

Ord 3998-2016

AN ORDINANCE AMENDING CHAPTER XV OF THE LAND DEVELOPMENT  
ORDINANCE OF THE CITY OF WOODSTOCK, GEORGIA

**Whereas**, the City of Woodstock, Georgia (hereinafter sometimes referred to as the City ") is a municipality duly formed and existing pursuant to Georgia Law; and

**Whereas**, the 1983 Constitution of the State of Georgia provides for the self –government of municipalities without the necessity of action by the General Assembly<sup>1</sup>; and

**Whereas**, the City of Woodstock, Georgia, has the legislative power to adopt clearly reasonable ordinances, resolutions or regulations relating to its property, affairs and local government for which no provision has been made by general laws, and which are not inconsistent with the Constitution or any charter provision applicable thereto<sup>2</sup>; and

**Whereas**, the City Council of the City of Woodstock, Georgia desires to amend **Chapter XV STREET STANDARDS** of the Land Development Ordinance, City of Woodstock, Georgia to provide for trail standards and specifications as set forth herein; and

NOW, THEREFORE, BE IT RESOLVED THAT THE MAYOR AND COUNCIL OF THE CITY OF WOODSTOCK HEREBY ORDAINS:

**Section 1.**

A new **Article IV Asphalt Trails Standards and Specifications** and **Article V Concrete Trails Standards and Specifications** as more particularly set forth on Exhibit "A" attached hereto and made a part hereof by reference are hereby inserted into the Land Development Ordinance of the City of Woodstock, Georgia.

**Section 2.**

---

<sup>1</sup> Ga. Const. 1983, Article IX, Section II, Paragraph II provides in pertinent part as follows.

The General Assembly may provide by law for the self g- overnment of municipalities and to that end is expressly given the authority to delegate its power so that matters pertaining to the municipalities may be dealt with without the necessity of action by the General Assembly "

<sup>2</sup> O C G.A §36- 35 -3( a) provides as follows:

“(a) The governing authority of each municipal corporation shall have legislative power to adopt clearly reasonable ordinances, resolutions or regulations relating to its property, affairs, and local government for which no provision has been made by general law and which are not inconsistent with the Constitution or any charter provision applicable hereto. Any such charter provision shall remain in force and effect until amended or repealed as provided in subsection (b) of this Code Section This Code Section, however, shall not restrict the authority of the General Assembly, by general law, to define this home rule power further or to broaden, limit, or otherwise regulate the exercise thereof The General Assembly shall not pass any local law to repeal, modify or supersede any action taken by a municipal governing authority under this Code section, except as authorized under Code Section 36- 35 -6 "

Severability. If any sentence, clause, part, paragraph, section, or provision of this Ordinance is declared by a court of competent jurisdiction to be invalid, the validity of the Ordinance as a whole or any other part hereof shall not be affected.

Effective Date. This Ordinance shall take effect immediately upon its adoption.

PASSED AND ADOPTED BY THE MAYOR AND COUNCIL OF THE CITY OF WOODSTOCK, GEORGIA, THIS 11 DAY OF July, 2016.

First Reading Date: 6-20-16  
Public Hearing Date: 6-20-16  
Public Hearing Advertised: \_\_\_\_\_  
Final Adoption Date: 7-11-16

  
\_\_\_\_\_  
DONNIE HENRIQUES,  
MAYOR CITY OF WOODSTOCK,  
GEORGIA

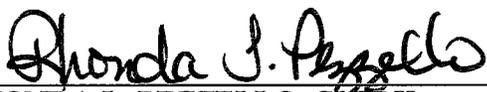
  
\_\_\_\_\_  
RHONDA L. PEZZELLO, CLERK  
CITY OF WOODSTOCK

EXHIBIT "A"

ARTICLE IV. ASPHALT TRAIL STANDARDS AND SPECIFICATIONS  
ARTICLE V. CONCRETE TRAIL STANDARDS AND SPECIFICATIONS  
AS PART OF CHAPTER XV OF THE LAND DEVELOPMENT ORDINANCE

## **Article IV. Asphalt Trail Standards and Specifications**

### **15.400. - ASPHALT TRAILS**

#### **15.401. - SCOPE**

1. Asphalt Trail shall be laid out and constructed so as to be woven through the woods, between the trees and over the root systems. This is a careful, interactive process between the Woodstock Parks and Recreation Department, Woodstock Public Works Department (City), Contractor, and Surveyor.
2. Asphalt Trail shall be constructed to the desired width of 10 feet. If site conditions prohibit the construction of a 10-foot wide trail, a minimum width of 8 feet may be constructed with City approval.
3. Asphalt Trail shall be constructed in a manner that does not disrupt the tree root systems or require unnecessary removal of trees or cutting of roots. All ground disturbances should be outside of the tree's drip line where practical. Where this is impractical, encroachments into the drip line may be approved by the City. Drip line is defined as the area of ground perpendicularly below the outer reaches of the tree's branches. This specification does not prevent any matters allowed under the Tree Preservation Standards.
4. Asphalt Trail shall be constructed at the locations and to the dimensions, lines, grades and cross section indicated on the Drawings or as directed by the City and in conformity with the provisions and requirements set out in these Specifications
5. Asphalt Trail shall include all the necessary excavation, unless otherwise indicated, sub-grade and sub-base preparation, backfilling, final clearing up and completing all incidentals thereto, as indicated on the Drawings or as directed by the City.

#### **15.402.- QUALITY ASSURANCE**

1. Use only materials that are furnished by a bulk asphalt concrete producer regularly engaged in production of hot-mix, hot-laid asphalt concrete.
2. Comply with applicable requirements of the current approved edition of Georgia Department of Transportation, Standard Specifications – Construction of Transportation Systems.

