage organic matter, and soluble salts (electric conductivity in millimos/centimeter).
 - a. Test is to be completed within sixty (60) days preceding delivery to site. Report shall cover soil textural classification (percentages of sand, silt, and

clay), pH, percentage organic matter, and soluble salts (electric conductivity in millimos/centimeter).

- b. Submit a one (1) quart sample along with analysis results.

5. DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver or place topsoil in a frozen, wet, or muddy condition.
- B. Protect stored and placed topsoil from vehicular traffic, equipment storage, material storage, or from contaminants or pollution sources. Topsoil that is compacted or tainted during construction is to be removed from site and disposed of at a licensed landfill at no additional cost to the Town.

2.PRODUCTS

1. ON-SITE TOPSOIL

- A. Topsoil previously stripped and stockpiled prior to earthwork operations. See Division 31 Section "Earthwork".

2. IMPORTED TOPSOIL

- A. All topsoil shall be a loam or sandy loam conforming to ASTM D 5268. At least ten (10) days prior to topsoil delivery, notify Project Manager of the source(s) from which topsoil is to be furnished. Topsoil shall be furnished by the Contractor and shall be a natural, friable soil representative of productive soils and shall meet the following conditions.
- B. It shall be obtained from the top six-inches (6") of well drained areas.
- C. Fertile, friable, loamy soil, reasonably free from subsoil, refuse, roots, heavy or stiff clay, stones larger than one-inch (1"), coarse sand, noxious seeds, sticks, brush, litter, and other deleterious substances; suitable for the germination of seeds and the support of vegetative growth. The pH value shall be between 6.0 and 8.0.
- D. Soil Texture:
 1. Sand: thirty percent (30%) – fifty percent (50%)
 2. Silt: thirty percent (30%) – fifty percent (50%)
 3. Clay: five percent (5%) – thirty percent (30%)
- E. Additives: As determined by soil fertility tests.
- F. Percent Organic Content:
 1. Turf grass shall be three percent (3%) maximum after amending or conditioning.
 2. Native grass shall be one percent (1%) maximum after amending or conditioning.
- G. Soluble Salts: Electric conductivity (EC) shall be less than two (2.0) mmhos/cm for turfgrass areas, dryland areas, and planting beds.

3.EXECUTION

1. EXAMINATION

- A. Examine areas where the Work of this Section will be performed 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 the work area.
 - 2. Verify that final grades are completed in accordance with the Contract Drawings.
- B. Proceed with installation only after unsatisfactory conditions have been corrected and approved by Project Manager.

2. PLACING TOPSOIL

- A. Scarify compacted subgrade to a six-inch (6") depth to bond topsoil to subsoil. Place topsoil to a minimum depth of twelve-inches (12") after settlement. Topsoil shall be free from weeds, sod, and material larger than 1-inch (1"), toxic substances, litter or other deleterious material. Spread evenly and grade to elevations and slopes shown on Contract Drawings. Hand rake areas inaccessible to machine grading.
- B. Utilize salvaged topsoil as the top layer to the extent available. If sufficient on-site material is not available, the Contractor shall furnish and install imported topsoil in the manner described above. Topsoil shall mixed thoroughly with the salvaged topsoil prior to placement.
- C. Utilize manufactured topsoil as the top layer, placing over lightly scarified, moisture conditioned subgrade for north and south turf lawn area to match adjacent grade. Do not disturb subgrade layer when placing.

3. PROTECTION AND REPAIR

- A. Protect completed areas where topsoil has been spread from traffic which will compact the soil volume. Any areas that, as determined by Project Manager, become compacted due to Contractor's construction traffic shall be reconstructed to specified requirements and approved by Project Manager.

END OF SECTION

329223 - SODDING

1. GENERAL

1. RELATED DOCUMENTS

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

2. SUMMARY

- A. This Section includes requirements for furnishing and installation of fescue blend sod, and maintenance of sodded areas.
- B. Related Sections:
 - 1. Division 32 Section "Soil Preparation".
 - 2. Division 32 Section "Topsoil".
 - 3. Division 32 Section "Trees, Plants, and Groundcovers".

3. DEFINITIONS

- A. Finished Grade: Elevation of finished surface of planting soil.
- B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, pesticides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, herbicide, defoliant, or desiccant.
- C. 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.
- D. 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.
- E. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.
- F. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- G. 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.
- H. Weeds: Including but not limited to Goathead, Bindweed, Twitch, Dandelion, Jimsonweed, Knapweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Weed, Bent Grass, Wild Garlic, Perennial Sorrel, and Broom Grass.

4. SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Sod Certificates:
 - 1. State, Federal and other inspection certificates for sod shall be provided to the Project Manager a minimum of 10 working days prior to anticipated date of sod delivery.
 - 2. Submit a list of varieties contained in the sod, and include the source and origin for approval by the Project Manager.
- C. Analysis and standards: Wherever applicable, for non-packaged materials, provide two copies of analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists.
- D. Planting schedule: Submit in writing two copies of proposed planting schedule, indicating dates for topsoil placing, site preparation, pesticide treatments, soil preparation, sodding, seeding, and coordination with plant procurement, planting soil preparation, plant delivery and planting. Schedule all Work during specified planting seasons. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.
- E. Contract Closeout Submittals:
 - 1. Operating and Maintenance Data: At completion of work, submit one digital copy and two hard copies to the Project Manager. Include directions for irrigation, aeration, mowing, fertilizing and spraying as required for continued and proper maintenance through full growing season and dormant period.
 - 2. Warranty for Turfgrass Sod Areas: At completion of work, furnish written warranty to Project Manager based upon specified requirements.

5. QUALITY CONTROL

- A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf establishment.
 - 1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
 - 2. Experience: Five years' experience in turf installation.
 - 3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 - 4. Sod Producer: Company specializing in sod production and harvesting with minimum five (5) years' experience, and certified by the State of Georgia Department of Agriculture.
 - 5. Personnel Certifications: Installers shall have certification the following categories from the Professional Landcare Network:
 - a. Certified Landscape Technician - Exterior, with installation maintenance irrigation specialty area(s), designated CLT-Exterior.
 - 6. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
 - 7. Pesticide Applicator: State licensed, commercial.
- B. Soil-Testing Laboratory Qualifications: An independent laboratory 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: See Division 32 Section "Soil Preparation".
- D. Preinstallation Conference: Conduct conference at Project site to coordinate the process with other trades, to coordinate equipment movement within planting areas and to avoid soil compaction, to review proposed methods of installation, performance criteria, and maintenance procedures. Review underground utility location maps and plans. This meeting shall be coordinated by the Contractor, and comply with requirements in Division 1.
- E. Standards: All materials and methods used during this portion of the work shall meet or exceed applicable federal, state, county, and local laws and regulations. All sod shall be free from insects and disease. Species shall be true to their scientific name as specified.
- F. Materials: The Contractor shall submit to the Project Manager for approval a complete list of all materials to be used during this portion of the work prior to delivery of any materials to the site. Include complete data on source, amount and quality. This submittal shall in no way be construed as permitting substitution for specific items described on the plans or in these specifications unless approved in writing by the Project Manager.
- G. Source Quality Control:
 - 1. Sod Materials: Subject to inspection and acceptance. The Project Manager reserves the right to reject at any time or place prior to acceptance, any work and sod which in the Project Manager's opinion fails to meet these specification requirements.
 - 2. Inspection will be made periodically during sodding, at completion and at end of warranty period by the Project Manager. Primarily for quality; however, other requirements are not waived even though visual inspection results in acceptance.
 - 3. Promptly remove rejected sod from site.
- H. Sod Standards:
 - 1. Sod shall consist of healthy, thick turf having undergone a program of regular fertilization, mowing and weed control; free of weeds; uniform in green color, leaf texture and density; healthy, vigorous root system; inspected and found free of disease, nematodes, pests and pest larvae by the State Department of Agriculture.
 - 2. Each piece of Sod shall consist of a sandy-loam soil base that will not break, crumble or tear during sod installation.
 - 3. Sod thickness shall be a minimum three quarters inch (3/4") thick, excluding top growth and thatch.
 - 4. Thatch layer shall not exceed one half inch (1/2"), uncompressed.
 - 5. Sod shall be delivered and installed within twenty four (24) hours of being cut.

6. DELIVERY, STORAGE, AND HANDLING

- A. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver on pallets properly loaded on vehicles with root system protected from exposure to sun, wind, and heat in accordance with standard practice. Sod that has

been damaged by poor handling or improper storage is subject to rejection by the Project Manager.

1. Protect from dehydration, contamination, freezing and heating at all times. Keep stored sod moist and under shade or covered with moistened burlap.
2. Do not drop sod rolls from carts, trucks or pallets.
3. Do not deliver more sod than can be installed within twenty four (24) hours.

B. Fertilizer: Deliver inorganic or chemical fertilizer to site in original unopened container bearing manufacturer's guaranteed chemical analysis, name, trade name, trademark, warranty and conformance to state law.

