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**SECTION 32 93 00**  
**TREES, SHRUBS & GROUND COVER**

**PART 1 – GENERAL:**

1.01 DESCRIPTION

- A. This Section includes specifications for furnishing and planting of trees, shrubs, ground cover, ornamental grasses and vines as indicated; furnishing and installation of all planting accessories; care and replacement during construction; and a one-year care and replacement period.

1.02 QUALITY ASSURANCE

- A. All plants to be supplied shall be first class representatives of their normal species or varieties unless otherwise specified. All plant materials are to conform in size and grade as specified under the current edition of ANSI Z60.1 "American Standard for Nursery Stock." The current edition of "Hortus Third" shall be the authority for all plant names.
- B. All plants shall be freshly dug at time of delivery and nursery grown unless otherwise specifically permitted, and shall have been growing for at least two years prior to award date of the contract within the state of Maryland.
- C. All plant materials shall have normal, well developed branches and a vigorous root system. They shall be healthy, vigorous plants free from defects, decay, disfiguring roots, sunscald injuries, abrasions of the bark, plant diseases, insect pest eggs, borers, and all forms of infestations or objectionable disfigurements. Plant materials that are weak or which have been cut back from larger grades to meet certain specified requirements will be rejected.
- D. Shade and flowering trees are to be symmetrically balanced according to their normal habit of growth. Shade trees of standard variety shall have a single leader and shall be branched as indicated on the plans. Major branches shall not have V-shaped crotches capable of causing structural weakness. Trunks shall be free of unhealed branch removal wounds greater than a one inch diameter. Evergreens are to be full foliage, specimens of mature growth. Deciduous shrubs shall be well furnished with branches and have ample, well balanced root systems capable of sustaining vigorous growth. Vines and ground cover shall have been growing for at least three months in the size of container specified.
- E. Prior to digging, plant materials will be inspected by the landscape architect. Plant material grown in fields or blocks which show evidence of containing any parts (seeds, rhizomes, roots) of Johnson Grass or Canada Thistle will not be accepted. An approval of material on such inspection shall not be construed as an acceptance of it. The plant materials will again be inspected at arrival on the subject site. Material arriving with broken seals, broken or loose balls, insufficient protection of roots or top, shriveled dry or insufficiently developed roots or which are weak and thin, or damaged or defective or which do not comply with the specifications will not be accepted. All container grown plants shall be well rooted, vigorous and established in the size container specified, shall have well balanced tops for the container size, and shall not be root bound.
- F. Plant materials, represented by each shipment, invoice, or stock order shall be declared and certified free from disease of any kind. All necessary inspection certificates to the effect which are required by law for the necessary interstate or interdistrict transportation shall accompany each shipment, invoice, or order of stock.

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- G. All tree pruning shall conform to the current edition of the National Arborist Association's "Pruning Standards for Shade Trees".
  - H. Roots from trees shall conform to the standard root formation from that species. Major roots will be spot checked at the nursery and when planted. If roots are poorly formed or located too deep, the tree will be rejected. See spec section 3.03 A-8.

### 1.03 SUBMITTALS

- A. Within thirty days of the Notice-to-Proceed, the Contractor shall submit in writing an itemized list of sources of all plant items and shall give all necessary assistance when inspections are made by landscape architect. The Contractor shall keep his list of plant sources to a minimum; the cost of plant inspection and tagging trips in excess of the Contractor's initial source list shall be deducted from his invoices. Representative samples of every shipment of plant materials shall be labeled as to genus, species, and specified size. No substitutions shall be made without the permission of the Landscape Architect.
- B. Provide samples of all products listed in Part 2 of this Specification Section for testing and visual inspection.