### **15.403.- PROTECTION**

1. Contractor shall not encroach upon any areas outside the proposed asphalt trail surface and shoulder. Equipment shall not twist, turn or backup into woodland spaces outside of the area of the graded trail unless approved by the City.
2. Contractor shall not park vehicles, store or stage any materials or equipment under the overhanging branches or the drip line of trees to be saved.
3. Contractor shall review all construction adjustment considerations with the City prior to implementation.
4. Contractor shall keep detailed field notes of all adjustments and changes and make them available at any time.
5. Contractor shall utilize gravel fill base material when paved surfaces or trails are placed over any tree root system or under any tree canopy. Reference details on construction documents.
6. Trees and roots shall be protected from damage both above grade and below ground by using the development process outlined in Part 3 – Execution.
7. After final rolling, do not permit vehicular traffic on asphalt concrete pavement until it has cooled and hardened, and in no case, no sooner than six (6) hours.
8. Do not permit construction traffic on finished asphalt trail surfaces.
9. Provide barricades and warning devices as required to protect pavement and the general public.

### **15.404.- SUBMITTALS**

1. Provide certificates stating that the materials supplied comply with Specifications. Certificates shall be signed by the asphalt producer and the Contractor.
2. Application instructions and a description as well as other data relative to the Contractor's application equipment and methods shall be submitted to the City for approval.

## **15.405.- CONDITIONS**

1. Weather Limitations:
  - a. Apply bituminous prime and tack coats only when the ambient temperature in the shade has been at least 40°F.
  - b. Do not conduct paving operations when surface is wet, frozen, or contains excess moisture that would prevent uniform distribution and required penetration.
  - c. Construct asphaltic courses only when atmospheric temperature in the shade is above 35°F, when the underlying base is dry and when the weather is not rainy.
  - d. Place base course when air temperature is above 35°F and rising. No base course shall be placed on a frozen, saturated, or otherwise unsuitable sub-grade material.
2. Grade Control: Establish and maintain the required lines and grades for each course during construction operations.

## **15.406.- INSPECTION AND TESTING**

1. Pavement and base testing will be performed by an independent testing laboratory selected by the Owner.
2. Trail alignment shall be hand-probed immediately after staking by a geotechnical consultant to determine subsurface structural conditions.
3. The testing agency shall test in-place graded aggregate base courses for compliance with specified compaction, thickness and surface smoothness requirements.
4. The testing agency shall take one 4-inch diameter core per 50 linear feet of asphalt paved areas at locations selected by the City for density and thickness tests. Repair holes resulting from coring to match existing paving.
5. Compaction:
  - a. Graded Aggregate Base: Minimum acceptable density shall be 98 percent of maximum dry density in accordance with ASTM D 698. Conduct one test for each 2,500 square yards of in-place material, but in no case less than one daily for each layer. Test density of graded aggregate base according to ASTM D 2167.
  - b. Asphaltic Concrete: Compare density of in-place material against laboratory specimen of same mixture. Minimum acceptable density of in-place material shall

be 94 percent of the calculated voidless density based upon the effective specific gravity of the aggregate used. It is intended that acceptance density testing will be accomplished while the bituminous mixture is hot enough to permit further densification if such is shown to be necessary. If the density does not conform to the requirements stated herein above, the Contractor shall continue compactive effort until the required density is obtained.

6. Pavement Thickness: Inspect the cores of the base and surface courses to determine the average thickness of the course. If the average thickness exceeds the allowable values listed below, additional cores shall be made at the Contractor's expense to determine the area of deficient thickness. The deficient area shall be corrected by overlay with the same type of mix to the limits as determined by the City.
  - a. Base Course: 6 inch
  - b. Binder Course: 2 inch
  - c. Surface Course: 1 inch
  
7. Surface Smoothness: Test finished surface of each asphalt course for smoothness using a 10-foot straightedge. Intervals of tests shall be as directed by the Owner. Surfaces will not be acceptable if exceeding the following:
  - a. Base Course:  $\frac{1}{4}$  inch in 10 feet
  - b. Binder Course:  $\frac{1}{4}$  inch in 10 feet
  - c. Surface Course:  $\frac{1}{8}$  inch in 10 feet
  
8. Contractor's Duties Relative to Testing:
  - a. Notifying laboratory of conditions requiring testing.
  - b. Coordinating with laboratory for field testing.
  - c. Paying cost for additional testing performed beyond the scope of that required and for retesting where initial tests reveal non-conformance with specified requirements.
  - d. Paying the cost of overlays or pavement removal and replacement, which does not comply with the specified testing limits.

#### **15.407.- PRODUCTS & MATERIALS**

1. Staking Materials shall be placed in field according to the plans and shall consist of the following:
  1. 1" x 2" x 3' tall stakes for center line stakeout
  2. 1" x 2" x 18" short stakes for corners
  3. Plastic flagging tape:
    - Red – Indicates trees to remove

Yellow – Indicates trees to save  
White – Indicates centerline  
Pink – Control Points

4. Wire Flags (Pink)
  5. 2" x 2" x 12" Hub stakes
  6. Mallet – short handle for driving stakes
- 
2. Graded Aggregate Base Course: Graded aggregate base course shall be of uniform quality throughout and shall meet the requirements of Section 815 of the Georgia Department of Transportation Standard Specifications.
  3. Binder Course: Binder course shall be a uniform quality throughout and conform to the requirements of Section 828 of the Georgia Department of Transportation Standard Specifications.
  4. Surface Course: Surface course shall be of uniform quality throughout and shall conform to the requirements of Section 828, Type "F" of the Georgia Department of Transportation Standard Specifications.
  5. Prime Coat: Prime coat shall conform to the requirements of Section 412 of the Georgia Department of Transportation Standard Specifications.
  6. Tack Coat: Tack coat shall conform to the requirements of Section 413 of the Georgia Department of Transportation Standard Specifications.
  7. Gravel: #57 stone for root area fill not under trail: Gravel shall be of uniform quality throughout and shall meet the requirements of Section 800 for No. 57 Stone, Group II and shall have the following gradation:

Sieve Size	Percent Passing
2-inch	-
1-1/2-inch	100
1-inch	95-100
½-inch	25-60
No. 4	0-10
No. 8	0-5

8. Plastic Pipe: 4" perforated Schedule 40 ultra violet light resistant PVC.

9. Geosynthetic Materials:

1. Filter Fabric: Filter Fabric utilized for separation of aggregate base or controlled fill materials from existing subgrades or sediment deposition shall conform to the requirements of the Georgia Department of Transportation Standard Specifications, Section 881.06 for non-woven, needle-punched filter fabrics. The requirements outlined under Item 2.01.I.2 of this Specification Section will typically be sufficient for most applications. Filter fabric samples, as well as specific manufacturer's property characteristics and installation guidelines, shall be submitted to the City for review and approval with specific identification of each proposed application.
2. Geogrid Reinforcement Materials: Geogrid reinforcement materials utilized for subgrade stabilization applications shall be a regular grid structure formed by biaxially drawing a continuous sheet of select polypropylene material and shall have aperture geometry and rib and junction cross-sections sufficient to permit significant mechanical interlock with the material being reinforced. The geogrid shall have high flexural rigidity and high tensile strength at ribs and junctions of the grid structure. The geogrid shall maintain its reinforcement and interlock capabilities under repeated dynamic loads while in service and shall also be resistant to ultraviolet degradation normally encountered in the material being reinforced. Geogrid reinforcing material samples, as well as specific manufacturer's property characteristics and installation guidelines, shall be submitted to the City for review and approval.

**15.408. - EXECUTION**

**15.409. - EQUIPMENT**

1. No track type equipment shall be used in the construction of this work. Rubber tire vehicles shall be used exclusively and shall be limited to small back hoes, bobcats, pickup trucks, dump trucks and narrow paving machines of the type used for golf course cart paths. Equipment shall be a lightweight, small-scale vehicle capable of negotiating 8'-10' wide pathways.
2. Asphalt spreader machines shall have a spreader opening width not to exceed 8' and a total width not to exceed 10'.

**15.410. - LAYOUT**

1. Contractor shall stake trail coordinate control points as per the plans with hub stakes and tall stakes shall flag stakes with pink tape.
2. Contractor shall stake the centerline of the proposed trail layout as per the plans with wire/flag stakes to indicate routes.

3. Contractor and a representative from the City shall walk the stakeout to make adjustments to the layout and flag trees to be removed with red tape.
4. The Owner's Surveyor shall make field notes and transfer field adjustments to the construction documents.
5. Contractor shall prepare a construction stakeout of the trail based on the revised layout and grading plans. Stakeout shall include horizontal and vertical (i.e. spot elevations) information.
6. Contractor and a representative from the City shall walk the stakeout again to make minor horizontal adjustments and to adjust the vertical grading.
7. The Owner's Surveyor shall transfer revised data to the construction documents for Contractor's reference.

#### **15.411. - CLEARING AND GRUBBING**

1. Clearing and grubbing shall be performed in accordance with the applicable laws and regulations.
2. Contractor shall remove trees and underbrush from the trail corridor. This shall be accomplished with a rubber tire tractor and bush hog. Small trees shall be cut off flush with the ground. Large trees shall be cut down by hand saws or uprooted and removed by knocking the tree down so that it falls within the trail corridor. All stumps shall be ground down 18"-24" below finished subgrade. Trees shall be cut into pieces and removed by small truck. No dragging of cut trees, tree trunks or limbs shall be permitted. No root rakes shall be permitted.
3. Limbs, brush and treetops shall be removed or chipped and stock-piled for later use in areas approved by the City.
4. Contractor shall hand rake surface leaf mulch and humus away from trail bed. Contractor shall scatter this material in designated areas that will not be disturbed by construction. Soil mixed with ground up stump litter shall be removed from the trail corridor and not be left under the trail surface.

#### **15.412. - REMOVAL OF STRUCTURES AND OBSTRUCTIONS**

Unless otherwise indicated or stipulated, the removal of structures, obstructions, etc., will be performed in accordance with the applicable laws and regulations.

#### **15.413. - TRAIL AND DRAINAGE EXCAVATION**

Trail and drainage excavation, as indicated on the Drawings or as directed by the City, shall be performed in accordance with the applicable laws and regulations.

#### **15.414. - EMBANKMENT CONSTRUCTION**

Embankment construction, as indicated on the Drawings or as indicated by the City, shall be performed in accordance with the provisions of the City LDO, Chapter XV, Section 15.202 2.

#### **15.415. - SUBGRADE PREPARATION**

1. As determined necessary by the City, cut roots on the uphill slope prior to grading. Fine grading shall proceed to remove bumps, dips and holes from the trail bed. Stump holes must be filled and compacted.
2. The subgrade shall be shaped so that the finished asphalt surface will slope to direct water into the natural drainage swales and conform to natural drainage patterns to the greatest extent possible, within the limits imposed by the Drawings and Specifications. Cross slope shall be downhill at 2%.
3. The subgrade for the trails shall be formed by excavation to a depth equal to the thickness of the asphalt and base course, except where the trail passes under or through the drip line of a tree or trees. Contractor shall not excavate where the trail passes under or through the drip line of a tree or trees unless the soils are determined by the geotechnical engineer to be unstable.
4. Rough grade of native soil shall be roller compacted to achieve maximum density stated on the details.
5. Yielding or unsuitable material shall be removed and backfilled with satisfactory material except where the trail passes under or through the drip line of a tree or trees.
6. Where yielding or unsuitable materials are found and where the trail passes under or through the drip line of a tree or trees, the geotechnical consultant shall be utilized to determine the subgrade conditions and to verify subgrade preparation specifications. Geotechnical test results for subgrade preparation shall be submitted to the City for any specification revisions prior to the Contractor's commencement of work.
7. Final subgrade shall conform to the lay of the trail less the depth of the asphalt and specified base.