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 and soil amendments with appropriate certificates.
4. Fertilizer: Deliver inorganic or chemical fertilizer to site in original unopened container bearing manufacturer's guaranteed chemical analysis, name, trade name, trademark and conformance to state law, and bearing name and warranty of producer.

D. Material will be inspected upon arrival at project site. Project Manager will reject any opened or unacceptable materials as described above.

E. Immediately remove unacceptable material from job site.

7. PROJECT/SITE CONDITIONS

A. Work scheduling: Proceed with and complete landscape work as rapidly as portions of the site become available, working within the specified planting season and approved schedule.

B. Vehicular accessibility on site shall be as directed by Project Manager. Repair damage to prepared topsoil and existing surfaces, caused by vehicular access and movement during work under this section, to original condition at no additional cost to the District.

C. Schedule work for periods of favorable weather. Do not install sod on saturated or frozen soil. The Project Manager reserves the right to deny sod installation on days that are deemed to be unfavorable for installation.

D. Existing conditions:

1. Existing Plants: Install sod only after all other landscape and irrigation items have been installed and accepted by the Project Manager.
2. Utilities: Determine location of underground utilities. Perform work in a manner to avoid possible damage. Hand excavate, as required.
3. Excavation: Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned. When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, noxious materials or obstructions, notify Project Manager before planting.
4. If weeds are present on site, treat with pesticide prior to preparing soil for installing sod as specified in this or other Sections.

- E. Coordination:
 - 1. Coordinate with construction of utilities on site. Do not begin placing topsoil and sod until underground work is completed in the area.
 - 2. Coordinate sodding with Contractor(s) approved schedule. Limit construction access to areas where topsoil has been placed if placement is completed more than 3 days prior to commencement of landscaping in the area. Limit fine grading to areas that can be prepared for planting within twenty four (24) hours after fine grading.
 - 3. Coordinate with Contractors' work requiring access to site over sodded areas.
 - 4. Coordinate with installation of underground irrigation system.

8. WARRANTY

- A. Warrant sod areas to be in a healthy, vigorous growing condition, and for consistency and completion of coverage for a period of one (1) year from date of Substantial Completion as a full stand of grass. Re-sod any areas where sod has failed due to disease or other inadequate installation, as defined in this Section.
 - 1. During the original warranty period, immediately replace the sod with a comparable sod blend/mix in the areas that have failed to achieve a stand of grass or which are unhealthy in the Project Manager's opinion.
 - 2. Re-sodding will not be allowed in any season considerable unfavorable for sod installation by the Project Manager.

2.PRODUCTS

1. MATERIALS

- A. Topsoil: See Division 32 Section "Topsoil".
- B. Soil Preparation: See Division 32 Section "Soil Preparation".
- C. Sod:
 - 1. Georgia grown TifBlair centipede sod having a healthy, vigorous root system.
 - 2. Middle Georgia Super-sod Farm, Outlet, & Irrigation Demonstration Gardens 158 Sod Farm Rd. Ft. Valley, GA 31030 or approved equal.
 - 3. Sod to be produced in accordance with requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding."
 - 4. Harvesting: Sod shall be fertilized 2–3 weeks prior to harvesting. Mow sod to a height of one and one-half inches (1-1/2") before the sod is lifted. Sod shall be harvested in rolls, and shall not be cut more than 24 hours prior to planting.
 - 5. Size: Machine cut to a minimum pad thickness of three quarters inch (3/4), excluding top growth and thatch. Provide sod of uniform pad sizes eighteen inches (18") maximum width by twenty four (24") minimum length, with maximum five percent (5%) deviation in either length or width. Broken pads or pads with uneven ends will not be acceptable. Sod pads incapable of supporting their own weight when suspended vertically from upper ten percent (10%) of pad will be rejected. Sod which has dried out, sod with adhering soil which breaks, tears, or crumbles away will not be accepted. Sod cut for more than twenty-four (24) hours will not be accepted.
 - 6. Plastic netting: Sod to be free of plastic netting used during establishment by sod grower.

- D. Fertilizer: As recommended by UGA extension office for turf grass and by testing lab based on soil sample results. Fertilizer recommendations vary based on season and temperature.

2. 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 the District Project Manager and authorities having jurisdiction.
 - 1. Pre-Emergent Herbicide (Selective and Non-Selective): Use only with approval by Project Manager. Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
 - 2. Post-Emergent Herbicide: Glyphosate or 2,4-D, or approved equal

3. EXECUTION

1. EXAMINATION

- A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.
 - 1. Verify that finish grades are consistent with the slopes and grades indicated on the Contract Drawings.
 - 2. 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.
 - 3. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
 - 4. 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.
 - 5. 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 and approved by the Project Manager.
- 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 the Project Manager and replace with new planting soil.
- D. Beginning of installation means acceptance of existing conditions by the Contractor.