### 1.04 HANDLING AND PROTECTION

- A. All plant materials shall be dug immediately previous to the shipment. Special precautions shall be taken to avoid any unnecessary injury to, or removal of, fibrous roots. Each species or variety shall be handled and packed in the approved manner for that plant, having regard to the soil and climatic conditions and the time that will be consumed in transit or delivery. All precautions that are customary in good trade practice shall be taken to insure the arrival of the plants at the destination in a good condition for successful growth.
- B. All plants which are required to be balled and burlapped prior to shipment are designated B&B in the itemized list of plant materials. Balled and burlapped plants shall be lifted so as to retain as many fibrous roots as possible. The burlap shall be firmly held in place by wrapping of cord or wire. No imitation or artificial burlap materials shall be used on any plant.
- C. Ball diameters and depths shall be in conformance with ANSI Z60.1 and the dimensions given therein are the minimum which will be accepted and apply to the nursery plants only. Oversized and exceptionally heavy plants are acceptable at no increase in cost to the Administration.
- D. On receipt of nursery stock at the site, the Contractor shall notify the Engineer. All plant shipments shall be accompanied by an invoice, furnished to the Engineer, giving detailed description of the plant materials and the date of shipment.
- E. Immediately following the delivery and inspection at the site, all plants with exposed roots shall be heeled-in in moist soil and in a manner satisfactory to the Engineer. All plants heeled-in shall be properly maintained by the Contractor until planted.
- F. All rejected material shall be immediately removed by the Contractor.
- G. The balls of B&B plants shall, if not immediately planted after delivery and inspection, be adequately protected from heat, cold, and wind by covering until removed for planting, in a manner appropriate to the conditions and satisfactory to the Engineer. The Contractor shall, in loading, unloading, or handling of plants, exercise utmost care to prevent injuries to the branches and roots of the plants. The solidity of the balls of B&B plants shall be carefully preserved. Plants with exposed roots which are being transported to and from "heel-in," being distributed in planting beds, or awaiting planting after distribution, shall have their roots protected from drying by

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means of "puddling," if necessary. The means employed shall be satisfactory to the Engineer, and shall depend on weather condition and the length of time the roots must remain out of ground.

**PART 2 – PRODUCTS:**

2.01 PLANT MATERIALS

- A. Plant materials are defined as trees, shrubs, ground cover, vines, ornamental grasses, and plants of all descriptions.
- B. Collected plant material shall mean plants which are not nursery grown. No plant material shall be collected unless specifically indicated. Collected material shall be dug with a ball of earth and burlapped with the minimum diameter for nursery grown stock.

2.03 SOIL

- A. Typical Amended Soil: See Planting Soil specification 02205, section 2.1.
- B. Tree Pit and Planting Soil Mix: See Planting Soil specification 02205, section 2.2

2.04 ORGANIC COMPOST

- A. Organic compost shall be composted leaves as prepared by the Maryland Environmental Service and subject to approval by the landscape architect.

2.05 UREAFORM FERTILIZER

- A. Shall be 38-0-0 (ureaform). Ureaform fertilizer shall be commercial grade conforming to all State and Federal regulations and the Standards of the Association of Official Analytical Chemists.

2.06 SUPPLEMENTAL FERTILIZER

- A. The fertilizer shall be a slow release type contained in a perforated polyethylene bag with micropore holes for controlled feeding. Each bag shall contain four ounces of water soluble fertilizer analysis 16-8-16 minimum per unit to be effective for approximately eight years.
  - 1. Minimum guaranteed analysis: 16-8-16
  - 2. Total Nitrogen (N): 16% comprised of 9% Ammonical Nitrogen (NH<sub>3</sub>PO<sub>4</sub>) and 7% Nitrate Nitrogen (NO<sub>3</sub>N)
  - 3. Available Phosphoric Acid (P<sub>2</sub>O<sub>5</sub>): 8% from Ammonium Phosphate (NH<sub>4</sub>PO<sub>4</sub>)
  - 4. Soluble Potash (K<sub>2</sub>O): 16% from Potassium Chloride (KCL)
  - 5. Potential Acidity equivalent to 850 lbs. Calcium Carbonate (CaCO<sub>3</sub>) per ton.

2.07 MYCORRHIZAL FUNGI

- A. Shall be live beneficial mycorrhizal fungi formulated for the inoculation of transplanted trees, including a water management gel.
- B. Shall be "DIEHARD" as provided by Horticultural Alliance, inc. or approved equal.