8. For thin-based, light-duty trail, a geotextile fabric shall be placed along the trail prior to placing base material.

#### **15.416. - BASE COURSE**

1. Contractor shall work from within the proposed edges of the sub base. Compacted base shall extend 12 to 18 inches outside of the edges of the asphalt paving.
2. Contractor shall place a minimum of 4-inches of graded aggregate base along trail grading, compacted thoroughly and finished to a smooth, unyielding surface and proper line, grade and cross section of the proposed construction. Compaction Density shall be shown on the plans or details.
3. Except as indicated elsewhere, placement of graded aggregate sub base shall be in accordance with the applicable laws and regulations.
4. Where yielding or unsuitable materials are found and where the trail passes under or through the drip line of a tree or trees, the Contractor shall place a special fill material system consisting of, as determined by the geotechnical consultant, varying depths of graded gravel fill placed over geotextile fabrics or geogrid subgrade reinforcements, which are placed on or above the subgrade. The Geotechnical Consultant shall be utilized to take the soil borings as necessary to determine the subsurface conditions, and to verify that base material specifications and details are sufficient to support the trails and specified uses. Geotechnical test results for base material shall be submitted to the City for any base specification revisions prior to beginning work.
5. Drainage pipes, walls, bridge abutments, etc. may be constructed using the trail as an access route only after base cover is placed and compacted. Light duty pipes may be placed prior to rough grading.

#### **15.417. - SURFACE PREPARATION**

1. Contractor shall place asphalt paving over the approved base.  
  
Loose and Foreign Material
  - a. Remove loose and foreign material from surface immediately before application of paving.
  - b. Use power brooms or blowers, and hand sweeping as required.
  - c. Do not displace surface material.
2. Prime Coat

- a. Uniformly apply at a rate of 0.20 to 0.50 gallons per square yard over compacted and cleaned sub base surface.
  - b. Apply enough material to penetrate and seal, but not flood the surface.
  - c. Allow to cure and dry as long as required to attain proper penetration, and in no case less than 24 hours unless otherwise acceptable to the City.
  - d. Blot excess asphalt with just enough sand to prevent pick-up under traffic.
  - e. Remove loose sand before paving.
3. Tack Coat
- a. Dilute material with equal parts of water and apply to contact surfaces of previously constructed asphalt concrete or Portland cement concrete and similar surfaces.
  - b. Apply at a rate of 0.05 to 0.15 gallons per square yard of surface.
  - c. Apply tack coat by brush to contact surfaces of curbs, gutters, manholes, and other structures projecting into or abutting asphalt concrete pavement.
  - d. Allow surfaces to dry until material is at condition of tackiness to receive pavement.

#### **15.418. - ASPHALT CONCRETE PLACEMENT**

1. Place asphalt concrete mix on prepared surface, spread and strike-off using paving machine.
2. Spread mixture at a minimum temperature of 225°F.
3. Inaccessible and small areas may be placed by hand.
4. Place each course at a thickness such that when compacted it will conform to the indicated grade, cross-section, finish thickness, and density indicated.
5. Pavement Placing:
  - a. Unless otherwise directed, begin placing along centerline of area to be paved on crowned section, and at high side of sections on one-way slope, and in direction of traffic flow.
  - b. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips.
  - c. Complete base courses for a section before placing surface courses.
  - d. Place mixture in as continuous an operation as practical.
6. Hand Placing
  - a. Spread, tamp, and finish mixture using hand tools in areas where machine spreading is not possible, as acceptable to the City.

- b. Place mixture at a rate that will ensure handling and compaction, before mixture becomes cooler than acceptable working temperature.
7. Joints
- a. Carefully make joints between old and new pavements, or between successive days' work, to ensure a continuous bond between adjoining work.
  - b. Construct joints to have some texture, density and smoothness as adjacent sections of asphalt concrete course.
  - c. Clean contact surfaces free of sand, dirt, or other objectionable material and apply tack coat.
  - d. Offset transverse joints in succeeding courses not less than 24-inches.
  - e. Cut back edge of previously placed course to expose an even, vertical surface for full course thickness.
  - f. Offset longitudinal joints in succeeding courses not less than 6-inches.
  - g. When the edges of longitudinal joints are irregular, honeycombed, or inadequately compacted, cut back unsatisfactory sections to expose an even, vertical surface for full course thickness.

#### **15.419. - ASPHALT CONCRETE COMPACTION**

- 1. Provide sufficient rollers to obtain the required pavement density.
- 2. Begin rolling operations after placing, as soon as the mixture will bear weight of roller without excessive displacement.
- 3. Do not permit heavy equipment, including rollers, to stand on finished surface, before it has thoroughly cooled or set.
- 4. Compact mixture with hot hand tampers or vibrating plate compactors in areas in accessible to rollers.
- 5. Start rolling longitudinally at extreme lower side of sections and proceed toward center of pavement. Roll to slightly different lengths on alternate roller runs.
- 6. Do not roll centers of sections first, under any circumstances.
- 7. Breakdown Rolling
  - a. Accomplish breakdown or initial rolling immediately following rolling of transverse and longitudinal joints and outside edge.
  - b. Operate rollers as close as possible to edge without causing pavement displacement.
  - c. Check crown, grade, and smoothness after breakdown rolling.