2. PREPARATION

- A. Work notification: Notify the Project Manager at least seven (7) working days prior to start of sodding operations.
- B. Limit turf subgrade preparation to areas that can be sodded within twenty four (24) hours.

- C. Newly Graded Subgrades: Prepare soil as required by Division 32 Section "Soil Preparation".
 - D. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:
 - 1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
 - 2. Loosen surface soil to a depth of at least 8 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top six inches (6") of soil. Till soil to a homogeneous mixture of fine texture.
 - 3. Remove stones larger than one-half (1/2") inch in any dimension and sticks, roots, trash, and other extraneous matter.
 - 4. Legally dispose of waste material, including grass, vegetation, and turf, off City and District property.
 - E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
 - F. Verify that all areas are graded to drain at a minimum of two percent (2%) or as indicated on the Contract Drawings. Verify that subsurface drainage system and drain inlets if any, are operative.
 - G. Verify that irrigation system is operable and provides adequate coverage prior to planting.
 - H. Adjustment: Adjust irrigation heads to proper watering height according to depth of sod material but lower than compacted blade height to enable lawn mowers to cut grass freely without damage to the sprinkler system.
 - I. When completed, the soil shall be firmed by float dragging, followed by steel raking, to provide for the proper sodded subgrade. The sod bed shall be totally free from rock or clay clods over one-half inch (1/2") inch in diameter.
 - J. Repair: Re-establish grade and specified conditions to damaged sod areas prior to placing sod.
3. INSTALLATION
- A. Sodding:
 - 1. Sod within twenty-four (24) hours after preparation of bed.
 - 2. If plastic netting is present within sod, remove all netting during sod installation and discard from site.
 - 3. Subgrade on which sod is laid shall be slightly moist during installation.
 - 4. Lay sod with longest dimension parallel to contours and in continuous rows.
 - 5. Tightly butt ends and sides of sod together. Stagger and compact vertical joints between sod strips.
 - 6. Sod shall not be overlapped or stretched during placement. Exposed joints due to shrinkage will require replacement of sod in affected areas.
 - B. Topsoil: Where new sod abuts an existing turf area topsoil shall be placed along seams and or joints to provide a smooth transition.
 - C. Rolling: Sod shall be rolled after installation to ensure proper contact with the subgrade, and to ensure tight joints between adjacent pieces. Sod shall be moist prior

to rolling. Once rolling is complete additional watering shall occur. Roller shall weigh one-hundred (100) pounds.

- D. Drainage: Contractor shall ensure that finished areas are graded so that positive drainage of storm and irrigation water is achieved.
- E. Water: Contractor to utilize the existing irrigation system and or quick coupler(s) when available. If irrigation or quick coupler(s) are not available then the contractor is responsible for watering. Water shall be free of substances that may be harmful to sod growth. Hoses and other watering equipment necessary to water the sod to be furnished by Contractor.
 - 1. Water thoroughly with a fine spray as laying progresses and immediately after planting. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches (1-1/2 ") below sod.
- F. After sod and soil have dried, roll sodded areas to ensure a good bond between sod and soil and to remove minor depressions and irregularities. Roller shall not exceed one hundred (100) pounds.

4. CLEANING

- A. Perform cleaning during installation of the Work and upon completion of the Work to the satisfaction of the Project Manager. Remove all excess materials, debris, and equipment from site. Repair any damage resulting from sodding operations.

5. PROTECTION

- A. Protect existing utilities, paving and other facilities from damage caused by sodding operations, the Contractor shall repair any damage at no additional cost to the District.
- B. Restrict vehicular and pedestrian traffic from sodded areas until grass is established. Erect signs and barriers as required or directed by the Project Manager at no additional cost to the District.
- C. Locate, protect and maintain the irrigation system during sodding operations. Repair irrigation system components damaged during sodding operations shall be replaced or repaired to current City and County of Broomfield or District irrigation standards at the Contractor's expense.
- D. Erosion Control: Take measures and furnish equipment and labor necessary to control and prevent soil erosion, blowing soil and accumulation of wind-deposited materials on the site throughout the duration of work.

6. MAINTENANCE

- A. General: The maintenance period shall begin immediately after each area is sodded and continue for one (1) year or as determined by the Project Manager. During this time, the Contractor is responsible for watering, mowing, spraying, weeding, fertilizing and all related work as necessary to ensure that sodded areas are in a vigorous growing condition. Provide all supervision, labor, material and equipment to develop and maintain sodded areas from time of installation.