2.08 MULCHING MATERIAL FOR PLANTING

- A. Mulching material shall be shredded bark from hardwood trees which has been milled and screened to a maximum 2 inch particle size. When placed, the mulch shall provide a uniform texture. The shredded hardwood bark shall not have been subjected to any conditions that would shorten its life or lose any of its value as a mulch. Mulching material shall be free from leaves, twigs, wood shavings, sawdust, toxic substances, and any foreign materials.

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2.09 PLANTING ACCESSORIES

- A. Vertical Stakes: Vertical stakes shall be rough sawn straight grain oak or other wood approved by the Engineer, reasonably free from knot holes, bark, wane, warp, and splits, as determined by the Engineer.
- B. Staking Wire: Staking wire shall be either number 12 or 14 gauge, new annealed galvanized wire.
- C. Wrapping Material: Wrapping material for trees shall be a waterproof duplex kraft paper crinkled to 33<sup>1</sup>/<sub>3</sub>% stretch, in strips 4 inches to 6 inches wide.
- D. Twine: The tying material to be used in wrapping trees shall be jute twine, not less than two ply, as approved by the Engineer.
- E. Rubber Hose: Rubber hose for all trees shall be 5/8" or 3/4" black corded hose or approved equal.
- F. Water: All water for plants shall be obtained from fresh water sources and shall be free from injurious chemicals and other toxic substances harmful to plant life. No water which is brackish will be permitted at any time. The Contractor shall identify to the landscape architect all sources of water prior to use. The Contractor shall not use any water from any source which is disapproved by the landscape architect.
- G. Insecticide: A landscape architect - approved chemical which will provide protection against pests.

**PART 3 – EXECUTION:**

3.01 GENERAL

- A. Planting Season
  - 1. All plant material shall be planted according to the following planting season schedule:

Deciduous Material:	March 1 to June 1
	October 1 to December 15
Evergreen Material:	March 15 to May 15
	August 31 to November 15
Ornamental Grasses	March 1 to May 15
	September 15 to November 1
  - 2. The periods above may be extended or reduced according to weather and soil conditions at the time and at the discretion of the Landscape Architect. The Contractor shall use his best judgment when scheduling the planting of deciduous and evergreen plant material, either B&B or containerized. Preparations for planting may begin earlier than the specified seasons, provided the staking of plant locations has been approved.
- B. Subsurface Conditions
  - 1. When utility lines are encountered or other subsurface conditions in plant pits are otherwise unsuitable for the particular varieties of plants to be planted, as determined by the Engineer, he will direct that the plants be relocated in satisfactory locations.
  - 2. Test Pits: Test Pits shall be excavated, when directed by the Engineer, and shall be a size necessary to locate and identify existing utility facilities or other obstructions.
- C. Backfilling and Seeding Abandoned Planting Pits

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1. When the landscape architect directs that any plant pit be abandoned after it is partially or fully excavated, due to conditions which were not reasonably determinable prior to excavation, the Contractor shall backfill the pit with the excavated soil, in well compacted in 8 inch deep layers, and finished by re-spreading the stripped topsoil to the compacted finished grade. Unsuitable material shall be removed from the project. The disturbed area shall then be prepared, seeded and mulched or sodded, as directed and to the satisfaction of the landscape architect.

### 3.02 TYPICAL GROUND PREPARATION

#### A. Laying Out and Starting Work

1. The Contractor shall provide the stakes and stake out the locations of all plant pits and the outlines of all planting areas and beds as shown and detailed on the plans. No excavation or cultivation shall be started until the locations and outlines have been approved by the landscape architect.
2. Planting beds shall mean beds which are specified to be cultivated, edged, prepared, and finished as specified. Individual pits shall be excavated for each plant within planting beds.
3. Planting beds shall have all existing vegetation removed to the limits indicated on the plans. These planting bed areas are then to receive two inches of organic compost spread upon their surfaces, followed by rototilling to a depth of six inches. The beds shall then be raked to create uniform surfaces acceptable to the Landscape Architect prior to either planting or mulching operations.
4. Rocks greater than 1-1/2 inches in any dimension, debris, roots and root mats, and weeds shall be removed from the site after raking.