- d. Repair displaced areas by loosening at once with lutes or rakes and filling, if required, with hot loose material before continuing rolling.
8. Second Rolling
- a. Follow breakdown rolling as soon as possible, while mixture is hot and in condition for compaction.
  - b. Continue second rolling until mixture has been thoroughly compacted.
9. Finish Rolling
- a. Perform finish rolling while mixture is still warm enough for removal of roller marks.
  - b. Continue rolling until roller marks are eliminated and course has attained specified density.
10. Patching
- a. Remove and replace damaged or defective areas. Remove a minimum of 10' of trail length, 5' minimum length up the trail and 5' minimum length down the trail, from the edges of the damaged area. Small patches within the boundaries of the finished trail are not permitted.
  - b. Cut out and fill with fresh, hot asphalt concrete.
  - c. Compact by rolling to specified density and smoothness.
  - d. Remove deficient areas for full-depth course.
  - e. Cut sides perpendicular and parallel to direction of traffic with edges vertical.
  - f. Apply tack coat to exposed surfaces before placing new asphalt concrete mixture.

#### **15.420.- BACKFILLING**

Contractor shall fine grade the outside edges of the trail to transition down to base grade by spreading native soil and covering with leaf and stockpiled wood chip mulch.

#### **15.421. - CLEANING AND PROTECTION**

1. Cleaning: After completion of paving operations, clean surfaces of excess or spilled asphalt materials to the satisfaction of the City.
2. Protection
  1. After final rolling, do not permit vehicular traffic on asphalt concrete pavement until it has cooled and hardened, and in no case no sooner than six (6) hours.
  2. Provide barricades and warning devices as required to protect pavement and the general public.

3. Maintenance: The Contractor shall maintain the surfaces of pavements until the acceptance of the Project. Maintenance shall include replacement, overlay, milling and reshaping as necessary to prevent raveling of the road material, the preservation of smooth surfaces and the repair of damaged or unsatisfactory surfaces, to the satisfaction of the City.

#### **15.422. - SUPERVISION AND APPROVAL**

Pavement shall meet the requirements of the regulatory agency responsible for the maintenance of pavement. Obtain agency approval of pavement before requesting final payment.

**15.423.--- 15.499. Reserved.**

## **Article V. Concrete Trail Standards and Specifications**

### **15.500. - CONCRETE TRAILS**

#### **15.501. - SCOPE**

1. Concrete Trail shall be laid out and constructed so as to be woven through the woods, between the trees and over the root systems. This is a careful, interactive process between the Woodstock Parks and Recreation Department, Woodstock Public Works Department (City), Contractor, and Surveyor.
2. Concrete Trail shall be constructed to the desired width of 10 feet. If site conditions prohibit the construction of a 10-foot wide trail, a minimum width of 8 feet may be constructed with City approval.
3. Concrete Trail shall be constructed in a manner that does not disrupt the tree root systems or require unnecessary removal of trees or cutting of roots. All ground disturbances should be outside of the tree's drip line where practical. Where this is impractical, encroachments into the drip line may be approved by the City. Drip line is defined as the area of ground perpendicularly below the outer reaches of the tree's branches. This specification does not prevent any matters allowed under the Tree Preservation Standards.
4. Concrete Trail shall be constructed at the locations and to the dimensions, lines, grades and cross section indicated on the Drawings or as directed by the City and in conformity with the provisions and requirements set out in these Specifications.
5. Concrete Trail shall include all the necessary excavation, unless otherwise indicated, sub-grade and sub-base preparation, backfilling, final clearing up and completing all incidentals thereto, as indicated on the Drawings or as directed by the City.

#### **15.502. - QUALITY ASSURANCE**

1. Comply with applicable requirements of the current approved edition of Georgia Department of Transportation, Standard Specifications – Construction of Transportation Systems.

#### **15.503. - PROTECTION**

1. Contractor shall not encroach upon any areas outside the proposed concrete trail surface and shoulder. Equipment shall not twist, turn or backup into woodland spaces outside of the area of the graded trail unless approved by the City.

2. Contractor shall not park vehicles, store or stage any materials or equipment under the overhanging branches or the drip line of trees to be saved.
3. Contractor shall review all construction adjustment considerations with the City prior to implementation.
4. Contractor shall keep detailed field notes of all adjustments and changes and make them available at any time.
5. Contractor shall utilize gravel fill base material when paved surfaces or trails are placed over any tree root system or under any tree canopy. Reference details on construction documents.
6. Trees and roots shall be protected from damage both above grade and below ground by using the development process outlined in Part 3 – Execution. The Tree Preservation Standards set forth in the City LDO, Chapter IX shall apply.

#### **15.504. - SUBMITTALS**

1. Provide certificates stating that the materials supplied comply with Specifications. Certificates shall be signed by the concrete producer and the Contractor.
2. Application instructions and a description as well as other data relative to the Contractor's application equipment and methods shall be submitted to the City for approval.

#### **15.505. - CONDITIONS**

1. Weather Limitations:
  - a. Do not conduct concrete paving operations when surface is saturated, or contains excess of moisture that would prevent uniform distribution and required penetration.
  - b. Construct concrete trail sections only when atmospheric temperature in the shade is above 40°F, when the underlying base is dry and when weather is not rainy.
  - c. Place base course when air temperature is above 35°F and rising. No base course shall be placed on a frozen, saturated, or otherwise unsuitable sub-grade material.
2. Grade Control: Establish and maintain the required lines and grades for each course during construction operations.