- B. Mowing and Trimming: When turfgrasses reach three and one-half inches (3-1/2") in height, begin weekly mowing program to maintain turf at two and one-half inches (2-1/2") to three inches (3") in height. Do not remove more than 1/3 the height of the grass blade in single mowing. Do not mow when grass is wet. All clippings from adjacent paved areas shall be removed and clippings from mowed turf areas shall be removed to the satisfaction of Project Manager.
- C. Fertilizing: Within thirty (30) days of sodding and every sixty (60) days thereafter until Acceptance, apply specified fertilizer to maintain optimal turf vigor or per the direction of the Project Manager.
- D. Weed Control: Control annual weeds by mowing. Do not use herbicides unless approved by the Project Manager.
- E. Insect and Disease Control: As needed, apply insecticide and fungicide approved by the District Project Manager.

7. ACCEPTANCE

- A. Substantial Completion of sod areas will not be given until the Project Manager is satisfied with establishment and a full stand of grass, in a vigorous growing condition, and thoroughly rooted to the soil and absence of visible joints. The sodded areas shall be accepted on the basis of having a healthy, uniform stand of turf over the entire sodded area.
 - 1. Sixty (60) days after sodding, the sodded areas shall be reviewed by the Project Manager and the Contractor. Any areas as determined by the Project Manager where the sod has failed to establish shall be re-sodded.
- B. Final Acceptance will be defined as a healthy uniform turf that does not contain any stressed or bare spots greater than one (1) square foot.

END OF SECTION

329300 - TREES, SHRUBS, AND GROUNDCOVERS

1.GENERAL

1. SUMMARY

A. RELATED DOCUMENTS

1. The General Contract Conditions, Drawings and other Division 1 Specification Sections apply to Work of this Section.

B. DESCRIPTION

1. The work of this section consists of providing, installing, and maintaining live woody plant material.

C. RELATED SECTIONS:

1. Division 31: Soil Preparation
2. Division 32: Topsoil
3. Division 32: Sodding

2. SUBMITTALS

- ##### A. Delivery tickets for all bulk materials with Owner's Representative's approval or acknowledgment that materials were received in satisfactory condition.

- ##### B. Product certificates signed by manufacturers certifying that their products comply with specified requirements.

1. Manufacturer's certified analysis for standard products, where applicable.
2. Analysis for other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

- ##### C. Samples: 1 cubic foot of mulch for each mulch type required for the project, in labeled plastic bags, boxes, or buckets.

- ##### D. Contractor to provide representative photographs, or physical samples of all trees over 1" caliper to Landscape Architect for approval. Photographs must have a person or measuring stick to establish relative size. When approved, photographed or tagged will be maintained as representative samples for final installed plant materials.

- ##### E. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and address of Landscape Architects and Owners, and other information specified.

- ##### F. Material test reports from qualified independent testing agency, indicating and interpreting test results relative to compliance of the following materials with requirements indicated.

- G. Analysis of existing surface soil for plant growth.
- H. Planting schedule indicating anticipated dates and locations for each type of planting.
- I. Three (3) sets of maintenance instructions recommending procedures to be established by the Owner for maintenance of landscaping during an entire year. Submit before expiration of required maintenance period.
- J. Three (3) copies of a written warranty stating all items included in the warranty, conditions of the warranty, and beginning and ending of warranty period(s).