#### B. Excavation for Planting:

1. All pits shall be excavated as indicated on the plans; the bottoms of pits shall be horizontal. If augers or backhoes are used for excavation, the sides of the pits shall be scarified by a means acceptable to the Engineer.
2. All plant pits shall be excavated to two times the root ball diameter.
3. Planting pit diameters may exceed the minimum diameters indicated at no additional cost.
4. The Contractor shall use amended soil for backfilling plant pits. Shrubs which are located within planting beds do not require additional amended soil for backfilling.
5. Plant pits shall be backfilled with the amended soil within twenty-four hours of excavation.

### 3.03 PLANTING

#### A. General

1. No plants shall be planted until they have been inspected as specified under Article 1.02. All seals and tags shall remain intact unless otherwise directed by the landscape architect.
2. Planting shall be in conformance with the planting details included in the Contract Documents. All root balls shall be placed on undisturbed soil at the bottom of the pit
3. All planting pits shall be deep enough to assure that 1/8 of the ball height is above the existing grade. Any loose soil at the bottom of the pit shall be compacted by hand or with the bucket of a backhoe. Compaction shall be sufficient to support the plant without future settlement.

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4. Balled and burlapped plants and containerized plants shall be set vertically upon the bottom of the pits and the amended soil shall then be filled in around the plant balls to half the depth of the balls and tamped. The remaining burlap around the plant balls shall be loosened and spread out away from the plants, or if it is too bulky, cut away and removed. Thereafter, complete the backfilling. All rope or cord shall be completely removed from the root balls and disposed off site. When wire baskets are present, the Contractor shall bend or cut the basket so no portion extends above finished grade.
  5. Containers shall be carefully removed from potted plants prior to planting.
  6. Every care shall be taken during the backfilling, tamping, and watering to avoid injuring the roots and to avoid air pockets. Any roots which are found to be bruised or broken before or during planting shall immediately be pruned to sound tissue with a clean cut.
  7. Watering shall mean full and thorough saturation of all backfill in the pits the day the plants are planted. Water shall be applied only by an open end hose and at a very low pressure. When planted and watered, the plants shall be vertical and the ball shall have 1/8 of its height above finished grade.
  8. Random root inspection will take place at the nursery and once the tree is planted. Major roots will be measured 4" from the trunk to assure that the major roots are within 1" of the surface. Trees found to be planted too deep or too high will be raised or lowered to an acceptable level without cost to the owner.
  9. Upon completion of planting, the outline of the planting beds shall be neatly edged, except on lower edge of planting beds on slopes where a three inch depth shoulder of amended soil or excavated topsoil shall be placed.
  10. Individual plant pits shall be furnished with a shoulder of soil placed outside the rim of the pits to form a saucer over the entire area of the pits. Trees on flat areas must be shouldered with amended soil or excavated soil. Trees on slopes may be shouldered with excavated soil with a minimum of two inches of amended soil placed over the excavated soil. On all slopes, the soil shall be formed into an adequate compacted dam or shoulder on the downhill side to catch and hold water and avoid erosion, and the slope on the uphill side shall be properly regraded, all as detailed on the plans and to the satisfaction of the Engineer. All disturbed slopes, shoulders, dams, or other damaged areas shall be seeded and repaired to the satisfaction of the Engineer at no cost to the Administration.
- B. Supplemental Fertilizer
1. Supplemental fertilizer shall be used at the discretion of the Contractor.
  2. Fertilizer packets shall be placed in the plant pits around the root balls following the manufacturer's written instructions.
  3. If and when it becomes necessary to remove and replace dead or unhealthy plants as specified under Article 3.05, Care and Replacement During Construction, care shall be exercised so as not to damage the packet when removing the dead tree or planting the replacement. Any packet which may become damaged shall be promptly removed, along with any loose fertilizer in the plant pit, and shall be replaced with a new packet.
- C. Mycorrhizal Fungi
1. Mycorrhizal fungi and a water management gel shall be placed in tree planting pits only. Place the materials around the root balls following the manufacturer's written instructions.