## 15.506. - INSPECTION AND TESTING

1. Geotechnical Consultant shall hand probe the route of the trail prior to grading to determine structural conditions.
2. Pavement and base testing will be performed by an independent testing laboratory selected by the Owner.
3. The testing agency shall test in-place courses for compliance with specified density, thickness and surface smoothness requirements.
4. Earthwork and compaction operations shall conform to the requirements set forth in the currently approved edition of the Georgia Department of Transportation Standard Specifications.
5. Concrete Strength: One set of acceptance and field cylinders (a total of four) from the same batch of concrete will be made for each 50 cubic yards or fraction thereof, not less than once for each 5,000 square feet of pavement in each day's placing for each class and mix design.
  - a. Each batch of concrete shall be tested for slump prior to placement. Slump shall be between  $\frac{1}{2}$  and  $1 \frac{1}{2}$  inches as determined by AASHTO Test Method T119.
  - b. Acceptance cylinders are compression test cylinders molded in the field, stored and cured in the field for the first 24 hours after molding and thereafter in the laboratory of the testing agency until time of testing. Average breaking strength at 28 days of a set of two acceptance cylinders will comprise test.
  - c. Field cylinders are compression test cylinders molded in the field, stored and cured on the work site in the same location and subject to the same exposure as job concrete of which it is a representative. Each set of two acceptance cylinders will have two matching field cylinders.
  - d. One field cylinder will be broken at seven days and the remaining will be held in reserve.
6. Pavement Thickness: The surface course of the concrete trail shall be 6 inches thick. The allowable variation in thickness of each course is as follows:
  - a. Aggregate Base Course:  $\pm \frac{1}{2}$  inch
  - b. Surface Course:  $\pm \frac{1}{4}$  inch
7. Surface Smoothness: Test finished surface of each course for smoothness using a 10-foot straightedge. Intervals of tests shall be as directed by the Owner. Surfaces will not be acceptable if exceeding the following:
  - a. Base Course:  $\frac{1}{4}$  inch in 16 feet

- b. Surface Course: 1/8 inch in 10 feet
8. Contractor's Duties Relative to Testing:
- a. Notifying laboratory of conditions requiring testing.
  - b. Coordinating with laboratory for field testing.
  - c. Paying costs for additional testing performed beyond the scope of that required and for retesting, where initial tests reveal non-conformance with specified requirements.
  - d. Paying the cost of overlays or pavement removal and replacement, which does not comply with the specified testing limits.

**15.507. - MATERIALS**

1. Materials used in the construction of concrete trails shall conform, unless otherwise stipulated, to the following:
- a. Portland cement shall conform to ASTM C 150, Type 1.
  - b. Graded aggregate base shall be uniform throughout and conform to requirements of Section 815.01 of the Georgia Department of Transportation Specifications.
  - c. Sand: Dune sand, bank-run sand and manufactured sand are not acceptable. Only builder's sand shall be used.
  - d. Fiber Reinforcement: Engineered polypropylene fibers designed for secondary reinforcement of concrete slabs.
  - e. Premolded joint filler for expansion joints shall conform to the requirements of ASTM D 1751 or ASTM D 1752. The joint sealer for the joints in the concrete pavement shall meet the requirements of Federal Specification SS-S-164 and shall be hot-poured type.
  - f. Concrete Color: Concrete shall be grey concrete mix and shall be from same supplier and same batch mixture. Finished concrete shall have a medium broom finish parallel to traffic flow on all trail sections.
  - g. All concrete, except where shown or specified otherwise, shall have the following minimum compressive strengths at 28 days, and slump at time of placement:

Location	Strength	Maximum Aggregate Size	Slump
Footings, Bases	3000 psi	1-1/2"	1"
Walls	3000 psi	3/4"	1"
Pavement, Trails	4000 psi	1-1/2"	1"

2. Staking Materials shall be placed in field according to the plans and shall consist of the following:
- a. 1" x 2" x 3' tall stakes for center line stakeout

- b. 1" x 2" x 18" short stakes for corners
  - c. Plastic flagging tape:
    - Red – Indicates trees to remove
    - Yellow – Indicates trees to save
    - White – Indicates centerline
    - Pink – Control Points
  - d. Wire Flags (Pink)
  - e. 2" x 2" x 12" Hub stakes
  - f. Mallet – short handle for driving stakes
3. Plastic Pipe: 4" perforated Schedule 40 ultra violet light resistant PVC.
4. Geosynthetic Materials:
- a. Filter Fabric: Filter Fabric utilized for separation of aggregate base or controlled fill materials from existing subgrades or sediment deposition shall conform to the requirements of the currently approved edition of the Georgia Department of Transportation Standard Specifications, Section 881.06 for non-woven, needle-punched filter fabrics. The requirements outlined under Item 2.01.D.2 of this Specification Section will typically be sufficient for most applications. Filter fabric samples, as well as specific manufacturer's property characteristics and installation guidelines, shall be submitted to the City for review and approval with specific identification of each proposed application.
  - b. Geogrid Reinforcement Materials: Geogrid reinforcement materials utilized for subgrade stabilization applications shall be a regular grid structure formed by biaxially drawing a continuous sheet of select polypropylene material and shall have aperture geometry and rib and junction cross-sections sufficient to permit significant mechanical interlock with the material being reinforced. The geogrid shall have high flexural rigidity and high tensile strength at ribs and junctions of the grid structure. The geogrid shall maintain its reinforcement and interlock capabilities under repeated dynamic loads while in service and shall also be resistant to ultraviolet degradation normally encountered in the material being reinforced. Geogrid reinforcing material samples, as well as specific manufacturer's property characteristics and installation guidelines, shall be submitted to the City for review and approval.