3. 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 landscape establishment.
- B. **Installer's Field Supervision:** Require Installer to maintain an experienced full-time supervisor on the Project site during times that landscaping is in progress.
- C. **Testing Agency Qualifications:** To qualify for acceptance, an independent testing agency must demonstrate to Owner's Representative's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E 699, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.
- D. Provide quality, size, genus, species, and variety of trees indicated, complying with applicable requirements of ANSI Z60.1 "American Standard for Nursery Stock", and all applicable state and local rules and regulations.
- E. **Inspection:** Owner's Representative may inspect plants either at place of growth or at site before planting, for compliance with requirements for name, variety, size, and quality.
 - 1. The Owner's Representative reserves the right to reject at any time or place prior to final acceptance all plant materials, which in the Owner's Representative's opinion fail to meet specifications. Inspection of materials is primarily for quality, size, and variety, but other requirements are not waived even though visual inspection results in approval. Plants are to be inspected where available; however, inspection at the places of supply shall not preclude the right of rejection at the site or at a later time prior to final acceptance. Rejected material shall be removed from the site within 24 hours.
 - 2. The Contractor shall schedule inspection of the plants, at either the supplier or on-site, to be completed in one visit. Any further inspection required due to plants being unavailable or rejected as not meeting specifications shall be charged to the Contractor at the current hourly rate for the Owner's personnel performing the inspection.
 - 3. The Contractor shall pay all expenses for the Owner's Representative to visit the source for plants including airfare, taxi, hotels and meals.
- F. **Soil Analysis:** The Contractor shall 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 growth of applicable planting material. 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.
2. Provide testing from 3 locations per direction of Owner's Representative.
3. The Contractor shall perform soil tests 30 days prior to mobilizing for landscape construction.
4. Soil testing shall be provided by Utah State University Analytical Laboratory, ("Landscaper" test with additional Sulfate test) USU Analytical Labs, 9400 Old Main Hill, Logan, UT 84322-9400, or other approved testing facility. Soil shall be tested for soluble salts and nutrient levels. Testing facility shall provide interpretation of results and recommendation for soil amendments for each type of planting.
5. Deficient nutrients shall be corrected with the addition of appropriate fertilizer and amendment materials. The Contractor shall submit a Change Order Request for all additional materials that are recommended but are not included in this Specification.

- G. Measurements: Measure trees according to ANSI Z60.1 with branches and trunks in their normal position. Do not prune to obtain required sizes. Take caliper measurements 6 inches (150 mm) above ground for trees up to 4-inch (100-mm) caliper size, and 12 inches (300 mm) above ground for larger sizes. Measure main body of tree for height and spread; do not measure branches or roots tip-to-tip.
- H. Pre-installation Conference: Contractor shall attend pre-installation conference at location specified by Owner's Representative.

4. DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery and while stored at site. The Owner's Representative reserves the right to inspect containers before or after installation to verify compliance with Specifications.
- B. Trees: Deliver nursery stocked or freshly dug trees. Do not prune before delivery, except as approved by Owner's Representative. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees in such a manner as to destroy natural shape. Provide protective covering during delivery. Plant materials delivered without protective covering may be rejected. Do not drop trees during delivery. Label at least one tree of each variety with a securely attached waterproof tag bearing a legible plant name. Remove all tags and flagging as directed by Owner's Representative.
- C. Handle balled and burlapped stock by the root ball only.
- D. Deliver trees after preparations for planting have been completed and install immediately. If planting is delayed more than 6 hours after delivery, set planting materials in 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 trees stored on site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.

5. PROJECT CONDITIONS

- A. Utilities: Determine location of above grade and underground utilities and perform work in a manner that will avoid damage. Hand excavate, as required. Maintain grade stakes until their removal is mutually agreed upon by parties concerned. Contractor shall be responsible for utility locating, repair of utilities damaged by Contractor, and establishment of grade controls.
- B. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Owner's Representative before planting.
- C. Protection: Erect and maintain barricades, warning signs and lights, and provide guards as necessary or required to protect all persons on the site.

6. COORDINATION AND SCHEDULING

1. Coordinate installation of planting materials during normal planting seasons for each type of plant material required.
2. Plant trees after final grades have been accepted

7. WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Special Warranty: Warrant trees and shrubs for a period of one year after date of Final Acceptance, against defects including death and unsatisfactory growth. Warranty shall not cover defects resulting from lack of adequate maintenance, neglect, or abuse by Owner, abnormal weather conditions unusual for warranty period, or incidents that are beyond Contractor's control.
- C. Replace planting materials that are excessively pruned, more than 20 percent dead, or in an unhealthy or declining condition immediately upon notice from the Owner's Representative.
- D. All plants shall be true to name and meet all conditions of these specifications. Any plant that is not true to name as indicated by form, leaf, flower, or fruiting characteristics shall be replaced at the Contractor's expense.

- E. Inadequate or improper maintenance by the Owner shall not be cause for replacement, provided the Contractor shall have submitted a letter or report to the Owner on improper or inadequate maintenance practices and recommended remedial actions.
 - F. The warranty shall not be enforced should any plant die due to vandalism after Final Acceptance.
8. TREE MAINTENANCE DURING CONSTRUCTION PERIOD:
- A. Maintain trees by pruning, cultivating, watering, winter watering, weeding, restoring planting saucers, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Spray as required to keep trees free of insects and disease. Restore or replace damaged tree wrappings. Trees shall be maintained until Final Acceptance of the entire project.