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- D. **Mulching Material:** All planting beds and pits shall be mulched with mulching material. The mulching material shall be spread to a depth of three inches over the entire area of all plant pits, including the saucer rim, and all planting beds. The mulch shall be raked to an even surface to the limits as indicated on the plans, or as directed by the Engineer. All mulch shall be applied within three days after planting.
1. Prior to the application of mulch within a planting bed, 10 pounds of 38-0-0 ureaform fertilizer per 1000 square feet shall be evenly spread over the area to be mulched.
- E. **Staking for Typical Planting:**
1. Typical deciduous trees shall be staked with vertical stakes. All stakes shall be installed within 24 hours of the day the trees are planted and as detailed on the plans. Stakes shall be neat and secure, and shall evenly support the trees to the true vertical line.
    - a. Deciduous trees less than 3 inch caliper shall have two eight foot stakes.
    - b. Deciduous trees between 3 inch and 4 inch caliper shall have three eight foot stakes.
    - c. Evergreen trees 4 feet to 6 feet in height and all minor deciduous trees more than six foot in height shall have two stakes 5 to 8 feet long.
    - d. Evergreen trees greater than 6 feet in height shall have three stakes 5 to 8 feet long.
  2. In driving stakes, the Contractor shall avoid damage to the branches of the trees, particularly evergreen and low branched minor trees. All stakes shall be driven just outside the ball and to solid bearing below the pit bottom.
  3. Wires shall be covered with hose where in contact with trunk and branches shall be wrapped two full turns and around the stakes and secured so the tree is held firm and vertical. Tops of stakes shall be neatly trimmed to the proper height when so required.
- F. **Staking for Tree Pits and Planters**
1. For evergreen trees in planters follow typical staking section E above.
  2. For trees surrounded by tree grates, cast eye bolts into the concrete below the tree grate frame so as to not interfere with the placing of the frames or grates. Provide four anchors per tree pit in 4 foot square with tree trunk in the middle.
  3. Tie wire to eye bolts and pass wire through tree grate. Tie to tree trunk in typical fashion.
  4. Tie white surveying tape to wire, 2 feet apart, two per wire (8 per tree).
- G. **General Pruning**
1. Trees and shrubs shall be pruned after inspection on the site and as directed by the landscape architect with care being taken to preserve the natural appearance of the shrub or tree. Deciduous trees shall be pruned after inspection on the site and before planting. Broken or badly bruised branches shall be removed with a clean cut. The pruning shall be done by skilled personnel in accordance with best horticultural practice, appropriate to the type of shrub or tree and to the special requirements of the individual shrub or tree
- H. **Wrapping**
1. Wrapping shall be performed at the discretion of the Contractor. Any consequences due to the elimination of the wrapping will be the sole responsibility of the Contractor.
  2. Immediately before wrapping is installed, the trunks shall be thoroughly wetted with an approved insecticide for borer control applied with a brush and daubed into all cracks and crevices in the bark.

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3. The wrapping shall be tied at places including the bottom, middle, and top with not more than two feet intervals between ties. The wrapping shall be done before staking, but not before the condition of the tree trunks have been inspected and approved by the Engineer. Wrapping material shall be maintained in place until final acceptance of the Contract.

### 3.04 CLEAN-UP AFTER PLANTING

- A. During the course of planting, excess and waste material shall be continuously and promptly removed, the turf areas kept clear, and all reasonable precautions taken to avoid damage to existing structures, plants, and grass. When planting in an area has been completed, the area shall be thoroughly cleaned. All debris, rubbish, subsoil, and waste materials shall be cleaned up and removed from the property. Existing turf areas which have been injured by the work shall be regraded and seeded or sodded, and the entire area, when completed, shall be neat and clean to the satisfaction of the Engineer.