### **15.508. - EQUIPMENT**

- 1. No track type equipment shall be used in the construction of this work. Rubber tire vehicles shall be used exclusively and shall be limited to small back hoes, bobcats, pickup trucks, dump trucks and small concrete mixers.

2. Concrete placing machinery shall have a total width not to exceed width of trail plus 2'. No large heavy-duty track vehicles are allowed.

#### **15.509.- LAYOUT**

1. Contractor shall stake trail coordinate control points as per the plans with hub stakes and tall stakes shall flag stakes with pink tape.
2. Contractor shall stake the centerline of the proposed trail layout as per the plans with wire/flag stakes to indicate routes.
3. Contractor and a representative from the City shall walk the stakeout to make adjustments to the layout and flag trees to be removed with red tape.
4. The Owner's Surveyor shall make field notes and transfer field adjustments to the construction documents.
5. Contractor shall prepare a construction stakeout of the trail based on the revised layout and grading plans. Stakeout shall include horizontal and vertical (i.e. spot elevations) information.
6. Contractor and a representative from the City shall walk the stakeout again to make minor horizontal adjustments and to adjust the vertical grading.
7. The Owner's Surveyor shall transfer revised data to the construction documents for Contractor's reference.

#### **15.510. - CLEARING AND GRUBBING**

1. Clearing and grubbing shall be performed in accordance with the applicable laws and regulations.
2. Contractor shall remove trees and underbrush from the trail corridor. This shall be accomplished with a rubber tire tractor and bush hog. Small trees shall be cut off flush with the ground. Large trees shall be cut down by hand saws or uprooted and removed by knocking the tree down so that it falls within the trail corridor. All stumps shall be ground down 18"-24" below finished subgrade. Trees shall be cut into pieces and removed by small truck. No dragging of cut trees, tree trunks or limbs shall be permitted. No root rakes shall be permitted.
3. Limbs, brush and treetops shall be removed or chipped and stock-piled for later use in areas approved by the City.

4. Contractor shall hand rake surface leaf mulch and humus away from trail bed. Contractor shall scatter this material in designated areas that will not be disturbed by construction. Soil mixed with ground up stump litter shall be removed from the trail corridor and not be left under the trail surface.

#### **15.511. - REMOVAL OF STRUCTURES AND OBSTRUCTIONS**

Unless otherwise indicated or stipulated, the removal of structures, obstructions, etc., will be performed in accordance with the applicable laws and regulations.

#### **15.512. - TRAIL AND DRAINAGE EXCAVATION**

Trail and drainage excavation, as indicated on the Drawings or as directed by the City, shall be performed in accordance with the applicable laws and regulations.

#### **15.513. - EMBANKMENT CONSTRUCTION**

Embankment construction, as indicated on the Drawings or as indicated by the City, shall be performed in accordance with the provisions of the City LDO, Chapter XV, Section 15.202.2.

#### **15.514. - SUBGRADE PREPARATION**

1. Fine grading shall proceed to remove bumps, dips and holes from the trail bed. Stump holes must be filled and compacted. Drainage pipes, walls, bridge abutment etc. may be constructed using the trail as an access route.
2. The subgrade shall be shaped so that the finished concrete surface will slope to direct water into the natural drainage swales and conform to natural drainage patterns to the greatest extent possible, within the limits imposed by the Drawings and Specifications. Cross slope shall be downhill at 2%.
3. The subgrade for the trails shall be formed by excavation to a depth equal to the thickness of the concrete plus the base course, except where the trail passes under or through the drip line of a tree or trees. Contractor shall not excavate where the trail passes under or through the drip line of a tree or trees unless the soils are determined by the geotechnical engineer to be unstable.
4. Yielding or unsuitable material shall be removed and backfilled with satisfactory material except where the trail passes under or through the drip line of a tree or trees.

#### **15.515. - BASE COURSE**

1. Contractor shall work from within the proposed paving edges.
2. Contractor shall place a minimum of 6-inches of graded aggregate under trails, as determined by the geotechnical consultant, compacted thoroughly and finished to a smooth, unyielding surface and proper line, grade and cross-section of the proposed construction.
3. All subgrade shall be of such width as to permit the proper installation and bracing of the forms.
4. Additional stabilization of poor subgrade areas may be necessary to achieve compaction criteria for aggregate base. These additional subgrade stabilization measures shall be performed under the direct supervision of the geotechnical consultant. These measures may include, but are not limited to, placement of geogrid reinforcement materials, aggregate bridge lifts, undercutting of unsuitable soils, and soil cement admixtures.
5. Where the trail passes under or through the drip line of a tree or trees, the Contractor shall place a special fill material system consisting of, as determined by the geotechnical consultant, varying depths of graded gravel fill placed over geotextile fabrics or geogrid subgrade reinforcements which are placed on or above the subgrade. The geotechnical consultant shall be utilized to take soil borings as necessary to determine the subsurface conditions, to verify that base material specifications and details are sufficient to support the trails and specified uses. Geotechnical test results for base material shall be submitted to the City for any base specification revisions prior to beginning work.

#### **15.516. - FORMS**

1. All forms shall be set upon the prepared subgrade, true to lines and grade, and held rigidly in place so as not to be disturbed or displaced during the placing of the concrete. The top of the form shall be set to exact grade and the height shall be equal to, not less than, the thickness of the proposed concrete.
2. Design framework to be readily removable without impact, shock, or damage to cast-in-place concrete surfaces and adjacent materials.
3. Construct forms complying with ACI 347, to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for opening, offsets, sinkages, keyways, recesses, moldings, rustifications, reglets, chamfers, blocking, screeds, bulkheads, anchorages, inserts, and other features required in work. Use selected materials to obtain finishes. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.

4. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like to prevent swelling and for easy removal.
5. Immediately before placing the concrete, the forms shall be given a coat of light oil and where being removed and used again, the forms shall be thoroughly cleaned and oiled each time.
6. Forms shall be removed within 24 hours after placing concrete, and no pressure shall be exerted upon the concrete in removing the forms.
7. Where the concrete trail is to be joined to an existing trail or sidewalk, the existing sidewalk, if not in proper condition for the junction, shall be cut to a neat line perpendicular to both the centerline and the surface of the trail, or as indicated by the City.

#### **15.517. - EXPANSION JOINTS**

1. Trail designed to accommodate bike, skateboards, and blades shall not have trowel joints. Only saw joints are permitted.
2. Unless otherwise indicated on the Drawings or as directed by the Owner, premoulded expansion joint filler, ½ inch in thickness, shall be placed at the locations and in line with expansion joints in the adjoining pavement, gutter or curb. Transverse expansion joints for concrete trails shall be ½ inch thick. When expansion joints are not required in the adjoining pavement or gutter, and not otherwise indicated on the Drawings, a ½ inch premoulded expansion joint filler shall be placed at intervals of not over 30 feet apart. All premoulded expansion joint filler must be cut to full width or length of the proposed construction and shall protrude within ½ inch of the top or finished surface. All longitudinal expansion joints shall be placed as indicated on the Drawings or as directed by the City.
3. All expansion joints shall be true, even and present a satisfactory appearance.
4. All expansion joint material protruding after the concrete has been finished shall be trimmed as directed by the City.
5. Control Joints: Locate and install construction joints not shown on the Drawings, so as not to impair strength and appearance of the structure, as acceptable to the City. Review need for additional joints or scores with the City prior to construction.

6. Control Joints in Slabs-on-Ground: Construct control joints in slabs-on-ground to form panels of patterns as shown. Locate expansion type joint at spacing recommended by Portland Cement Association and review with the City prior to construction.
7. Control Joints in Trailway: Provide joints in pattern as indicated. Locate expansion type joints at spacing as indicated.

#### **15.518. - MANUFACTURING AND PLACING CONCRETE**

1. Immediately before placing concrete, the depth of the proposed concrete shall be checked by means of a template cut true to the cross section of the proposed construction and any irregularities shall be corrected.
2. Immediately before placing concrete, all subgrade shall be thoroughly sprinkled or wetted.
3. Concrete shall not be placed upon a frozen subgrade or subbase.
4. Construction joints will be permitted only at grooves or at expansion joints, unless otherwise approved by the Owner.
5. The concrete shall be manufactured and placed in accordance with the currently approved edition of the Georgia Department of Transportation Standard Specifications.
6. The concrete shall be placed immediately after mixing; the edges, sides, etc., shall be thoroughly spaded and the surfaces tamped sufficiently to thoroughly compact the concrete and bring the mortar to the surface. The concrete shall be deposited and compacted in a single layer.

#### **15.519. - FINISHING**

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

2. When the surface of the concrete is free from water and just before the concrete obtains its initial set, it shall be gone over and finished with a wooden float so as to produce a sandy texture. The longitudinal surface variations shall be not more than  $\frac{1}{4}$  inch under a 10 foot straightedge, nor more than  $\frac{1}{8}$  inch on a five foot transverse section. The surface of the concrete must be finished so as to drain completely at all times.
3. The edges of the trail shall be carefully finished and rounded with an edging tool having a radius of  $\frac{1}{2}$  inch.
4. The surface of the trail shall be divided into blocks by use of a saw cut joint. The joints shall be spaced equal to the trail width, but not to exceed 10' spacing between joints. The joints shall be cut to a depth of 1 inch deep by  $\frac{1}{4}$  inch wide. The joints shall be perpendicular, and any marks caused by edging or otherwise shall be removed with a wetted brush or wooden float, so as to give the surface a uniform texture and finish.
5. All expansion joints shall be caulked flush with trail elevation.

#### **15.520. - PROTECTION AND CURING**

1. Immediately after finishing the concrete, it shall be covered and cured in accordance with the requirements of the currently approved edition of the Georgia Department of Transportation Standard Specifications. Curing materials shall conform to the requirements of ASTM C 309 (liquid membrane compound) or ASTM C 171. If the temperature falls below freezing, satisfactory heating devices shall be placed under suitable covers to keep the temperature around the concrete at above 45°F
2. Pedestrians will not be allowed upon concrete sidewalks or trails until 12 hours after finishing concrete, and no vehicles or loads shall be permitted upon any sidewalk or driveway until the concrete has attained sufficient strength for such traffic.
3. The Contractor shall construct such barricades and protection devices as are necessary to keep pedestrians and traffic off the sidewalks or trails.
4. If any portion of the trail is damaged at any time prior to final acceptance of the project, it shall be repaired by removing all concrete within the limits of the grooves, and be replaced, at the Contractor's expense, with concrete of the type, kind and finish in the original construction.

#### **15.521. - BACKFILLING**

1. Contractor shall fine grade the outside edges of the trail to transition to base grade by spreading native soil.

#### **15.522. - CLEANING**

1. All excess or unsuitable material shall be removed and disposed of in accordance with the currently approved edition of the Georgia Department of Transportation Standard Specifications.
2. Final clean-up shall be performed in accordance with the requirements of these specifications.
3. All material becoming the property of the Owner shall be stored in a manner and at locations near or on the Project as directed by the Owner.

#### **15.523. - SUPERVISION AND APPROVAL**

Pavement shall meet the requirements of the regulatory agency responsible for maintenance of pavement. Obtain agency approval of pavement before requesting final payment.

**15.524--- 15.599. Reserved.**