2.PRODUCTS

1. PLANT MATERIALS

- A. General: Furnish nursery-grown trees and shrubs conforming to ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully-branched, healthy, vigorous stock free of disease, insects, eggs, larvae, girdling, and defects such as sun scald, injuries, abrasions, and disfigurement. Trees of a larger size may be used if acceptable to Owner's Representative with a proportionate increase in size of roots and balls.
- B. Label at least 1 plant of each variety and caliper with a securely attached waterproof tag bearing legible designation of botanical and common name.
- C. All plants shall be the species designated on the Drawings. No substitutions will be accepted without the prior written approval of the Owner's Representative. Contractor must provide proof of non-availability.

2. TREES

- A. Shade Trees: Single-stem trees with straight trunk, well-balanced crown, and intact leader, of height and caliper indicated, conforming to ANSI Z60.1 for type of trees required.
 - 1. Branching Height: 1/3 to 1/2 of tree height.
- B. Provide balled and burlapped trees. Container-grown trees will be acceptable in lieu of balled and burlapped trees subject to meeting ANSI Z60.1 limitations for container stock.
- C. All deciduous trees of one species used in formal rows or groupings shall exhibit cultural uniformity, i.e. "matched" in height, crown width and shape, height to first branch, and trunk taper. For this reason it is desired that these trees be produced by a single grower.

3. SHRUBS
 - A. Provide plants well established and rooted in removable containers with not less than the minimum number and length of branches required by ANSI Z60.1 for the pot size indicated.

4. MULCH
 - A. Wood Mulch: Organic mulch, free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of chipped cedar bark and/or wood material not larger than three inches (3") in length/dimension. Submit 1.0 CF sample for approval.

5. TOPSOIL
 - A. Shall be soil stockpiled on site or excavated from plant pit. Refer to Section 32 91 19.13

6. WATER
 - A. Water will be available from on-site quick couplers during the irrigation season (generally May through September). Contractor shall supply water when system is not charged.
 - B. Water shall not contain any substances injurious to plant growth.

7. MISCELLANEOUS MATERIALS
 - A. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's instructions.
 - B. Pre-Emergent Herbicide: Treflan as manufactured by Elanco Company, or an approved substitution.
 - C. Trunk-Wrap Tape: Two layers of crinkled paper cemented together with bituminous material, 4 inches (102 mm) wide minimum, with stretch factor of 33 percent.
 - D. Herbicides and Pesticides: EPA registered and approved, of type recommended by manufacturer.
 - E. Tree Stakes: 8' tall shaved juniper stakes 2" in diameter.
 - F. PVC Pipe: ½" diameter and 3' long (approx. – field measure)
 - G. Tree Ties: Grommeted nylon straps, 1 ½" wide.
 - H. Staking Wire: Fourteen (14) or sixteen (16) gauge or larger galvanized steel.

- I. Evergreen Tree Guying Anchor: #4 deformed steel rebar or larger or steel T-bars 30 inches long.
 - J. Deadman Type: Locust, catalpa, cedar or redwood, with minimum length of 24 in. and sufficient diameter to hold eyebolt securely. Provide each deadman with on (1) ¾ in. x 4 in. galvanized eyebolt, centered and secured on its side.
 - K. Optional Anchor Types: Screw-type galvanized steel ground anchor, or Universal ground anchors, as manufactured by Laconia Malleable Iron Company, Laconia, NH.
- 2.8 STEEL EDGER – Steel edger shall be commercial type steel edging. 3/16" x 4" height x 16' length with tapered steel stakes supplied by the manufacturer (Ryerson, or approved substitute.) Submit a 1 foot long sample to Landscape Architect for approval prior to installation.

3.EXECUTION

1. EXAMINATION

- A. Examine areas to receive landscaping 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.
- B. Cooperate with any other contractors and trades which may be working in and adjacent to the landscape work areas. Examine drawings which show the development of the entire site and become familiar with the scope of all work required.

2. FINISH AND FINE GRADING

- A. Tillable Soil: Mechanically rip or disk subsoil in all areas to be planted to minimum depth of 8 inches prior to placing top soil and soil amendments.
- B. Positive Surface Drainage: Finish and fine grade the project area to establish an even and well matched gradient over the entire surface. Provide positive surface drainage, with no depressions, settling, or irregularities in the finished grade.
- C. Transitional Areas: At any transitional point or line where one plane intersect another, such as from a sloping area or berm to a level area, a smooth and gentle transition shall be made. There shall be no abrupt changes in grade unless specifically noted otherwise. Match the grades of new work with existing areas outside the project area.
- D. Finish Grade Tolerance: The finish grade elevation shall not vary above or below the proposed grade more than 0.05 foot.