### 3.05 CARE AND REPLACEMENT DURING CONSTRUCTION

- A. The care and replacement of planting shall begin immediately after each plant item is satisfactorily completed as specified under Article 3.03, Planting, and shall continue during the entire life of the Contract. During such time, the Contractor shall do work which is necessary to establish and keep the plants in a healthy, thriving condition.
- B. The Contractor shall water all plant pits and beds during the life of the Contract. The Contractor shall manually apply water to all plant material, in the following quantities, until the irrigation system is operational. Minimum quantities of water for each manual watering are as follows:
 

1. Deciduous trees	20 gallons per pit
2. Evergreen trees	15 gallons per pit
3. Shrubs	2.5 gallons per pit
4. Ornamental Grasses	40 gallons per 100 square feet
5. Ground cover	50 gallons per 100 square feet
6. Vines	1 gallon per pit

All plant pits and beds not serviced by the irrigation system shall be watered manually, throughout the life of the Contract, in the quantities identified above.
- C. The Contractor shall monitor the water needs of all plants throughout the life of the Contract. When the Contractor feels manual watering is necessary, the Engineer shall be notified for his concurrence and approval. All manual watering shall be accomplished using an open end hose. Water shall be applied at a low water pressure directly to each plant pit, allowing water to be absorbed into the plant pit soil until saturated, but without runoff.
- D. All plants, plant saucers, and all planting beds, including those on steep slopes, shall be weeded of all weeds, vines, and grasses, at three to four week intervals during the growing seasons throughout the life of the Contract, or as otherwise directed by the Engineer. Each weeding shall be completed within five working days of the day on which weeding was designated to begin. The Contractor may request in writing the use of herbicides, approved by the Engineer, for the control of weeds and grasses. The Contractor shall prune and spray plants, and repair washouts when and as directed by the Engineer.
- E. All dead or unhealthy plants shall be promptly removed from the project; if this occurs during the planting season, these plants shall be replaced at once; if between planting seasons, they shall be replaced within thirty days of the start of the next proper planting season. Plants that have sizable die-back beyond the normal pruning limit, as deter-

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mined by the Engineer, shall also be replaced. If and when plant replacements are made, mulching material shall be replaced to its original specified depth at no additional cost to the Administration.

3.06 PARTIAL ACCEPTANCE

- A. To be partially acceptable, each new planting shall be true to name and size, and in a healthy, thriving condition. Each plant pit or bed shall be properly filled and mulched, pruned, staked, and wrapped.

3.07 ONE YEAR CARE AND REPLACEMENT PERIOD

- A. A ONE - YEAR care and replacement period shall commence after all plant material has been installed and has received partial acceptance as specified in Article 3.06.
- B. The one-year care and replacement period will require the Contractor to properly and adequately care for all plant material from partial acceptance through final acceptance as specified in Article 3.08. This work will include weeding as specified in Paragraph 3.05.D.
- C. At the end of the one-year care and replacement period all new plants, including replacement plants, shall be true to name and color and shall be in a healthy, thriving condition, with foliage of normal density, size, and color. Any plants which fail to meet these requirements shall be removed and replaced without additional payment. All replacements for the new plants shall be of the size, kind, and quality as specified for the original plants.
- D. Time is an essential element in the establishment of plant materials, and it is important that care and replacement operations be vigorously prosecuted until completion, as the failure to complete this work within the designated time limits can result in unsatisfactory plant establishment and unsatisfactory future performance of the plants.
- E. Thirty days prior to the end of the one-year care and replacement period, the Contractor shall notify the landscape architect in writing when, in the Contractor's opinion, all work has been satisfactorily completed and the final cleaning-up performed.
- F. The Contractor shall remove all stakes, wires, hose, and plastic seals from all plant material which have been in place one full year. All these planting accessories shall be disposed off site to the satisfaction of the landscape architect.

3.08 FINAL ACCEPTANCE

- A. Final acceptance by the Landscape Architect will be contingent on compliance with the requirements of Articles 3.05, 3.06, and 3.07. If the landscape work is not acceptable to the Landscape Architect, the Contractor shall replace the rejected work and continue specified maintenance until reinspected by the Landscape Architect and found to be acceptable.

3.09 OTHER

- A. The Contractor shall be responsible for replacing any plant material stolen or vandalized before the Partial Acceptance inspection is held with no additional cost. Any live plant material stolen or vandalized after the Partial Acceptance inspection shall be replaced by the Contractor and paid for at the unit price for the item.

**END OF SECTION**