3. PREPARATION

- A. Lay out individual tree locations and areas for multiple plantings. Stake locations, outline areas, and secure Owner's Representative's acceptance before the start of planting work. Make adjustments as directed at no additional cost to the Owner.

4. WEED CONTROL

- A. In areas that have been regraded and/or have existing weed growth, weed control measures appropriate to the amount of growth and/or species shall be provided. Submit weed control plan to Owner's Representative for approval.
- B. Clear and grub, apply pre-emergent herbicide, and/or apply post emergent herbicide as necessary to eliminate weeds. Do not proceed with landscape work until weed growth has been controlled.

5. TOPSOIL PLACEMENT

- A. Place topsoil to a depth of 4" in shrub beds and planters

6. EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits

- 1. Excavate with vertical sides and with bottom of excavation slightly raised at center to assist drainage. Roughen sides of planting pit.
 - a. Balled and Burlapped Trees: Excavate approximately 2 times as wide as ball diameter. The depth of the plant pit shall be 2 inches less than the depth of the ball in well drained soils and 4 inches less than the ball depth in poorly drained soils.
 - b. Container-Grown Trees and Shrubs: Excavate approximately 2 times as wide as container diameter. The depth of all plant pits shall be 1 inch less than depth of container.
 - c. Where drain tile is shown or required under planted areas, excavate to top of porous backfill over tile.

B. Obstructions

- 1. Notify Owner's Representative if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavation.

C. Drainage

- 1. Notify Owner's Representative if subsoil conditions show evidence of water seepage or retention in tree or shrub pits.
- 2. Fill the pit with water and allow it to completely drain before planting occurs.
- 3. If water does not drain out of pit within 24 hours, notify Owner's Representative.

7. PLANTING TREES AND SHRUBS

- A. Balled and Burlapped Stock:

1. Set balled and burlapped stock plumb and in center of pit with top of ball raised above adjacent finish grades as indicated.
2. Remove burlap from tops of balls and partially from sides, but do not remove from under balls. Remove wire baskets entirely. Remove pallets, if any, before setting. Do not use planting stock if ball is cracked or broken before or during planting operation.
3. Place backfill around ball in layers, tamping to settle backfill and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing and tamping final layer of backfill. Create 48" diameter saucer around tree and fill with 3" specified mulch.

B. Container Grown Stock:

1. Carefully remove containers so as not to damage root balls.
2. Lightly scratch sides of exposed root ball to loosen surface roots.
3. Set plants plumb and in center of pit or trench with top of ball raised above adjacent finish grades as indicated.
4. Place backfill around ball in layers, tamping to settle backfill and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing and tamping final layer of backfill.

C. Wrap trees with trunk-wrap tape

1. Start at base of trunk and spiral cover trunk to height of first branches. Overlap wrap, exposing half the width, and securely attach without causing girdling. Do not use staples. Inspect tree trunks for injury, improper pruning, and insect infestation and take corrective measures required before wrapping.
2. No tree shall be wrapped after May 21 nor before November 1.
3. All deciduous trees shall be wrapped by November 15. Remove tree wrap by May 15.
4. Contractor shall be responsible for wrapping and unwrapping trees during the warranty period.

8. PRUNING OF PLANTS

- A. Prune, thin, remove injured or dead branches, and shape plants as directed by Owner's Representative.

9. MULCHING

- A. Mulch backfilled surfaces of pits, planted areas, non-irrigated zones, and other areas indicated.

B. Pre-Emergent Herbicide

1. Apply pre-emergent herbicide to all shrub bed areas at the rate recommended by the manufacturer. Do not apply to annual, perennial, or ground cover areas.

- C. Mulch in shrub bed areas: Apply 3" (100 mm) thick layer of mulch and finish level with adjacent finish grades. Do not place mulch against trunks or stems.

- D. Mulch tree rings in turf and native grass areas with 3 inch depth specified mulch. Mulch ring to be 48" diameter.

10. INSTALLATION OF MISCELLANEOUS MATERIALS

- A. Apply antidesiccant using power spray to provide an adequate film over trunks, branches, stems, twigs, and foliage.
 - 1. When deciduous trees or shrubs are moved in full-leaf, spray with antidesiccant at nursery before moving and again 2 weeks after planting.

11. CLEANUP AND PROTECTION

- A. During landscaping, keep pavements clean and work area in an orderly condition.
- B. Protect landscaping from damage due to landscape operations, operations by other contractors and trades, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.
- C. At the time of the final inspection of the work, clean all paved areas by sweeping and washing. Remove construction equipment, excess materials, debris or rubbish from the site.

12. DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal
 - 1. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of it off the Owner's property.

END OF SECTION